



Food and Agriculture
Organization of the
United Nations



International
Plant Protection
Convention

Banana bunchy top disease (BBTD)

Biology, identification and surveillance

Africa Phytosanitary Programme

(APP) Phase 2 · Train-the-Trainer workshop
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Co-organized by:



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Outline

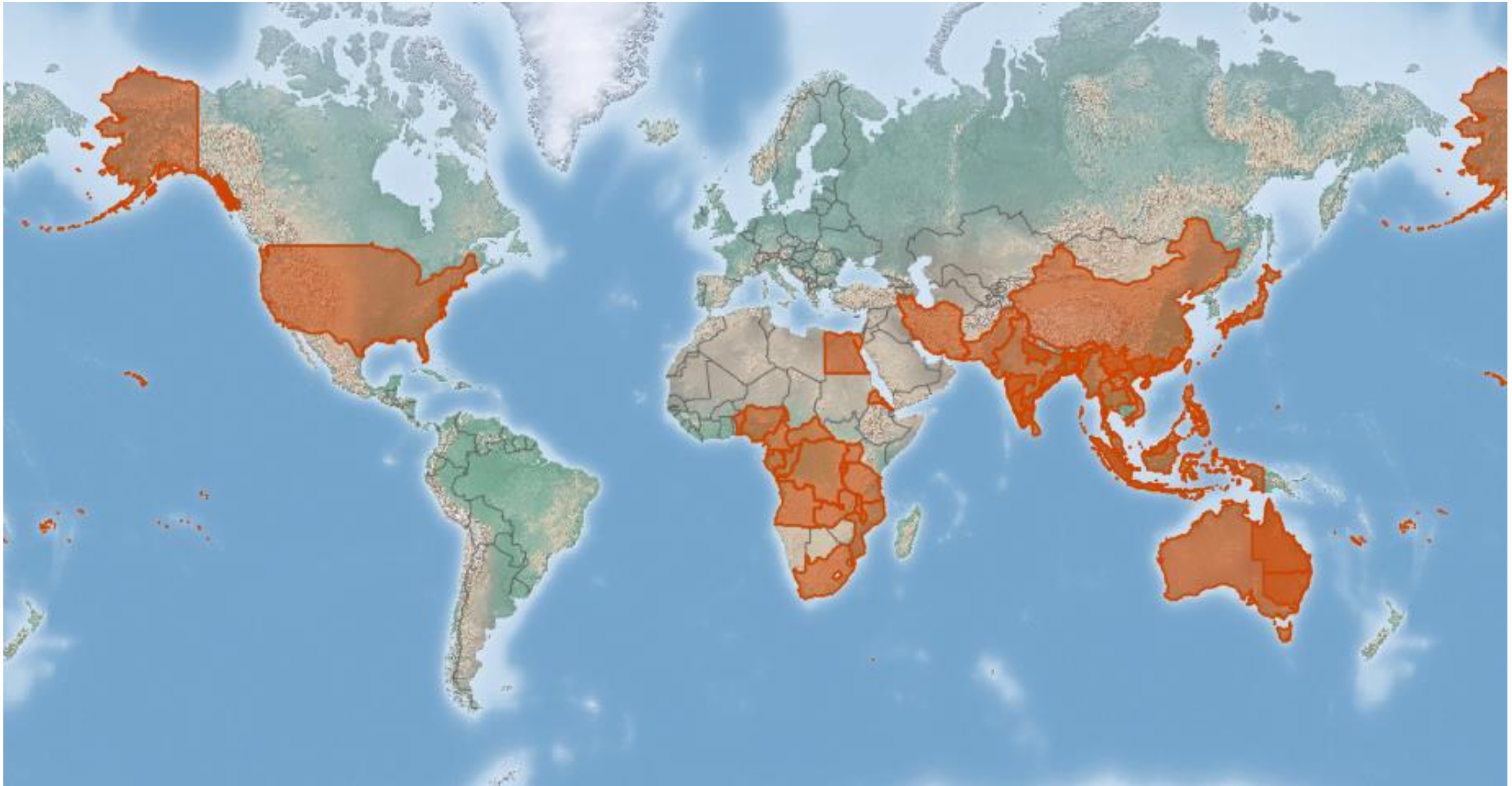
- **Banana Bunchy Top disease**
 - History and Distribution
 - Biology and Ecology of BBTV
 - Symptoms
- **Factors driving BBTV spread**
- **BBTV economic importance**
- **Surveillance protocol**
- **BBTV diagnosis**

Banana Bunchy top disease (BBTD)

- BBTD (caused by BBTV) is the most serious virus disease of bananas and plantains.
- BBTV is listed by Invasive Species Specialist Group (ISSG) as one of the world's 100 worst invasive alien species.
- It was first reported from the Fiji Islands in 1889, but its causal agent was not identified until nearly 100 years later.
- The first record of BBTD in Africa was from Egypt in 1901.
- BBTD was first discovered in SSA in the 1950s from Kisangani region (now DRC).



BBTD global distribution

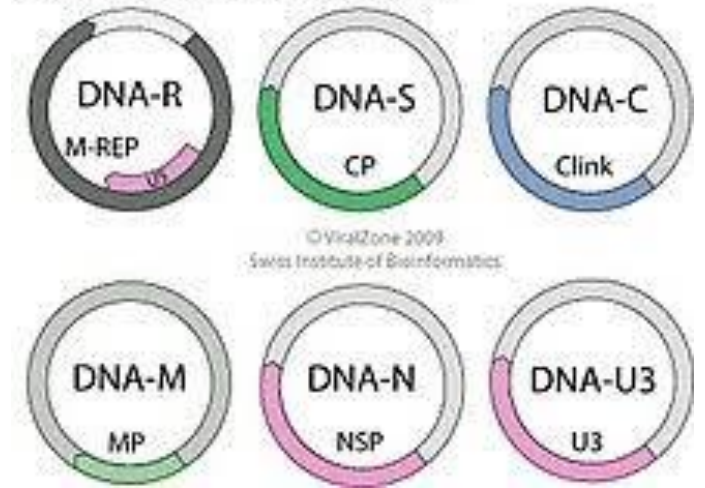


CABI, 2025

BBTV Taxonomic Tree

- Domain: Virus
 - **Group:** ssDNA viruses
 - **Family:** Nanoviridae
 - **Genus:** Babuvirus
 - **Species:** Banana bunchy top virus

BBTV genomic components

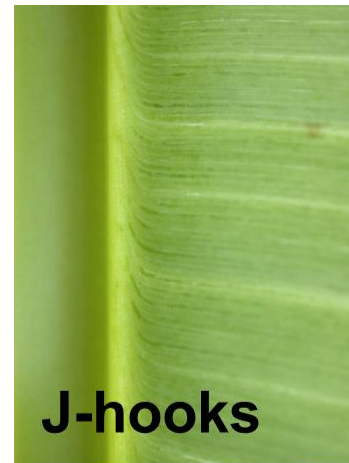


Biology and Ecology of BBTV

- BBTV is transmitted in a persistent, circulative, non-propagative manner by the banana aphid, *Pentalonia nigronervosa*, which has worldwide distribution.
- Following aphid inoculation, symptoms generally do not appear until a further two or more leaves have been produced.
- The virus is also spread through infected planting material.
- **Not** transmitted by mechanical inoculation
- All banana cultivars are thought to be susceptible, with no known sources of resistance.
- BBTV is systemic
 - 100% transmission have been observed through new 'eyes' (meristematic growing points) even in a plant that had only been expressing symptoms for 2-3 weeks.
- Suckers produced on an infected stool generally develop severe symptoms

Symptoms

- **Emerging leaves grow upright and have a stunted, bunched appearance.**
- **New leaf emerges smaller and narrower with brittle, yellow edges.**
- Dark green streaks found on the central midrib, secondary veins and the pseudostem.
- Dwarfism in banana plant is also significant.
- In severe cases, leaf stalk/midrib turn dark green and become brittle.

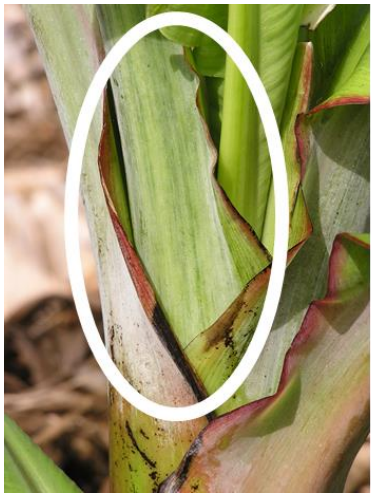


J-hooks



Morse code

Leaf veins “green J-hooks” near the midrib and “Morse code” **dots-and-dashes**.



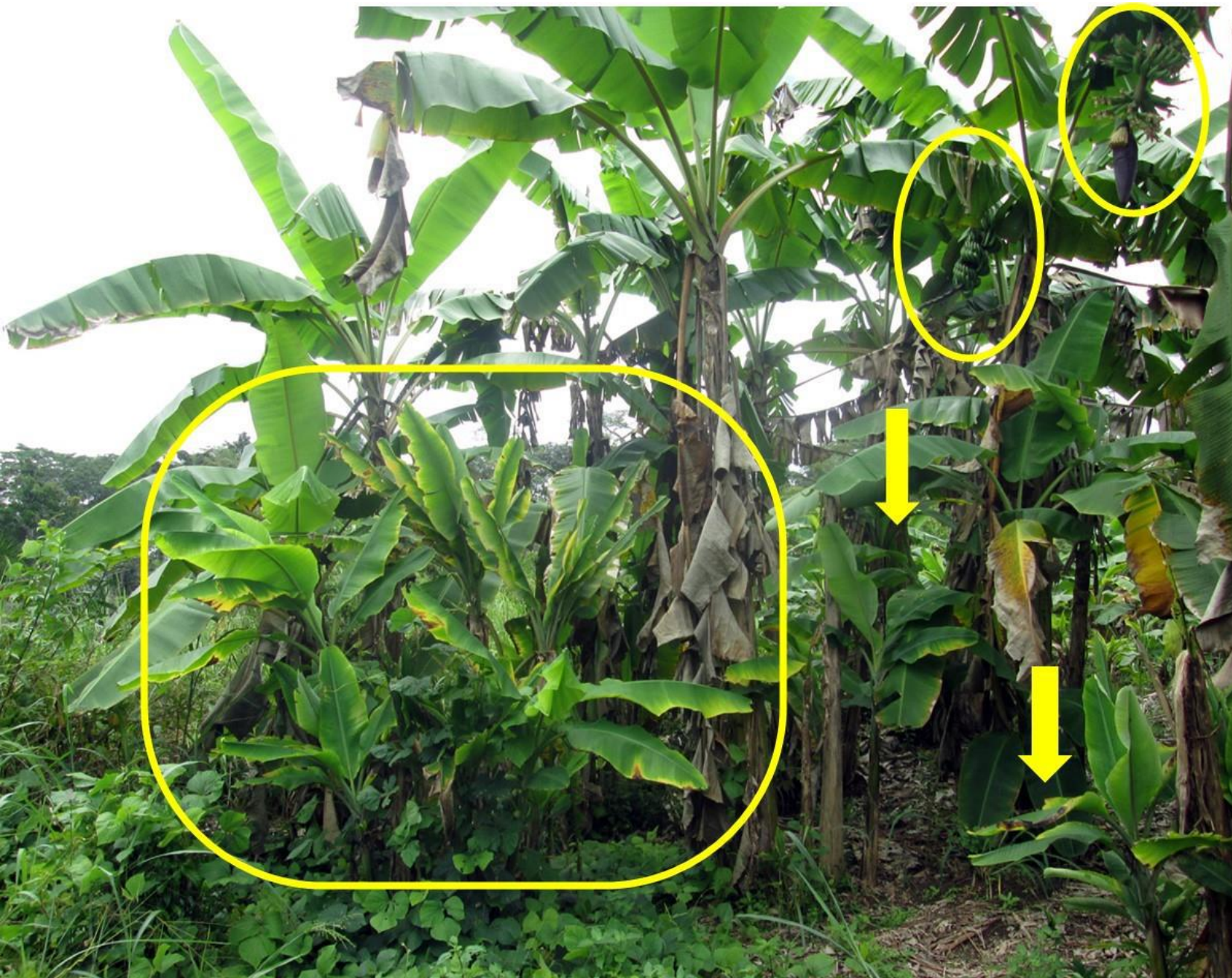
Petioles and flowers may be **mottled** and **streaked**



Diseased

Healthy











Factors driving BBTV spread



- Human movement of planting material seems to be the main contributing factor for the long-distance spread .
- Introduced infected planting materials served as the source for further virus spread by vectors and reuse of planting materials
- Aphid vectors involved in the short-distance spread and within-field spread



BBTV economic importance



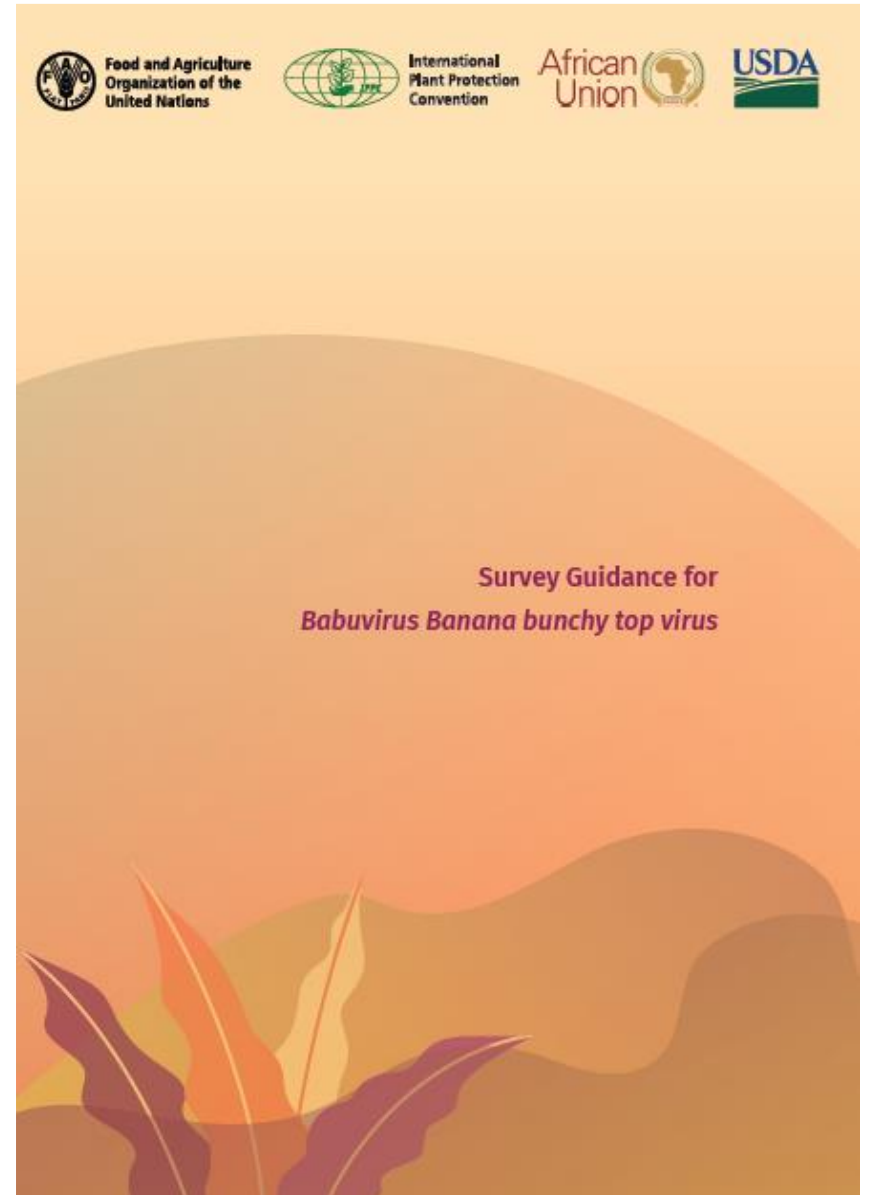


March 2024



December 2024

Survey protocol



Survey site selection

Primary Goal: Enable early **detection** and prevention of BBTD **spread** and assess the extent of potential **outbreaks**

Target Areas for Sampling

☐ Farmers' Fields/Facilities:

- Select farms based on geographic distribution
- Focus on areas with higher banana production
- Consider areas bordering countries where BBTD has been reported
- Landscaped areas, or natural areas with wild banana plants.

☐ Imported Consignments:

- Target shipments of banana plants and plant materials at ports of entry
- Intercepted consignments
- Check profiled risky consignments in customs databases

Time of survey

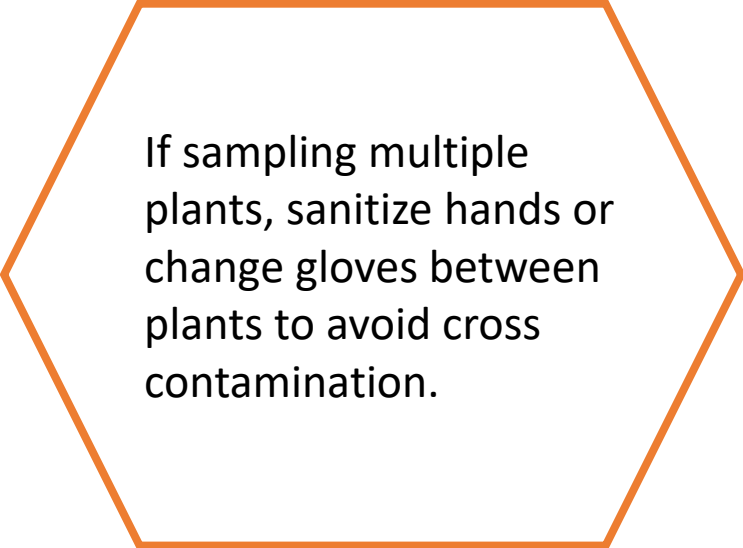


- Survey can occur whenever leaves are present, but for visual inspection young leaves are more likely to express symptoms of the disease.



Sampling and sample collection

- Visually inspect plants for BBTD symptoms
- Select the 3rd (third) leaf from the top of the plant, not counting the youngest unfurled "cigar leaf"
- Cut a section from the center of the leaf, including the midrib. Submit the leaf lamina and the midrib together.
- Place and wrap the sample with dry paper towels, place it into resealable sample bag.
- Remove air from bags before sealing.
- Keep samples cool and dry in an ice chest, but do not freeze
- Label the sample with farm details, place it in a cooler box for dispatch to the laboratory.
- Collected samples can be dispatched daily through courier to the testing laboratory
- A filled sample submission form should be sent to the test laboratory



If sampling multiple plants, sanitize hands or change gloves between plants to avoid cross contamination.

BBTV Lab Diagnosis

- ELISA
- PCR has proved to be about one thousand times more sensitive than ELISA or dot blots with DNA probes
- Isothermal assays such as Loop-mediated Isothermal Amplification (LAMP) and Recombinase Polymerase Amplification (RPA) assays have been developed.

**Africa
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Thank you



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