Development and promotion of agricultural biotechnology capacity to tackle plant virus diseases for food security and growth income

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Background

•Plant virus diseases are responsible for major economic losses in the agricultural industry. It has been estimated that plant viruses can cause as much as 50 billion euros loss worldwide (Vicente et al., 2018)

•Advanced agricultural biotechnology researches that include development of reliable diagnostic tools, the use of natural or engineered host resistance remain crucial to ensure control of virus diseases

•Though techniques exist for plant virus disease diagnostics, there is a need to continue developing, expanding and promoting the role of disease diagnostics to contribute in reducing plant virus spread and associated yield losses

•Here we present:

1.a recent in-situ hybridization (ISH) assay that we developed for detection and localization of *cassava brown streak virus* (CBSV) in infected Plant tissues

2. The orientations for development and promotion of Agricultural Biotechnology capacity to tackle plant viruses

Findings from use of RNA scope Technology

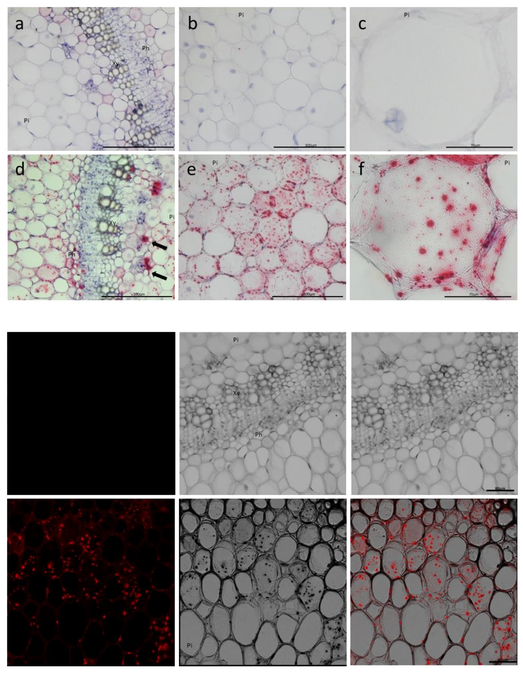


Figure 1. Localization of CBSV-Mo83 RNA in cross-sections of *Nicotiana rustica* stem tissues. (A) Acquisitions using light microscopy. Upper images: tissue from healthy control plants. Lower images: tissue from plants infected with CBSV-Mo83. Abundant presence of viral RNA in cells is visualized as single red dots or dots merged into signal clusters (arrows)..

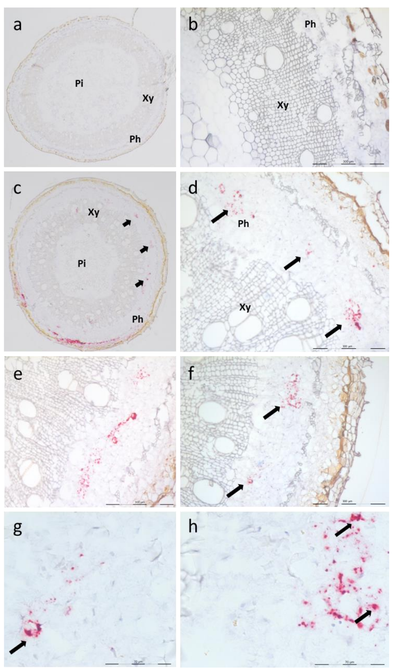
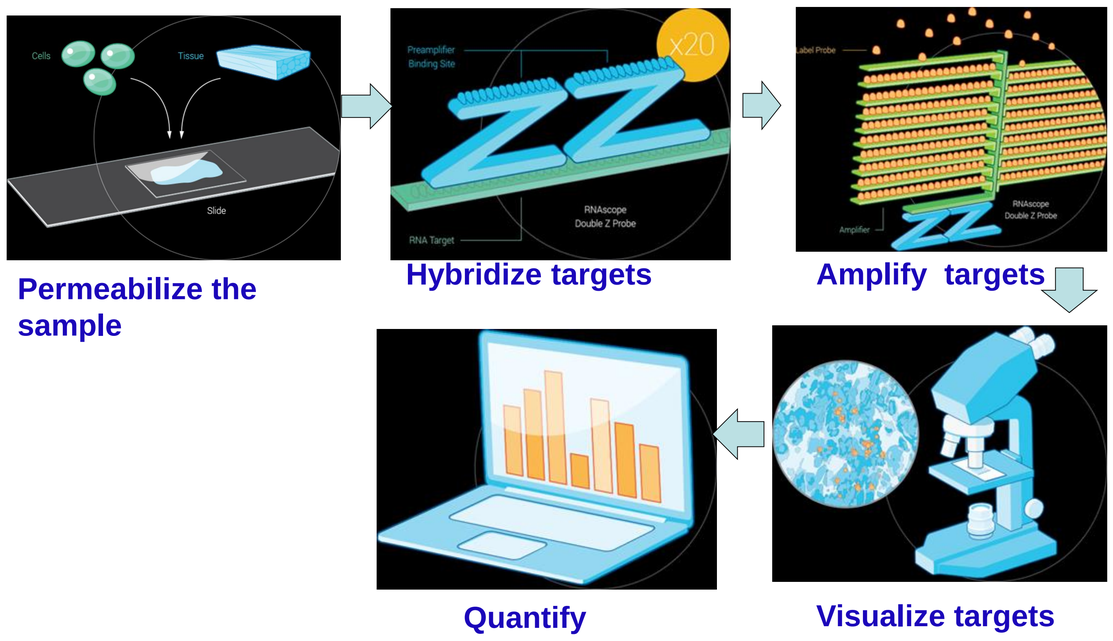


Figure 2. Localization of CBSV-Mo83 RNA in cross-sections of cassava stem tissues. Sections from a control healthy plant (a,b), stem sections from a CBSV-Mo83-infected cassava (c-h). Red dots indicate hybridization of the probes to viral RNA..

RNA scope technology : Methodology for in situ hybridization of targets



Permeabilize the sample

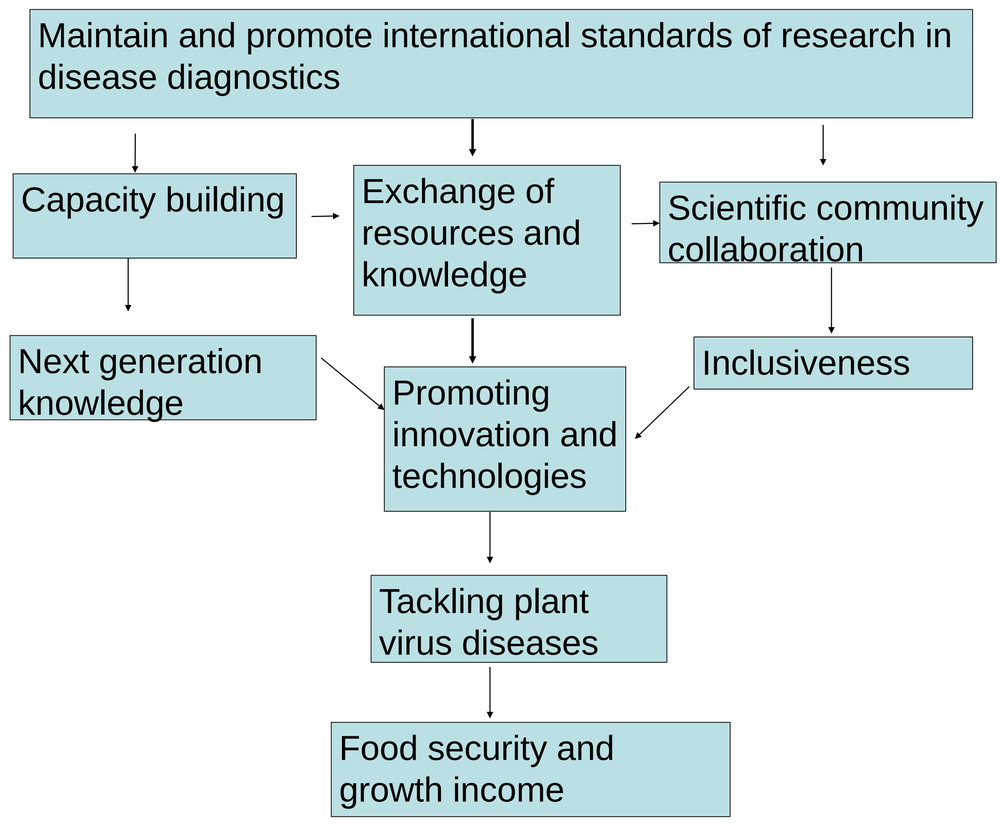
Hybridize targets

Amplify targets

Quantify

Visualize targets

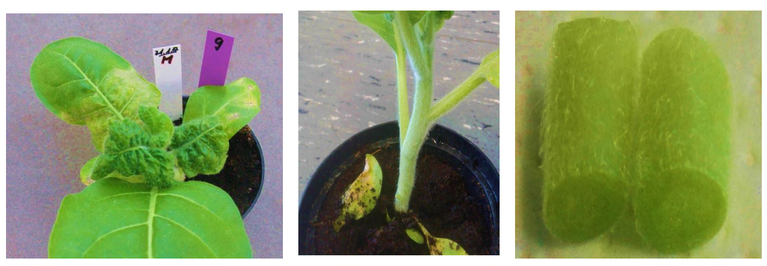
Orientations for development and promotion of Agricultural Biotechnology capacity to tackle plant viruses



Experimentation

Plant material

***Nicotiana rustica*: 14 days post inoculation with cassava brown streak virus (isolate Mo 83)**



Cassava TME7: 5 months of infection with cassava brown streak virus Mo 83

Sample preparation

Fixation (Formalin) → **Embedding (Paraffin)** → **Sectioning (10 µm)** → ***In situ* Hybridization**

Conclusions

- **The *In situ* hybridization assay developed based on RNAscope technology offers opportunity for precise determination of the viral RNA localization in infected host tissues and provide an increased disease diagnostic sensitivity.**
- **The promotion of agricultural biotechnology capacity will contribute to sustainable agriculture transformation and thus food security and growth income**

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