TECH OFFER

# DNA Test Kit for On-site Diagnostics of Tropical Crop Diseases

## KEY INFORMATION

TECHNOLOGY CATEGORY:
Life Sciences - Agriculture & Aquaculture

TECHNOLOGY READINESS LEVEL (TRL): TRL7
COUNTRY: SWITZERLAND
ID NUMBER: TO175082

## OVERVIEW

Fast crop disease management is important to ensure sustainable production. Many tropical crops suffer from infectious diseases that spread and kill plantations. Previously, new land had to be allocated to replant crops in disease-free areas. This is now more challenging because land conversion implies deforestation. Thus, one way to improve the metrics of both production and sustainability is by testing for infection before moving the non-infectious material (i.e. in nurseries). However, as PCR testing in tropical countries is more challenging due to logistics and other factors, testing on-site would be a preferred option.

This technology is a unique, portable, self-administered DNA detection kit to be used directly on-site to test for the DNA of the pathogen (virus, fungus etc.). Developed in Switzerland, the technology has already shown one use case for cocoa testing in West Africa and is shipped in the country without a cold chain.

## TECHNOLOGY FEATURES & SPECIFICATIONS

- The average development time needed to create a custom DNA test kit to fit a specific crop disease is 4 weeks.
- The developed kit will encompass sample preparation, isothermal amplification, and detection with a small device capturing data, timestamp and GPS location.
- Simple to use, with no technical equipment or methods: no spin-columns, no centrifuges, no thermo-cycler, no gel electrophoresis. A non-technician can pick up the skillset in a day.
- Average hands-on time with the DNA test kit is 5 minutes and results can be obtained within 1 hour.
- After sample preparation, the device has been shown to be robust enough to tolerate agitation (e.g. moving car in a jungle), minimising waiting time on-site.

## POTENTIAL APPLICATIONS

- The technology can be applied in
    - Integrated Pest Management
    - Breeding - identifying DNA markers for beneficial traits of novel varieties
    - Commodity Trading - predicting crop harvest quantities, for companies working with tropical crops like cocoa, coffee, tea, rice, banana or cassava.
- Test data aggregation/intelligence services can also be developed to support efforts in development of novel breeds/varieties, deployment of novel agro-forestry protocols, production of pathogen-free planting material, longer term yield forecast from identification of asymptomatic infected farms and sale of precision chemicals (biostimulants, fertilizers, pesticides) based on test result evidence.
- The DNA testing technology, in theory, applies also to animal diseases (i.e. aquaculture). This market area has not been developed by the company but can be explored on a preliminary basis.

## MARKET TRENDS & OPPORTUNITIES

- Paradigm shift in the food industry, with customers expecting to see displays of sustainability, welfare, quality and ethics – to help inform and validate their food choices
- Global movement to hold food companies accountable for their supply chains has uniquely positioned testing, inspection and certification as a core solution that can be achieved with this technology.
- According to the Food and Agriculture Organization (FAO), plant diseases cost the global economy around $220 billion each year. There is a significant upside potential to expand the technology capabilities to other identified growth markets

## UNIQUE VALUE PROPOSITION

- Test done on-site in tropical areas (temperature, humidity) without strict cold chain which traditional methods like PCR require, allowing for first mile testing.
- Early detection of infections in asymptomatic crops reduces the disease impact on production yield and sustainability metrics (less deforestation)