Block 2 Poster 9

One-stop shop for cassava phyto-sanitation: from *in-situ* diagnostics, stake disinfection to grower education

RESEARCH PROGRAM ON Roots, Tubers and Bananas

CGIAR

CIAT 50 1967-2017

TECHNOLOGY DESCRIPTION

Over the past decade, a number of pests and diseases have made their arrival in Southeast Asia and have come to affect the region's cassava crops. One major threat to Asia's cassava sector is a systemic phytoplasma disease, termed **cassava witches' broom disease (CWB)**. Currently recorded from >60% SE Asian cassava plots at field-level incidence levels up to 80-100%, CWB disease is impacting **millions of smallholder farmers and cassava-based industries** by causing yield drops of 30-35%, low-quality planting material, and reductions in starch content of harvested roots. With no curative solutions at hand and a total absence of disease-free planting material, farmers rely on *roguing* or crop elimination as their sole management tactic. The often-asymptomatic nature of the disease makes it difficult for farmers to detect the disease and to select healthy planting material.

Our particular innovation is three-fold, comprising new application of technology, rapid diagnostics and educational components. Phytoplasma pathogens are highly heat-labile, and our innovation consists of the **targeted application of heat** to disinfect CWB-affected cassava stem cuttings (so-called '*thermotherapy*'). Next, a low-cost, portable device will be employed for **real-time disease diagnostics**, based on loop-mediated isothermal amplification (LAMP). Lastly, innovative, **video-based extension** will be used to teach cassava farmers about disease symptomatology, prevention or control.

This **"one-stop shop"** allows for *a)* rapid diagnostics through molecular screening, *b)* delivery of healthy planting material, *c)* on-site farmer training in CWB disease control.

A witches' broom infested field in Bohol, Philippines

A thermotherapy device in Cali, Colombia

END USERS & BENEFITS

The goal of this technology is to be accessible and functional for **small- & medium-scale farmers** as well as **producers of planting material** to detect CWB, learn about disease management, and to inexpensively mass-produce clean materials. The principal beneficiaries will be:

(i) Over 8 million cassava farmers who require low-cost, sustainable management systems to protect against biotic threats.

(ii) Private sector, including cassava processors and input providers, who will realize savings through enhanced yields and higher starch contents.

SCALING STRATEGY

A number of possible scaling avenues exist to enable growth, financially and operationally, outside of initial funding:

1. **Public**: Government and grass-roots organizations can help roll out video-based education campaigns and promote disinfection tactics, e.g., through established extension offices, radio or television.
2. **Commercial**: CWB directly impacts profitability of local agro-industrial operations. Private sector actors thus may be inclined to deploy thermotherapy devices, facilitate the distribution of disinfected planting materials or finance farmer education programs.
3. **Hybrid**: Combined public x private scaling approaches could be pursued.

LEVEL OF ADOPTION OR USE

Short-term Goal (2017-18)

* One thermotherapy device provides clean planting material to approx. 1,000 farmers;
* Drastic reduction (>50%) in the CWB infection rate within and across approx. 500-1,000 cassava fields;
* Changed behavior of local cassava farmers, and specifically adoption of highly-improved disease mitigation measures;

Long-term Scaling Potential (2020-23)

Smallholder farmers across SE Asia, who are vulnerable to plant-borne diseases. **In initial target countries (i.e., Vietnam, Philippines), between 1 and 1.5 million farmers can be reached**.

CRITICAL GAPS AND NEXT STEPS

1. **Field testing and implementation** of min. 1 thermotherapy device
2. **Trouble-shooting & (technical/financial) viability assessment** of the device & multi-media extension package
3. **Develop** a multi-media extension package on CWB prevention & control
4. **Refine a full-fledged scaling plan**, covering CWB-outbreak areas throughout the Asia region

KEY PARTNERS FOR SCALING

Public sector (*NARI, NGOs, international partners*): trouble-shooting & validation of thermotherapy innovation, detection kit and extension program, roll-out of extension program

Private sector (*San Miguel, Vietnam Cassava Assoc.*): financing disinfection station, distribution planting material, facilitation education campaigns

Cassava farmers lining up outside a starch factory in western Laos

An educational cartoon on selection criteria for clean planting material, and CWB prevention

LOGOS

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