

## Fast Tracking of Certified Seed Potato Through the Use of Field Deployable LAMP Assay

### Seed Potato Certification in Kenya

Seed potato certification standards have zero tolerance for bacterial wilt (caused by *Ralstonia solanacearum*) leading to rejection of an entire potato field for seed. The current seed potato certification process involves traditional laboratory processes in the diagnosis of the bacterial wilt pathogen. This is time consuming and costly due to use of techniques such as isolation of bacteria on agar plates, ELISA tests with or without enrichment, and DNA based PCR detection. The ability to detect *Ralstonia* strains at ports of entry and in the field environments for seed potato quality assurance and certification processes with adequate sensitivity, reliability and speed, will not only improve efficiency of seed certification process and seed quality control mechanisms but also reduce the cost of the certification process. Thereby, increasing the availability of affordable certified seed.

### Field Deployable-LAMP Assay for *Ralstonia* Detection

**Table 1. Comparison of LAMP assay over alternative tests for bacterial wilt disease diagnostic tools, ELISA, PCR and qPCR**

Diagnostic tools	On-site testing <sup>1</sup>	Time to get results (hours) <sup>2</sup>	Cost per 100 samples (USD) <sup>3</sup>	Strain specificity <sup>4</sup>
<b>LAMP</b>	Yes	0.3-1	300	Very high
<b>ELISA</b>	No	48	250	Low
<b>PCR</b>	No	5	700	High
<b>qPCR</b>	no	2	1000	Very high

<sup>1</sup>Testing on potato fields on the farm or at point of entry (quarantine control), with handy instrument

<sup>2</sup>From receiving samples to getting test results for decision making. Current turnaround time for ELISA is at least a week

<sup>3</sup>Excluding labor costs which is significantly higher than LAMP, e.g., ELISA

<sup>4</sup>Detection of the entire RSSC strains or specific for potato brown rot (sequevar 1) strains

Field-deployable LAMP assay for *Ralstonia* diagnosis without extensive resources is in high demand to enable agricultural support services to better manage the diseases. The International Potato Center (CIP) in collaboration with the Kenya Plant Health Inspectorate Service (KEPHIS) has validated the cost-effective LAMP assay for the detection of *Ralstonia* from potato stem, leaf, tuber and soil.

The field deployable LAMP assay has a significant advantage over the standard ELISA and PCR tests in suitability for on-site diagnosis (be it farmers field or point of entry), the time it takes to get results (0.30 to 1 versus 2-48 hours), workflow simplicity, specificity of *Ralstonia* strains detected, and comparable cost with ELISA (**Table 1**). Deployment of LAMP assay requires far less expertise than ELISA, PCR and qPCR assays. Medium

to large scale seed producers can easily integrate LAMP assay into self-assessment of their seed quality because of its simplicity.



Figure. Field testing of potato stem and tuber, and soil samples for bacterial wilt disease using field deployable LAMP assay in GENE II device

Field deployable LAMP assay has the potential to be adopted for seed potato quality assurance and certification purposes. Use of the assay by national phytosanitary authorities and private diagnostic clinics will be affordable for farmers due to decreased cost for seed certification, shortened protocols and processes involved. Indeed, it will improve the efficiency of seed potato certification processes and seed quality control mechanism increasing the availability of certified seed. Increased accessibility of certified seed to farmers, both largescale and smallholder, of an assured quality, will positively affect the farming households by reducing their bacterial wilt related losses. In addition, farmers will further benefit from reduced cost for certified seed.

Faster decision-making arising from less than an hour using field-deployable LAMP assay versus 14 days of current practice by KEPHIS would not only help farmers to go for seed or ware market but also encourage small and medium scale producers to become certified seed producers with greater certainty, thus promoting seed sector investment and growth. Certified seed production in Kenya currently meets only 1% of total area planted with potato; few seed merchants produce certified seed potato. Increasing quantities of certified seed is a major priority to improve yields and meet increased food demands.

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