

# SEED YAM QUALITY ASSURANCE

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- 1. Development and adoption of QMP-V2**
- 2. Reinfection studies in seed yam plots**
- 3. Assessment of demonstration plots**
- 4. Yam seed tracker and capacity development**
- 5. Conclusions**

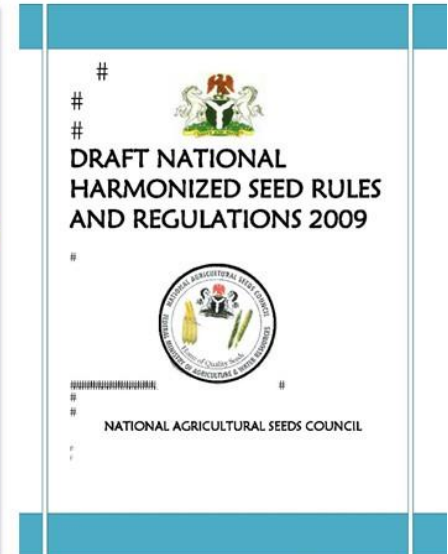
## Conventional yam propagation material (seed)



### Formal Standards

**ECOWAS Certification  
Standards for Root and Tuber  
Plant Seed**

**C/REG.4/05/2008**



**Regulations and quality assurance scheme  
for field propagation of seed yams**



**Laboratory**



**Screenhouse**



- Tissue culture plants
- SAH Plants

- Micro-tuber
- Mini-tuber
- Vine seedlings
- Vine cuttings

# New seed products and certification standards

Production	Technique	Products	Certification standards
Lab	<ul style="list-style-type: none"> <li>• TIBS</li> <li>• Vivipak</li> <li>• SAH</li> </ul>	<ul style="list-style-type: none"> <li>• Plantlets</li> <li>• Microtubers</li> </ul>	X
Screenhouse	<ul style="list-style-type: none"> <li>• Aeroponics</li> <li>• Hydroponics</li> <li>• Single node vine cuttings</li> </ul>	<ul style="list-style-type: none"> <li>• Vine cutting</li> <li>• Vine seedling</li> <li>• Bulbil</li> <li>• Mini-tubers</li> </ul>	X
Nursery	<ul style="list-style-type: none"> <li>• Vine seedlings (year round)</li> </ul>	<ul style="list-style-type: none"> <li>• Mini-tubers</li> </ul>	X
Field	<ul style="list-style-type: none"> <li>• Conventional setts &amp; min-setts (BS, FS and CS)</li> </ul>	<ul style="list-style-type: none"> <li>• Mini-tubers</li> <li>• Tubers (setts)</li> </ul>	✓

## Certification Challenges

- Quality standards for field-based seed production
- Inspection procedures based on ware yam crop cycle
- Many certification parameters unsuitable for new propagation methods
- Objective was to establish new procedures for certification of seed yams from new propagation methods

## Approach

- Product definition
- Parameters and maximum thresholds for quality influencing parameters for inspection and certification
- Drafts standards and stakeholder consultation
- Provision adoption of standards and drafting formal standards





**9 to 10 October 2018**



## **Nigeria**

**29 – 30 Aug 2019**



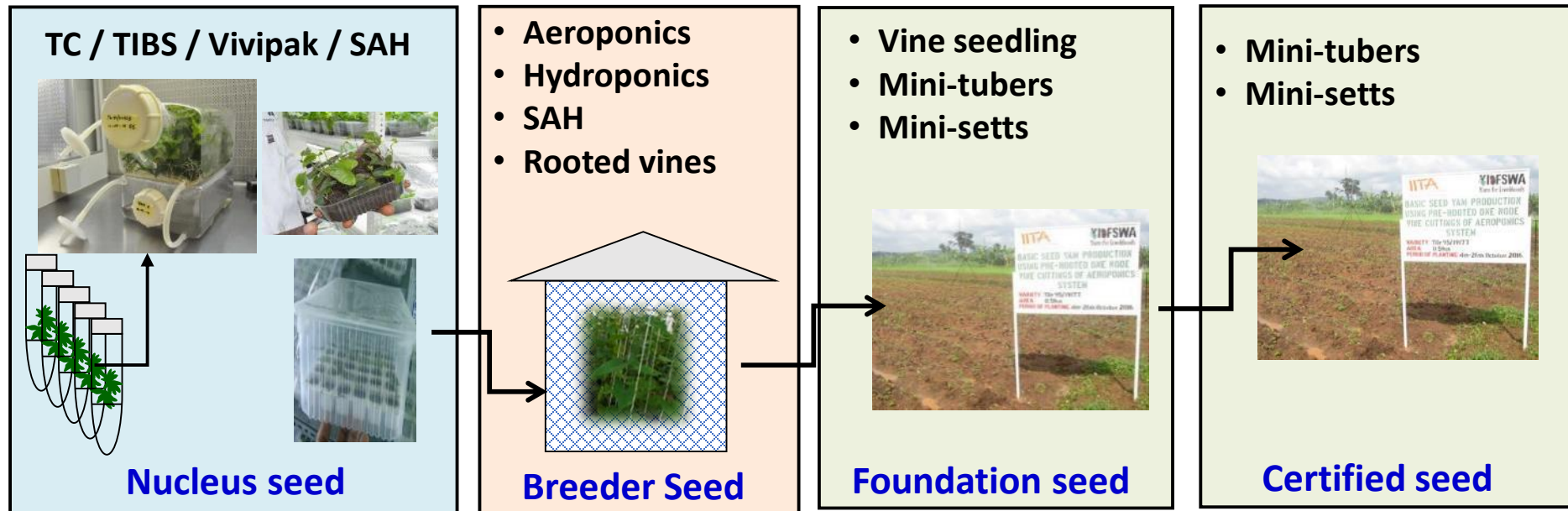
## **Ghana**

**19-20 Aug 2019**

## Product Definition

- **Seed tuber:** Whole seed yam tuber
- **Sett:** Sliced portion of a tuber of about 100 to 250 g
- **Mini-sett:** Sliced portion of a tuber of 30 to 100 g
- **Single node vine cutting:** Unrooted 1 node vines from aeroponics, SAH, Hydroponics and other methods, used for rooting and plant regeneration
- **Vine seedling:** Rooted plants generated from 1 node cut vines under screenhouse
- **Micro-tuber (<0.5 cm to 1 cm in dia):** Tubers of *in vitro* plants and TIBS
- **Mini-tuber (<1 cm to 10 cm dia):** Tubers generated from vivipak, SAH, vine seedlings, aeroponics, hydroponics and bulbil (tuber in leaf axil)

## Certification of seed yams from various methods

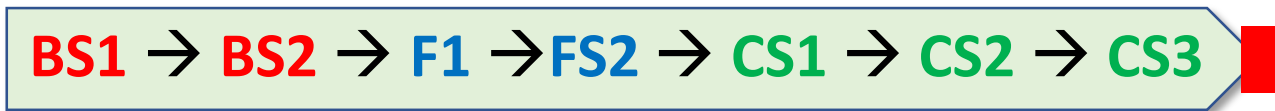


**LABORATORY PROPAGATION**  
**LAB ACCREDITATION**

**SCREEN HOUSE PROPAGATION**  
**SCREENHOUSE ACCREDITATION**

**FIELD PROPAGATION**  
**CONVENTIONAL CERTIFICATION**

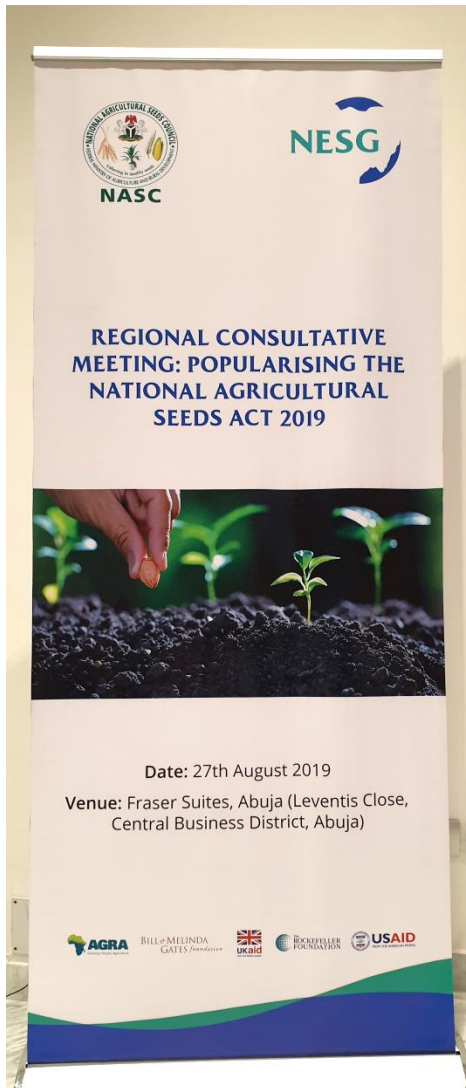
**FIELD PROPAGATION**  
**CONVENTIONAL CERTIFICATION**



## Seed standards

	<b>Nucleus seed</b>	<b>Breeder seed</b>	<b>Foundation seed</b>	<b>Certified seed</b>
<b>Propagation</b>	<b>Lab</b>	<b>Screenhouse</b>	<b>Field</b>	<b>Field</b>
<b>Certification type</b>	<b>Accreditation</b>	<b>Accreditation</b>	<b>Conventional</b>	<b>Conventional</b>
<b>Registration</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Source seed verification</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Inspections</b>	<b>Compliance check</b>	<b>Compliance check</b>	<b>3 inspections</b>	<b>3 inspections</b>
<b>Re-use</b>	<b>Perpetual*</b>	<b>Perpetual (BS1-BS2)</b>	<b>FS1, FS2</b>	<b>CS1, CS2, CS3</b>
<b>Virus</b>	<b>0</b>	<b>0</b>	<b>5% of <math>\leq 2</math></b>	<b>Mean severity <math>\leq 2</math></b>
<b>Anthraxnose</b>	<b>0</b>	<b>Mean severity <math>\leq 2</math></b>	<b>Mean severity <math>\leq 3</math></b>	<b>Mean severity <math>\leq 3</math></b>
<b>Nematodes</b>	<b>0</b>	<b>0</b>	<b>Mean severity <math>\leq 2</math></b>	<b>Mean severity <math>\leq 2</math></b>

## Revised Nigeria Seed Act (2019)



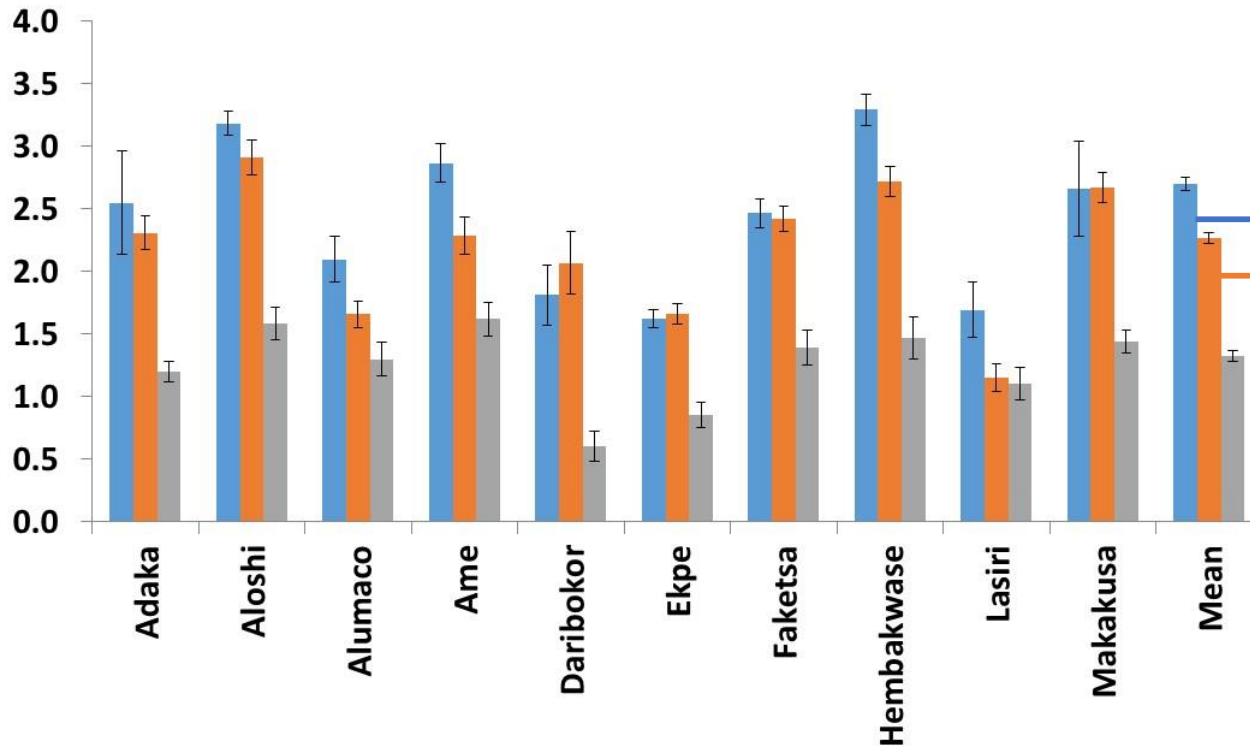
- **Quality assurance of seed produced under lab and screenhouse conditions**
- **Electronic certification (Seed Tracker)**
- **3<sup>rd</sup> Party Certifiers (decentralized system)**

# Understanding Reinfection to Protect Seed Yam Production



- White yam varieties are susceptible to **Yam mosaic virus (YMV)**, a persistent threat to yam in West Africa
- 
- Studies conducted to understand reinfection rates to design protection methods

Mean fresh tuber weight (kg/plant)

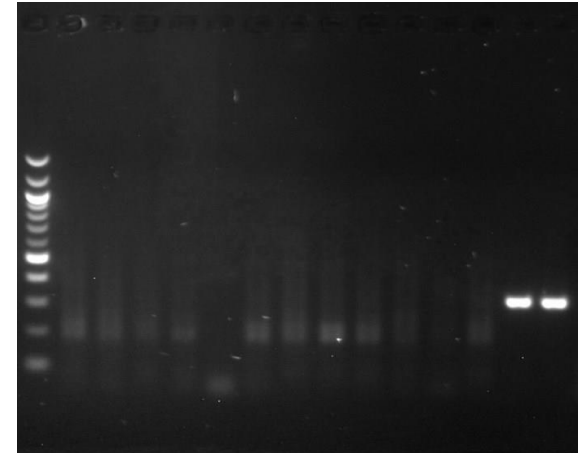


- Mean for 3 year trials (2016-17, 2017-18, 2018-19)
- 40 to 50% yield loss in plants with severe mosaic

## Estimating percent reinfection in a season



**Rooted vine cuttings**



**Virus indexing**



**Field planting**



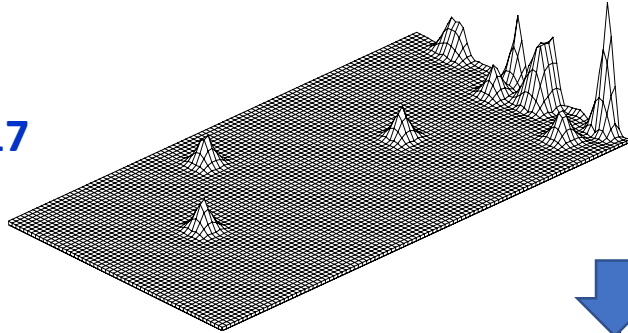
### Assessment

- Symptom severity
- Virus confirmation by RT-PCR / PAS-ELISA
- Semi-quantitative ELISA

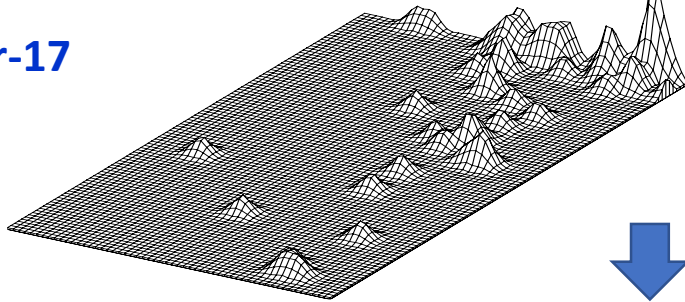


**2016-17** TDr 95/19177

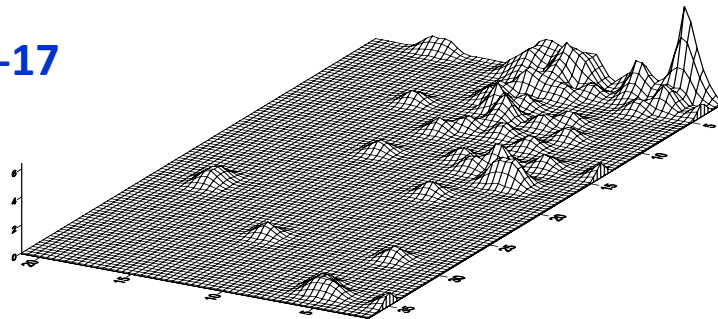
Feb-17



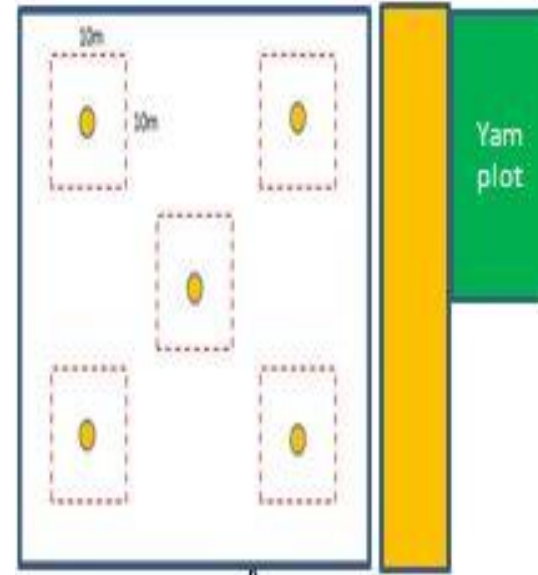
Mar-17



Apr-17

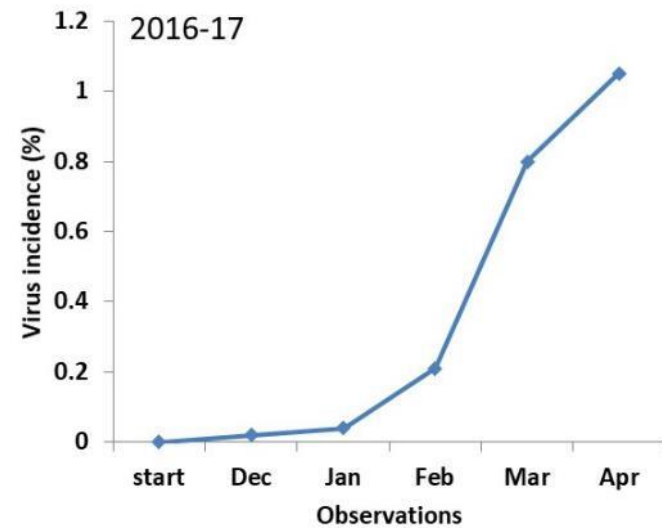


**A**



**B**

**C**

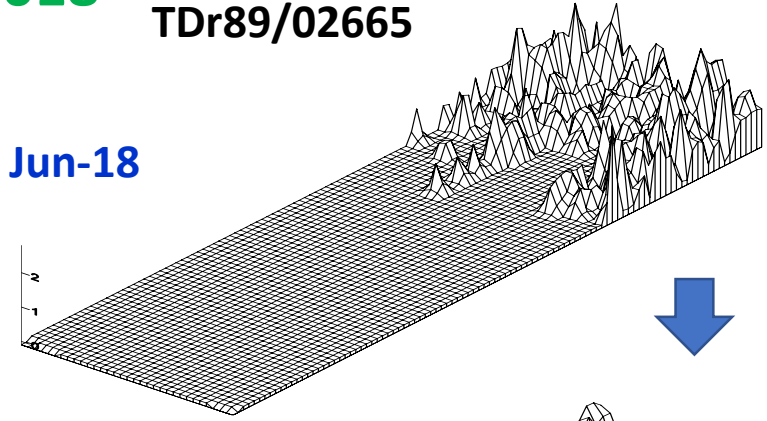




**2018** TDr 95/19177  
TDr89/02665

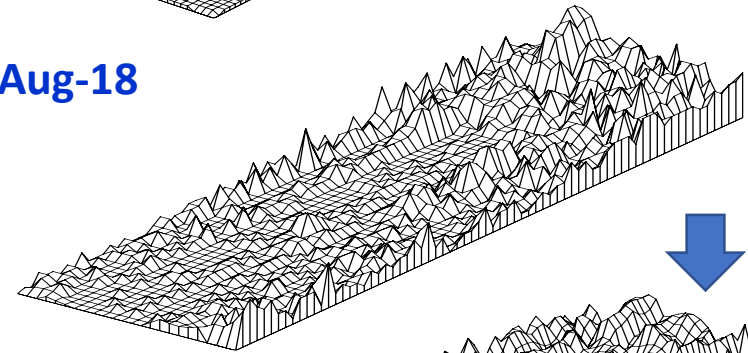
**A**

**Jun-18**



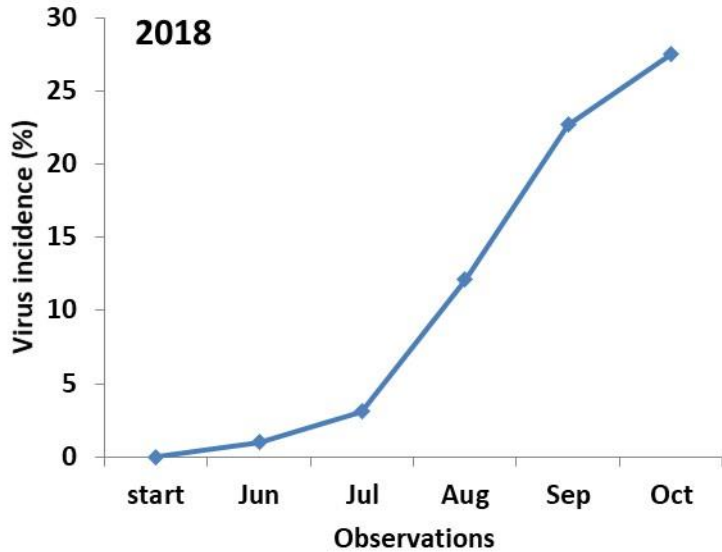
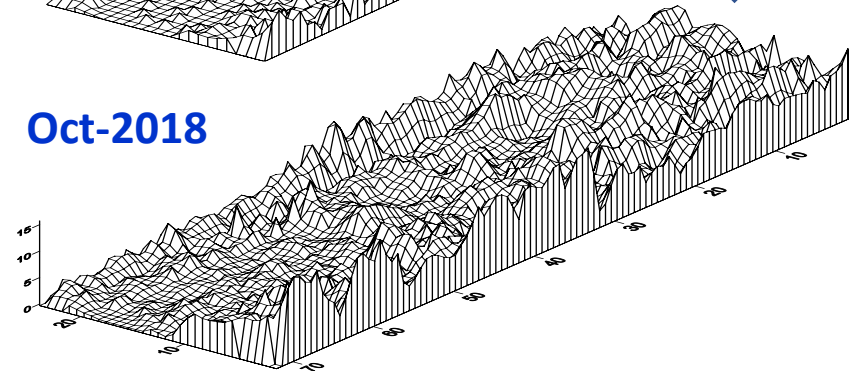
**B**

**Aug-18**

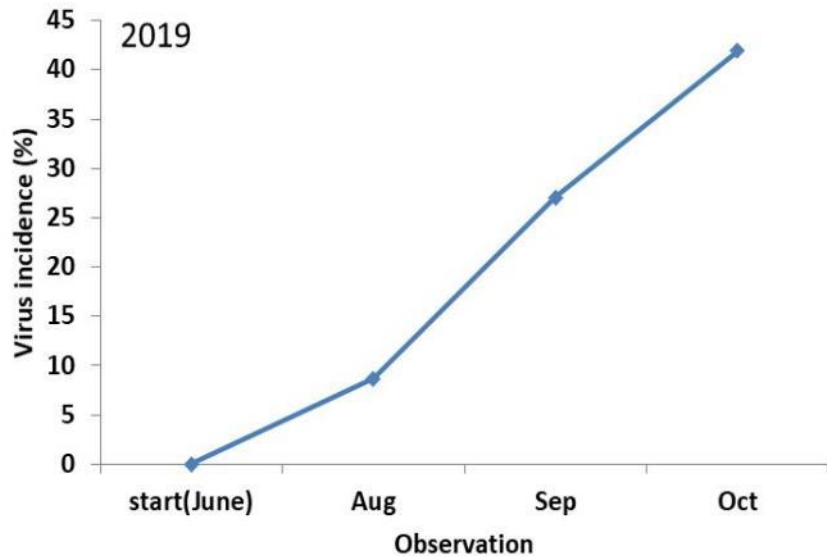
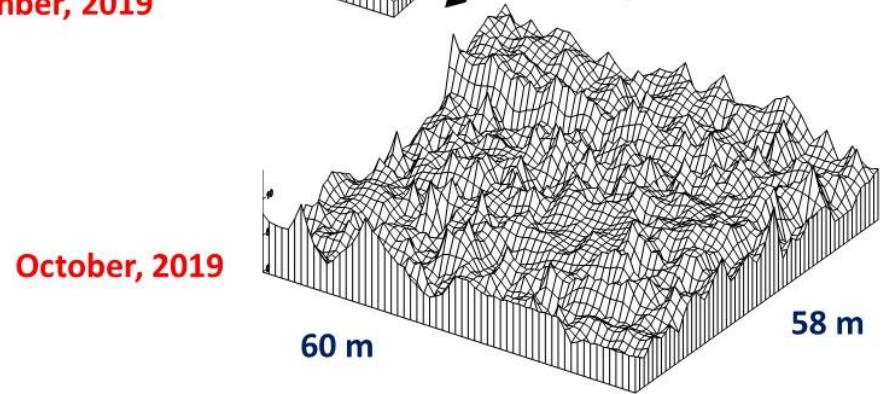
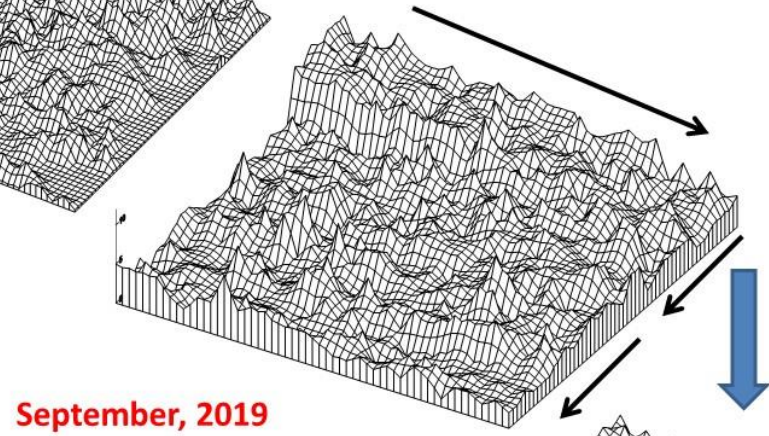
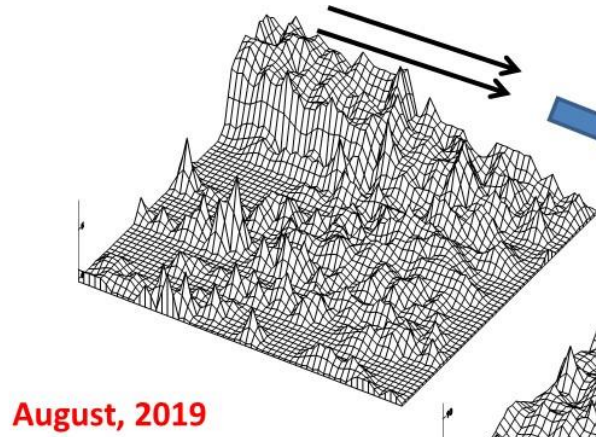
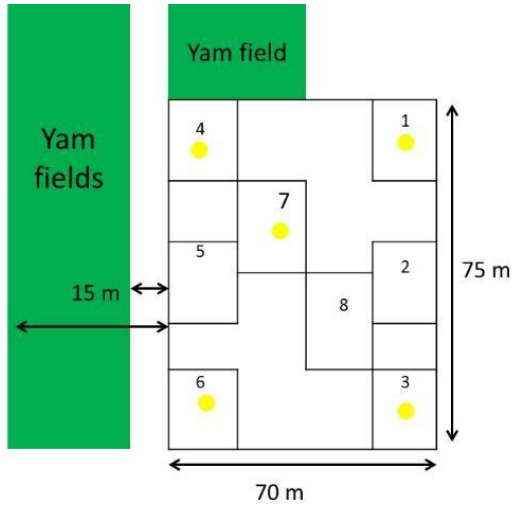


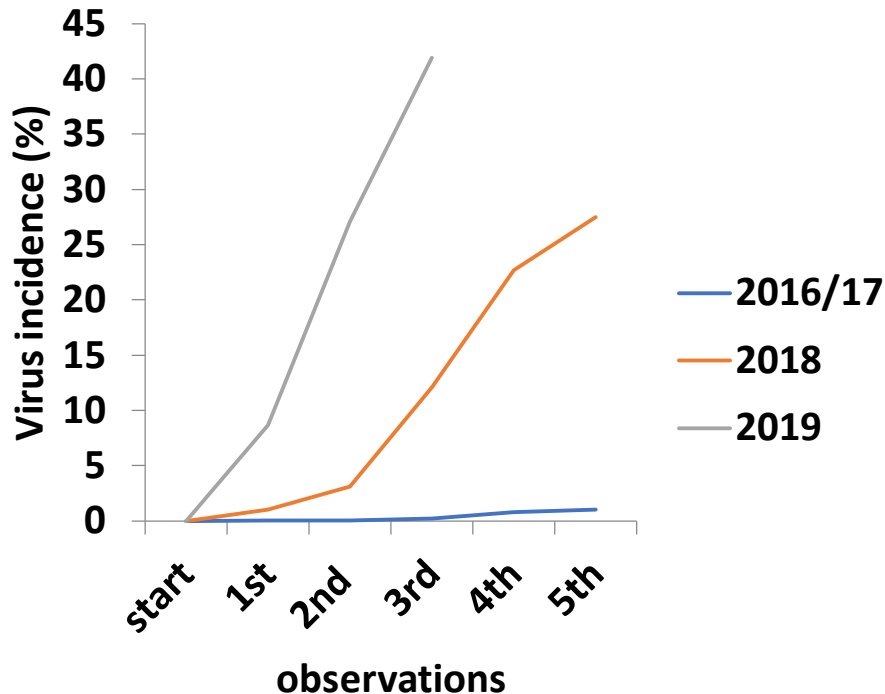
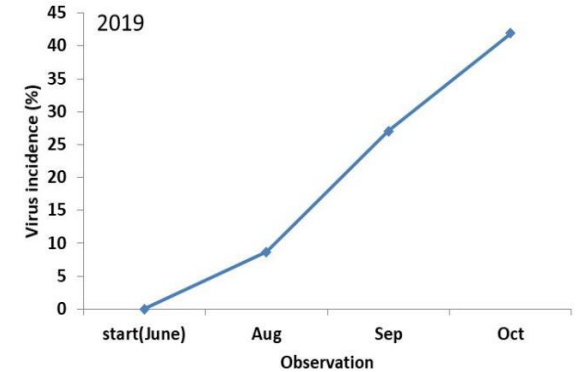
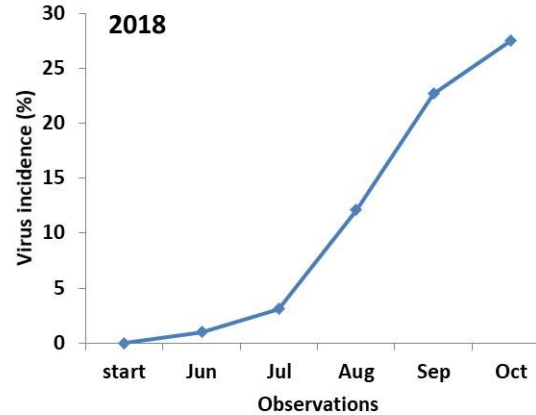
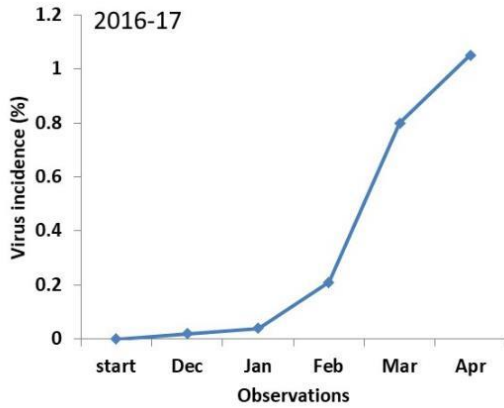
**C**

**Oct-2018**



## 2019 field (TDr95/19177)



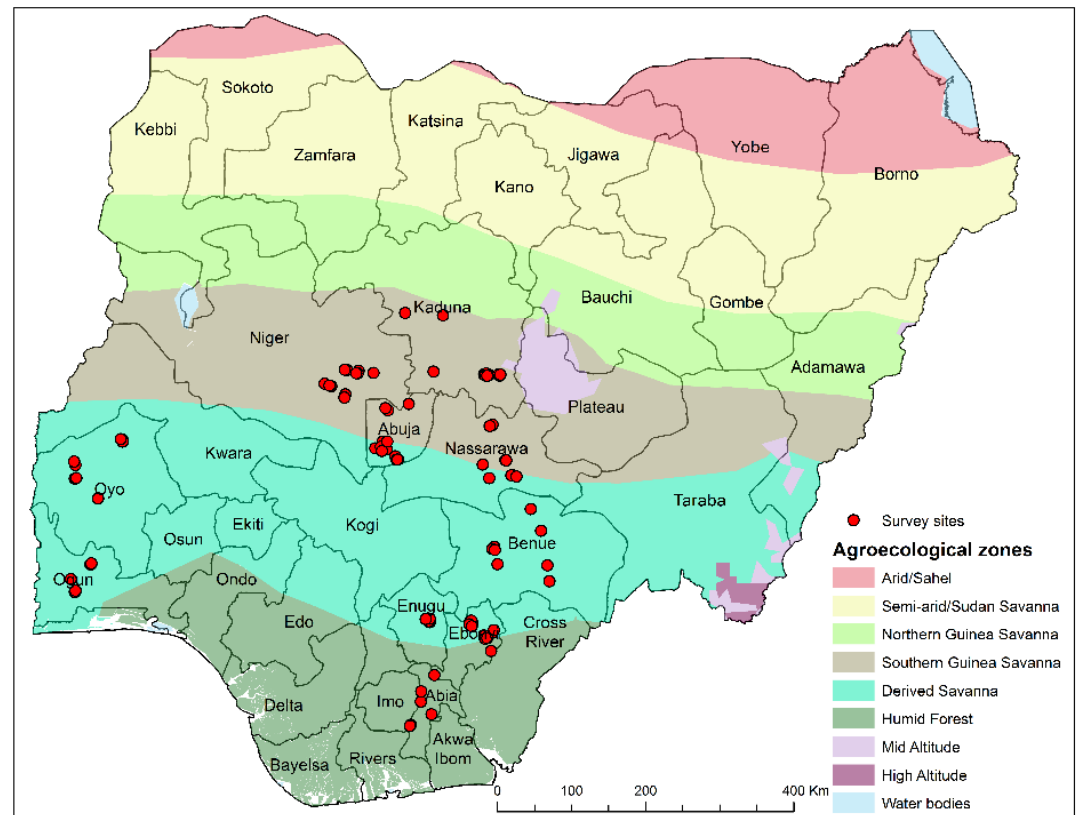


- **Reinfection rate: 2% to 40%**
- **Mean severity: 2.3**
- **Least infection during off-season**
- **Highest infection in yam plots sown downwind of infected fields**
- **Advice isolation distance and barrier crops**

- **Reinfection rate between 2% to 40%**
- **Mean severity 2.3**
- **Least infection during off-season**
- **Highest infection in yam plots sown downwind of infected fields**
- **Advice isolation distance and fast growing cereals as barrier crops to trap aphids**

## 3. Pest and Disease assessment in Demonstration Plots in Nigeria

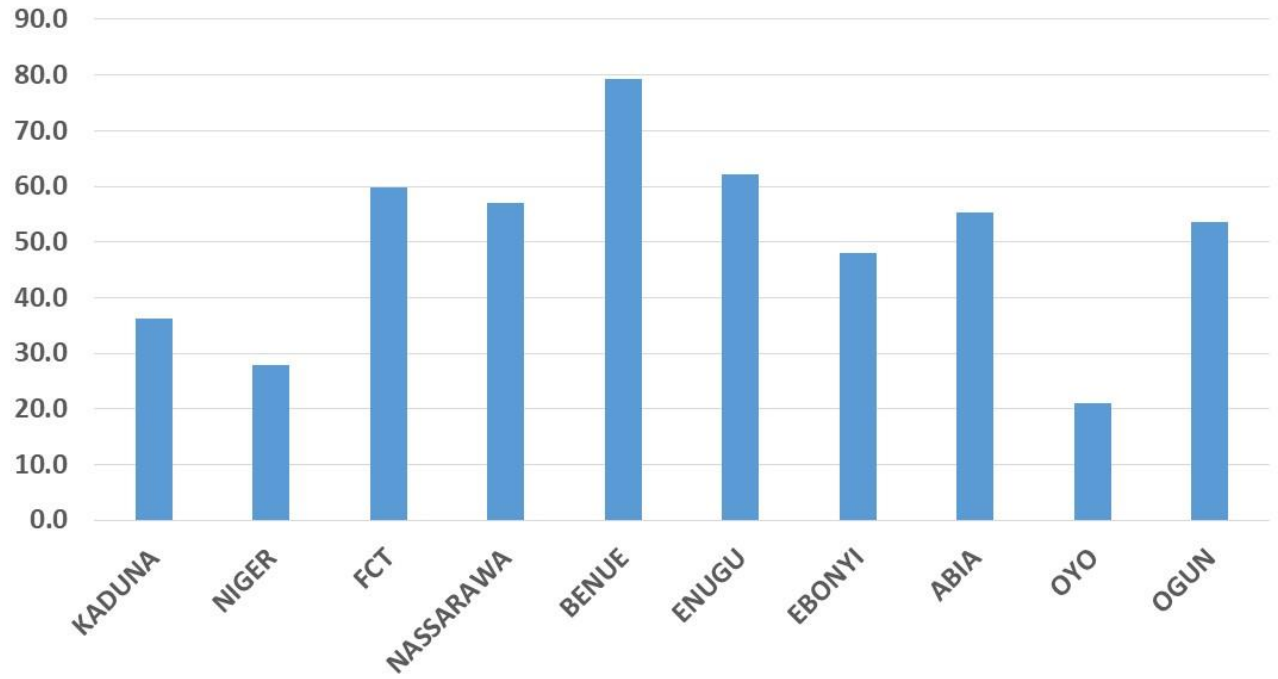
- Surveys at ~5 months old plants
- 15 Oct to 15 Nov 2019
- 10 States
- Varieties: Asiedu, Kpamyo, Swaswa and local varieties check
- 11,335 plants assessed on 1 to 5 rating scale
- Virus diagnostics on representative samples per field



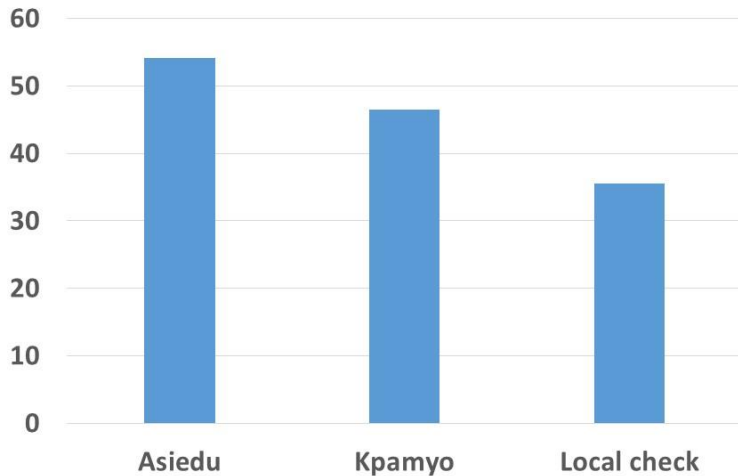
Distribution of demonstration plots assessed



Incidence (%) per state



Incidence (%)



# 4. Capacity development in Seed Yam Quality Assurance

- Development of Yam Seed Tracker for seed quality assurance and inventory management
- Improve capacity for virus disease diagnostics and ICT applications for Seed Tracker used and management



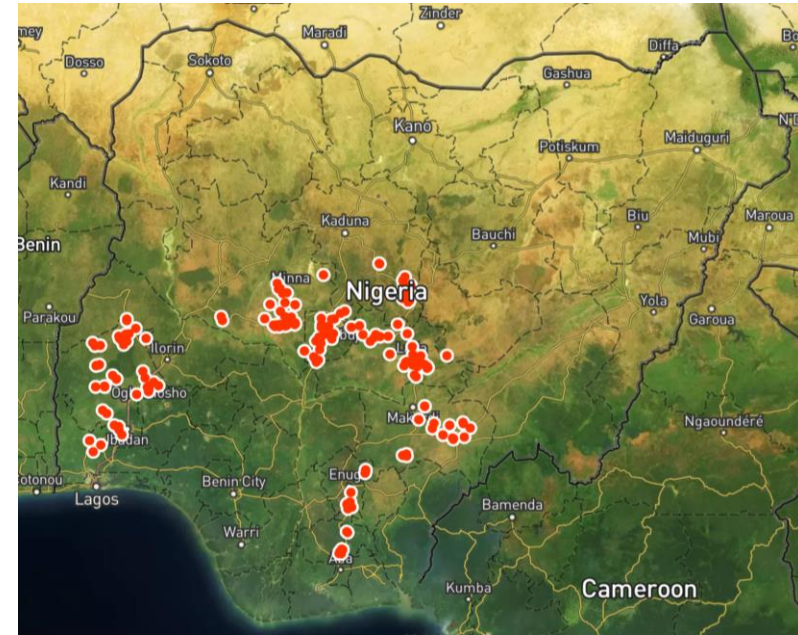




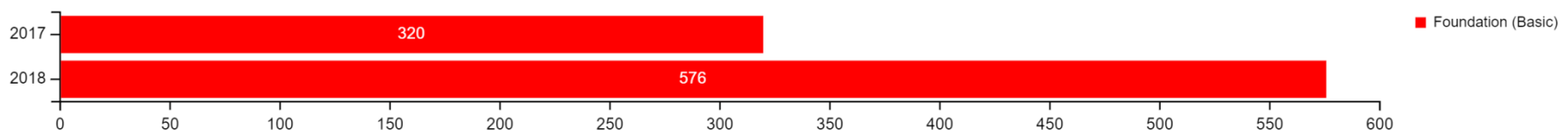
- Organize seed production information
- Enable seed quality monitoring and certification
- Digital integration of seed yam value chain to foster quality seed production for high productivity and profit
- Building on the established capacity at NASC and new development in Ghana

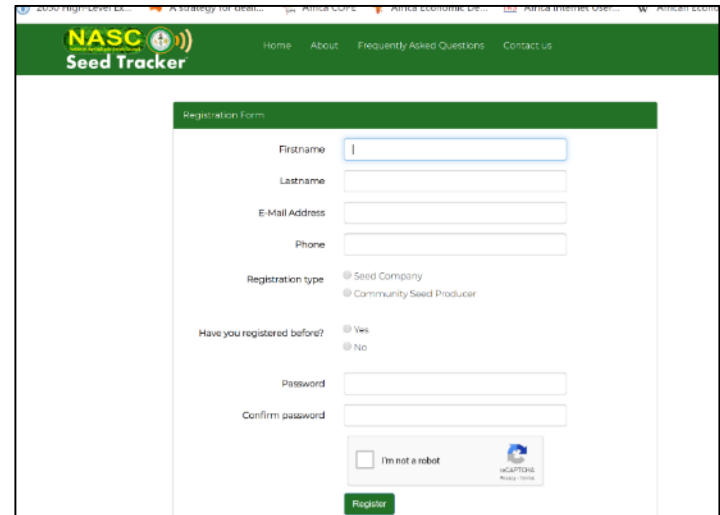
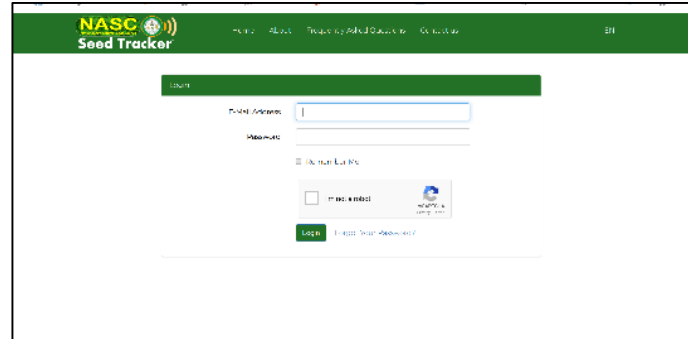
## Yam Seed Tracker™

- **Producers:** Registration and seed inventory
- **Regulator:** Seed certification, traceability and seed inventory
- **Buyers:** Access to seed producers



Year of Production grouped by Class of Seed





ghanatracker.test/dashboard

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Oluwafemi Alofe  
Seed Company

Dashboard  
Edit Profile  
Update Password  
Company Registration  
Logout

Welcome

Welcome Oluwafemi Alofe, you are now logged in!

Your application status: **approved**.  
Click here to print your verified certificate

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Notification: Application status successfully updated!

GST personnel Admin

Dashboard  
Edit Profile  
Update Password  
Applications  
Logout

Log history

2019-10-26 08:41:56 NST personnel is viewing Agromint Nigeria Limited application  
2019-10-26 08:41:55 NST personnel updated Agromint Nigeria Limited application status to approved  
2019-10-26 08:32:49 NST personnel is

Seed Company Application Status: **Approved (Awaiting)**

Personal Bio	Business Info	Seed Info	Facilities	Finance/Personnel	Certificate
Applicant	Oluwafemi Alofe				
Phone	08161608442				
Email	oluwafemialofe@gmail.com				
Date Submitted	30 Sep 2019				
Reason	Approved				
Certification Start Date	31 Oct 2019				
Certification End Date	31 Jan 2020				
Registration type	<input checked="" type="radio"/> Seed Company <input type="radio"/> Large Scale Company <input type="radio"/> Medium Scale Company				
Update Category	<input type="radio"/> Large Scale Company <input checked="" type="radio"/> Medium Scale Company				

FEDERAL REPUBLIC OF GHANA  
MINISTRY OF FOOD & AGRICULTURE  
LICENSED AS SEED PRODUCER AND SELLER  
REGISTRATION NO.: SC-2019-1

It is hereby certify that subject to the provision of the National Agricultural Council Act.

**Agromint Nigeria Limited**

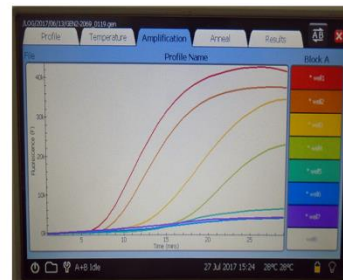
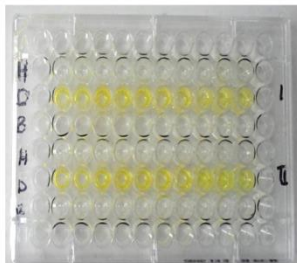
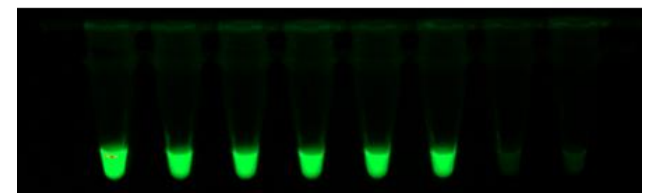
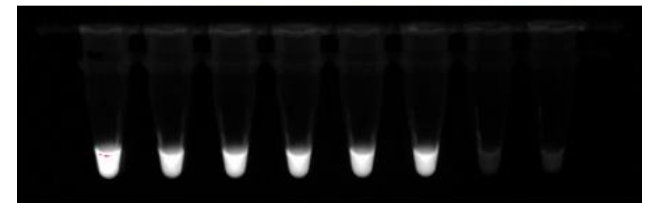
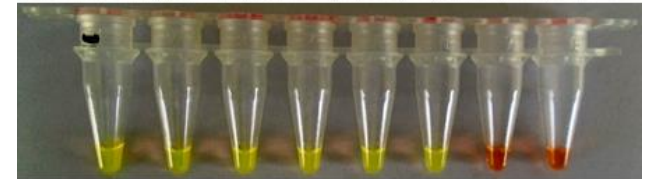
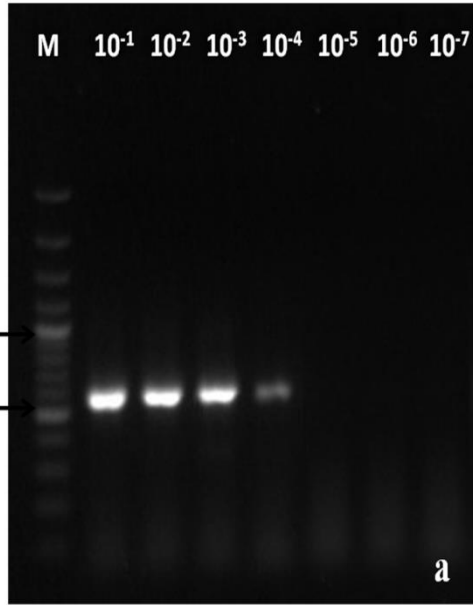
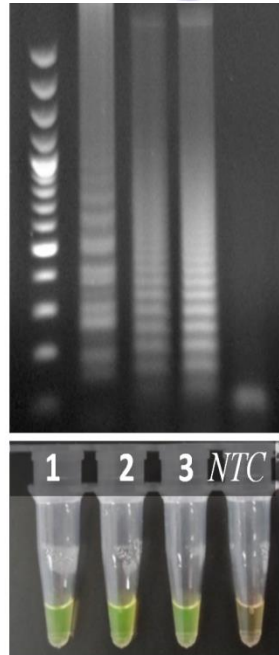
has this 26th day of October 2019 been licensed as a  
Medium Scale Company  
from  
**31st October, 2019 to 31st January, 2020**  
Approved On: 30th September, 2019

System generated certificate from the MOFA Seed Tracker

Signed  
Director General



- **Detection & quantification in plant and tubers**
- **Lab and Field**



## NACGRAB Diagnostics and phytosanitation

- Workflow assessment
- SOP
- Training in situ



## Upgrading diagnostics and ICT facilities at PPSRD (Ghana) and NASC (Nigeria)

- Needs assessment
- Procurements
- Installation
- Training



# NASC





# Conclusions

- **Revised standards for seed yam certification established and adopted**
- **Main causes for seed reinfection identified to develop integrated methods to protect seed yam fields**
- **Pest and disease thresholds in demonstration plots were within acceptable limits for seed certification**
- **YST developed and being installed at NASC and GSID**
- **Diagnostics and ICT equipment procured and being installed at NASC and GSID**



NASC



BILL & MELINDA  
GATES foundation



RESEARCH  
PROGRAM ON  
Roots, Tubers  
and Bananas



Genebank  
Platform

## Thanks for your attention

Contact

E-mail: [L.kumar@cgiar.org](mailto:L.kumar@cgiar.org)