

AGRILINKS



Enhancing Root, Tuber and Banana Crops' Contribution to Food and Nutrition Security

Speakers:

Graham Thiele, CGIAR Research Program on Roots, Tubers, and Bananas

Margaret McEwan, International Potato Center's Regional Office for Africa

James Legg, International Institute of Tropical Agriculture

Frederick Grant, International Potato Center

Stephen Walsh, USAID Bureau for Humanitarian Affairs

Moderator:

Zachary Baquet, USAID Bureau for Resilience and Food Security

Date:

May 27th, 2021

Stephen Walsh, Senior Technical Advisor, USAID Bureau for Humanitarian Affairs



Stephen Walsh is an agriculture advisor with USAID Bureau for Humanitarian Affairs, formerly Office of Foreign Disaster Assistance (OFDA). He has been privileged to work collaboratively with research and development colleagues at national and local levels to develop and implement, research, and advise on impact-oriented seed systems—for both true seed and vegetative propagated crops—for smallholder farmers in more than a dozen countries in sub-Saharan Africa. His seed system interest areas include how to build more responsive demand-driven seed systems, promoting private sector engagement with an emphasis on small and informal sector actors, and strengthening the analytic tools and capacity of practitioners to better understand and design seed systems interventions.

Graham Thiele, Director, CGIAR Research Program on Roots, Tubers, and Bananas



Graham Thiele is Director of the CGIAR Research Program on Roots, Tubers, and Bananas (RTB) led by the International Potato Center (CIP). He has led the RTB program for the last 10 years, making it an example of collaborative research for development in the CGIAR. Graham is a social scientist and expert in targeting, priority setting, and impact and adoption studies of new agricultural technologies. Previously he was the Leader for Social and Health Sciences at CIP. Graham has worked in Bolivia, Ecuador, Peru, Tanzania, Kenya, Benin, Rwanda, Indonesia, and the Philippines. He helped develop, implement, and assess several, novel participatory methodologies designed to link farmers with markets, inform research agendas, and promote innovation in policies, products, and technology uptake. Graham holds a PhD in Social Anthropology and an MSc in Agricultural Economics.

Margaret McEwan, Senior Scientist, International Potato Center's Regional Office for Africa



Margaret McEwan is a Senior Scientist at the International Potato Center's regional office for Africa based in Kenya. A social scientist, Margaret has over 30 years' experience working in multi-disciplinary teams focused on rural development, farming systems research, household food security and nutrition in Kenya, Uganda, Somalia, North Sudan, Zambia and Mozambique. In research for development contexts she is concerned with how to engage multi-stakeholder partnerships in ensuring improved livelihood and nutrition outcomes, and in understanding the conditions required to up-scale technologies for greater impact. She has a MSc in Human Nutrition and is currently pursuing a PhD at Wageningen University and Research, in the Netherlands, focusing on the social-technical interactions which influence the institutional arrangements for sustainable sweetpotato seed systems.

James Legg, Scientist, International Institute of Tropical Agriculture



James Legg is a scientist at the International Institute of Tropical Agriculture, with more than 20 years' experience of working on plant viruses and their insect vectors. Most of James' professional career has focused on strengthening understanding of cassava viruses and using that improved understanding to develop and facilitate the promotion of control strategies. In addition to playing a direct active role in research, James has also contributed to strengthening African science capacity through producing training materials, leading training workshops and supervising post-graduate students. James has been based at IITA East Africa hub in Dar es Salaam, Tanzania, for the last seven years, and he has been involved in running several regional R4D projects focused on cassava viruses, their whitefly vectors and the development and implementation of sustainable seed systems. James holds a PhD and MSc from the University of Reading, UK.

Frederick Grant, Public Health Nutrition Epidemiologist, International Potato Center



Frederick Kobina Grant is a Public Health Nutrition epidemiologist at the International Potato Center (CIP) with over 15 years' experience in implementation of nutrition-sensitive programs in SSA and south Asia. He is currently the CIP Uganda Country Manager and Nutrition Scientist. He leads the CGIAR Research Program on Roots, Tubers, and Bananas (RTB) Cluster on Nutritious Sweetpotato for Expanding Markets and Improving Diets. Previously he worked as Nutrition Specialist and Project Manager, Viable Sweetpotato Technologies for Africa (VISTA-Tanzania) and Project Leader, Mama SASHA Project at CIP. Frederick holds a PhD in Nutrition and Health Sciences from Emory University, and a MPhil in Nutrition, University of Ghana.



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and Bananas

Importance of RTB Crops for Food Security

GRAHAM THIELE RTB DIRECTOR • AGRILINKS • MAY 27TH 2021

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CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change



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IITA
Transforming African Agriculture

Roots, Tubers and Bananas Program



**Banana
Plantain**



Cassava



Potato



Sweetpotato



Yam



Other R&T

working globally to harness untapped potential of RTB crops to improve:

food security, nutrition, income, climate change resilience and gender equity of smallholders

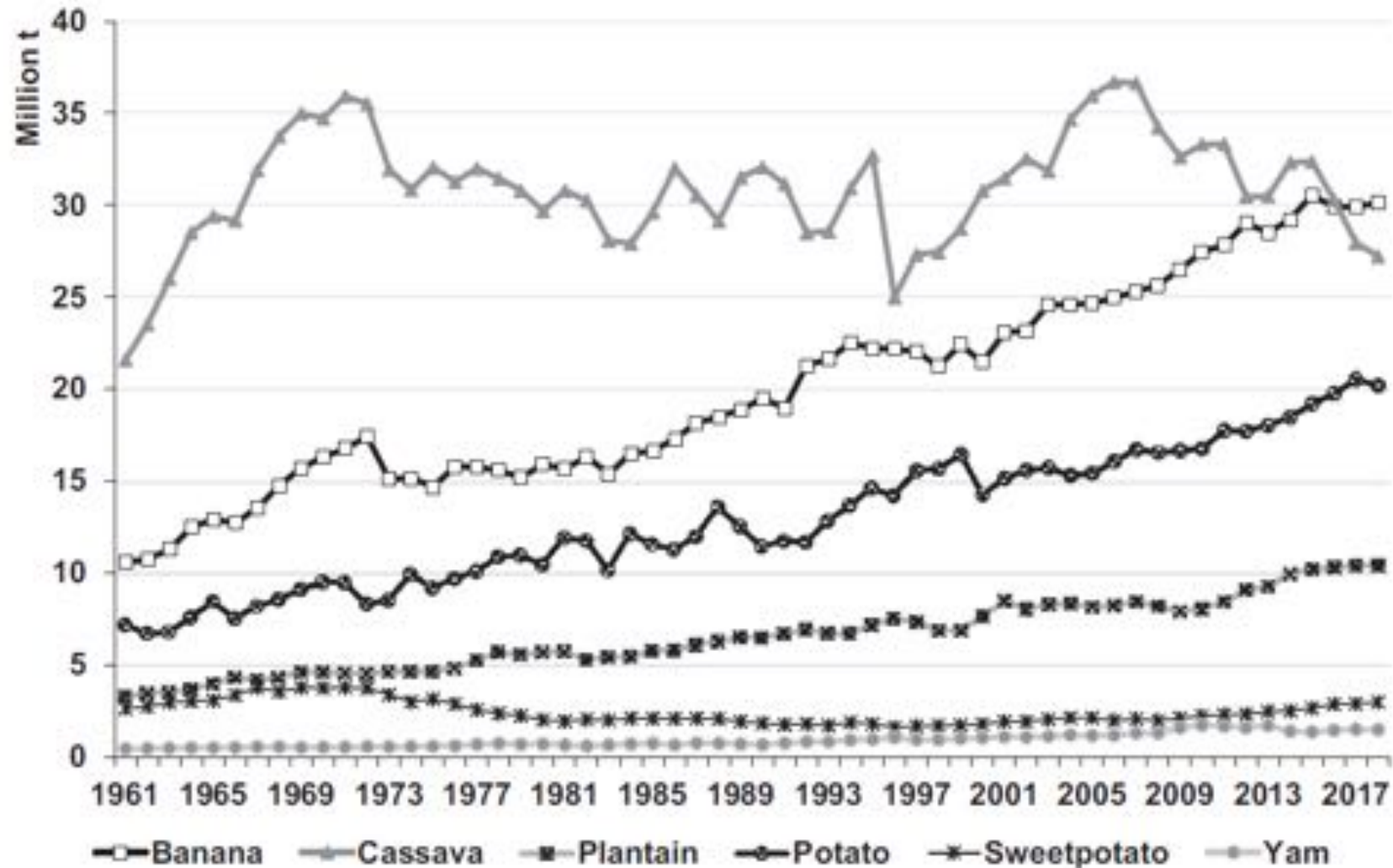


Why Roots, Tubers & Bananas?

- Genetic complexity (> grains)
- Vegetative propagated crops (VPCs) carry pests and diseases, similar seed systems,
- Similar role as staples (potential for biofortification)
- Perishability, bulkiness and post harvest/value chain options



Surging production RTB crops in developing countries!

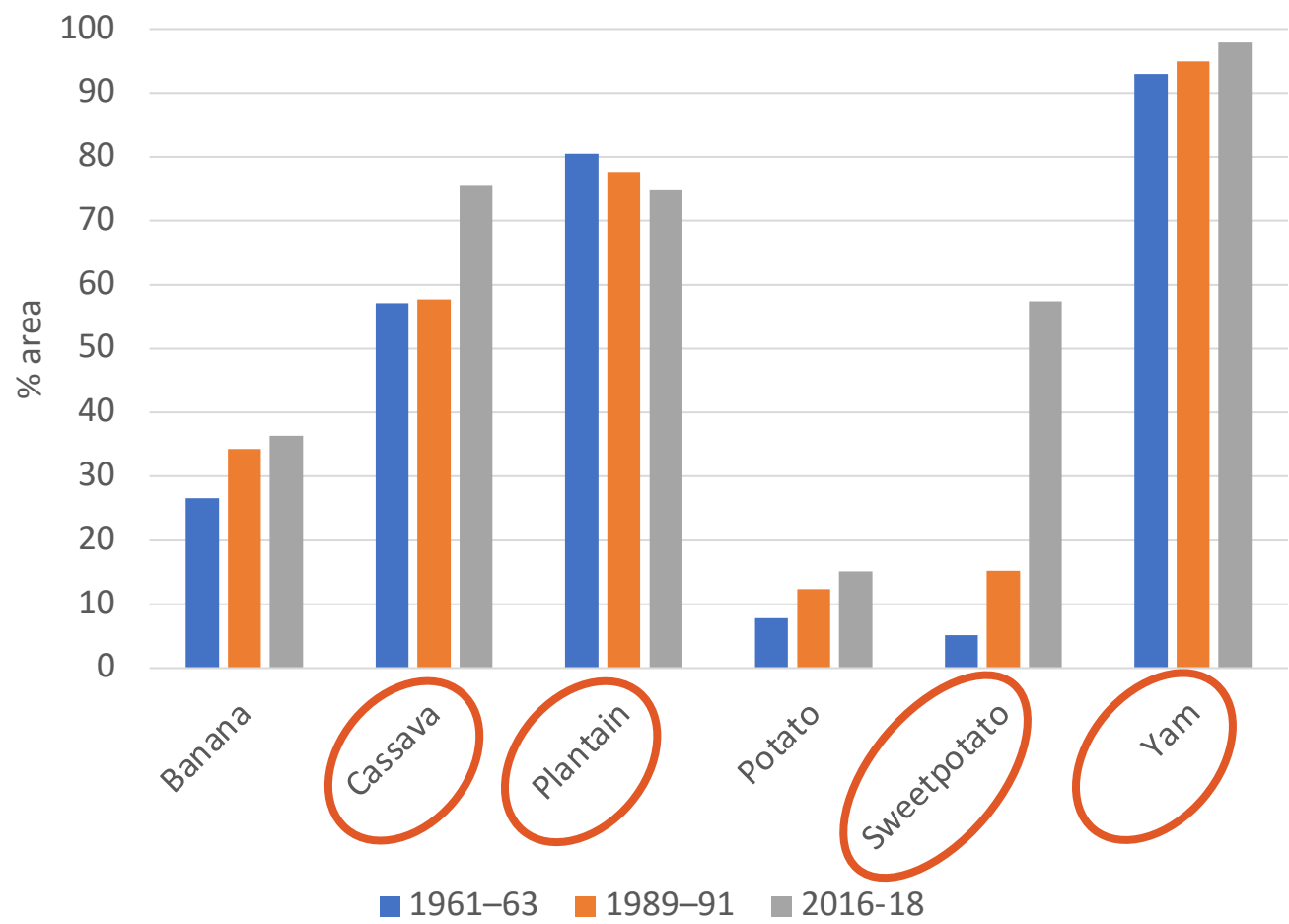


Source: Scott et al 2020, FAOStat data for developing countries in Africa, Asia and Latin America and the Caribbean



Increasingly in Africa

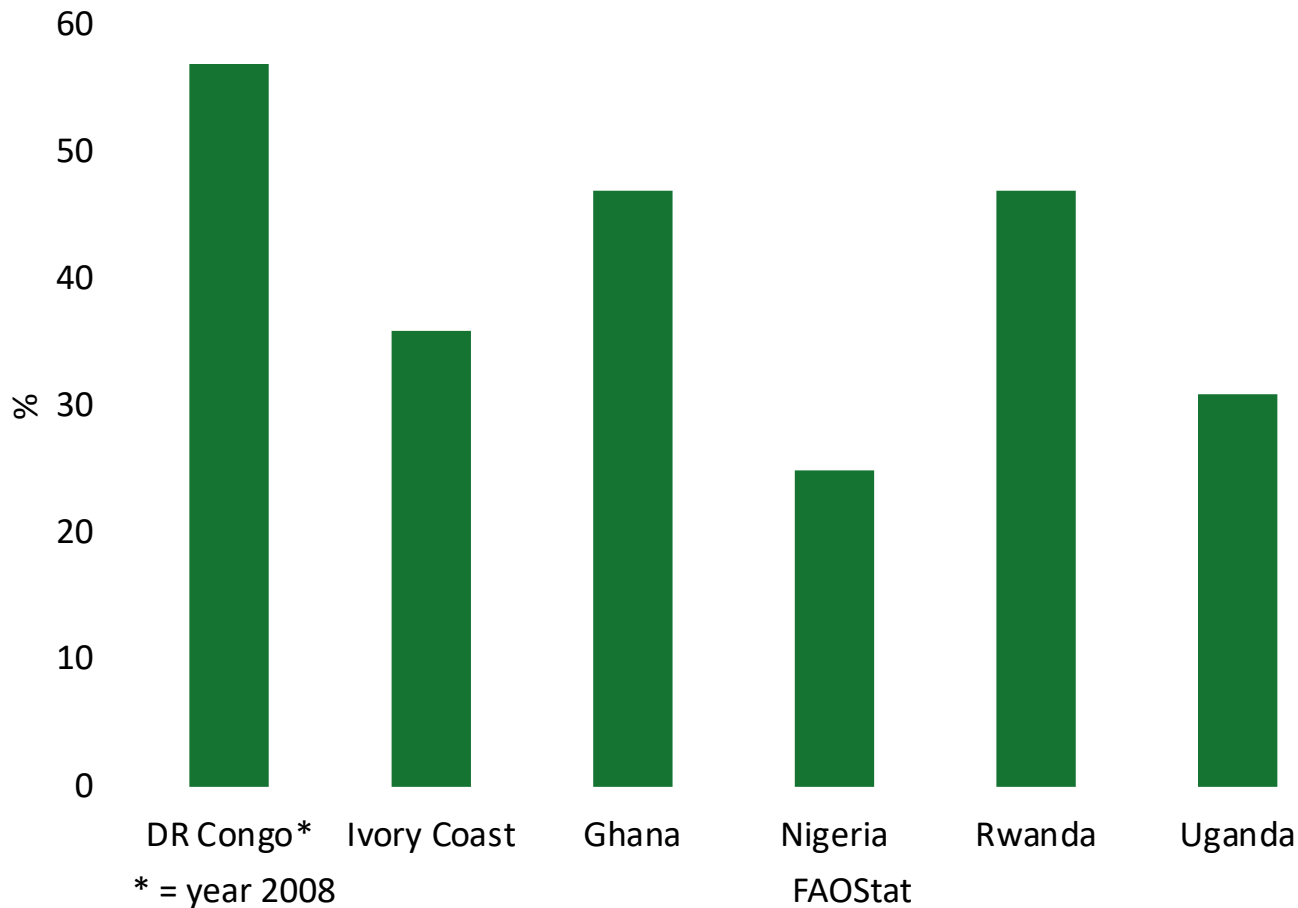
Changing share of total cropped area
in developing countries in Africa





Essential to food security

% Contribution of RTB crops to food intake in selected African countries in kilocalories (kcal) per capita (2017)



Asia and LAC, key role in diversity and resilience



Figure 1 - Track map of Ompong. Points show 6-h intervals. Colors represent wind speeds (red is max category 5 with speed $\geq 252\text{km/h}$). Source: Meow (2018)



Photo 1 - A field affected by typhoon with broken trees and barely damaged sweetpotato plants which still stand green and robust

The contribution of RTB golden eggs in the global food system



<https://www.rtb.cgiar.org/golden-eggs/>

RTB golden eggs

Build on uniqueness of crops

Constructed with communities of practice of RTB

Key for One CGIAR and other partners



Take home messages

- Roots, tubers and bananas expanding, especially so in Africa
- Especially important to vulnerable and disadvantaged, sometimes called “womens crops”
- Local production & short value chains are resilient in face of disruptions eg COVID-19
- Opportunity to build on RTB golden eggs
- Underinvested compared to potential, urgently need more R&D funding for RTB crops!



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Thank you

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Tools4SeedSystems:

building a better seed future - together

MARGARET MCEWAN • CONNY ALMEKINDERS • JORGE ANDRADE-PIEDRA AND RTB SEED COMMUNITY OF PRACTICE
AGRILINKS WEBINAR, MAY 27, 2021

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Why seed systems?

“Whatever touches on the seed system,
touches on food security,”

Dr Yemi Akinbamijo, Executive Director, Forum for Agricultural Research in Africa
(FARA)



Photo: RTB

- Ensure that improved varieties with market preferred traits **reach all farmers**
- Seed carries more than genes....
 - Healthy seed
 - Information
 - Social networks
- New beginnings and hope!

Understanding what farmers demand?

- **Varieties** with preferred traits – agronomic & quality
- **Availability** of sufficient quantities
- At the **right time**
- **Accessible** in terms of **cost** and **location**
- **Pest and disease free** – healthy for better yields



Mr. Twimanye Makoye at one of his seed production plots. Bukombe district, Tanzania. Photo credit: K. Ogero.

Root, tuber and banana seed



Unique characteristics & challenges

- Low multiplication rates
- **Bulky and perishable**
- Accumulation of **seed borne diseases and pests**
- Easy for farmers to multiply – so **business case for private sector** varies by crop & context
- Importance of **informal seed systems** for different crops & contexts



The Tool Box

<https://tools4seedsystems.org/>



Replicable,
open-source,
and backed by science

Tool users:

Development
practitioners,
researchers

Information users

program managers,
decision makers

- ✓ Description sheet
- ✓ User guide (G+)
- ✓ Case study
- ✓ Tool validation
- ✓ Peer-reviewed publication
- ✓ Technical support available



Attractive seed sources

- **Farmer considerations** in choosing sources:
 - Cultivar **diversity**, quantities available, timing
 - **Knowledgeable**, trustworthiness, transaction conditions, cost of transport
- Implications for **designing seed delivery pathways** – gender, scale of production, farmers' multiple production objectives;



Understanding farmers' perceptions of formal & informal sources of banana planting material in Uganda

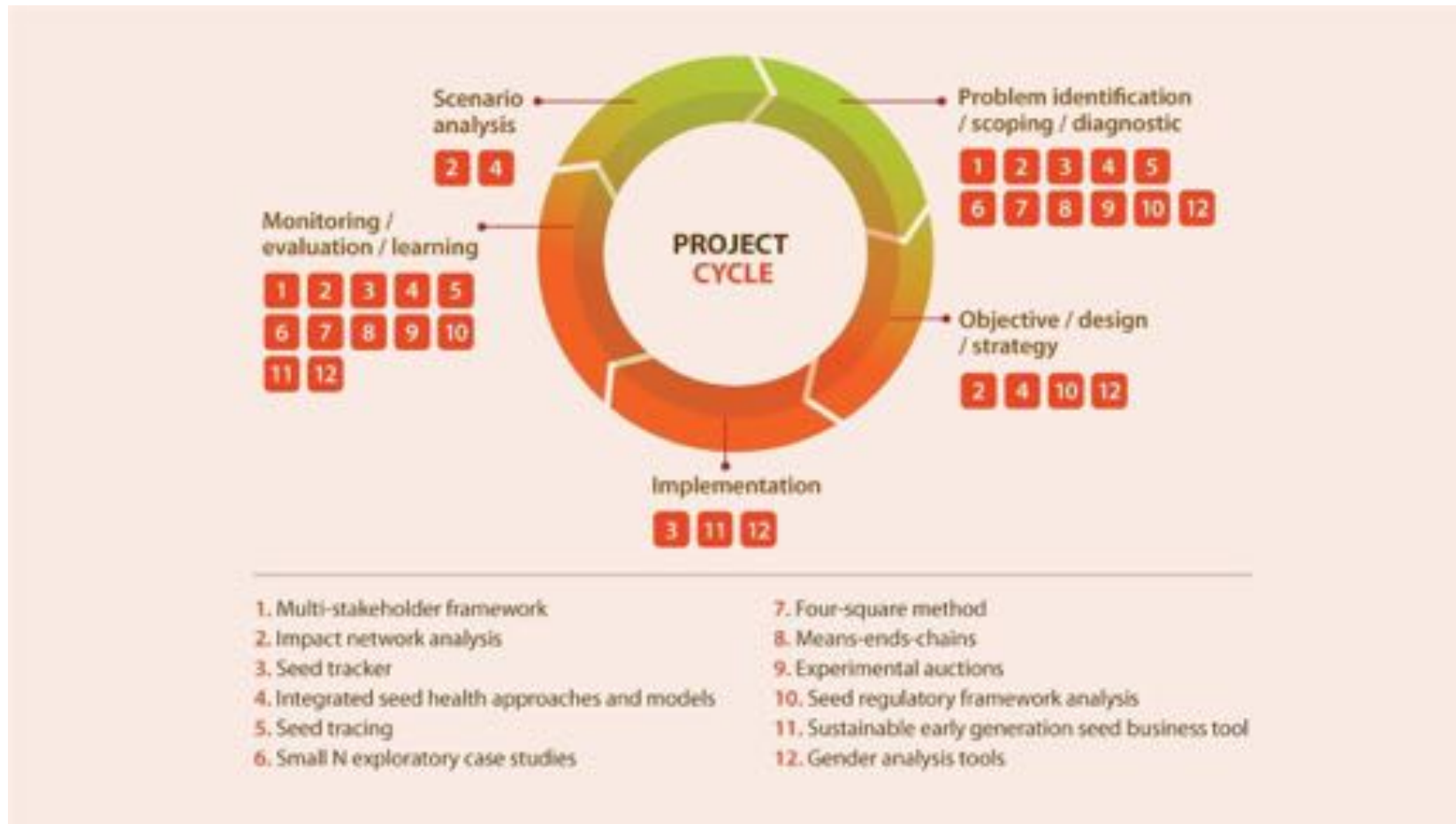
Who are the super-spreaders?

- **Seed Tracing – farmer-to-farmer** seed exchange
 - Ethiopia – better off “model farmers” distributed more seed of new varieties than resource poor households
- **Seed Tracker – quantities and quality of seed distributed through** formal system
- **Impact Network Analysis – scenario building for** system management
 - Characterisation of **distribution** nodes for targeting dissemination of varieties, or disease surveillance
 - Linkages between **formal and informal seed systems**

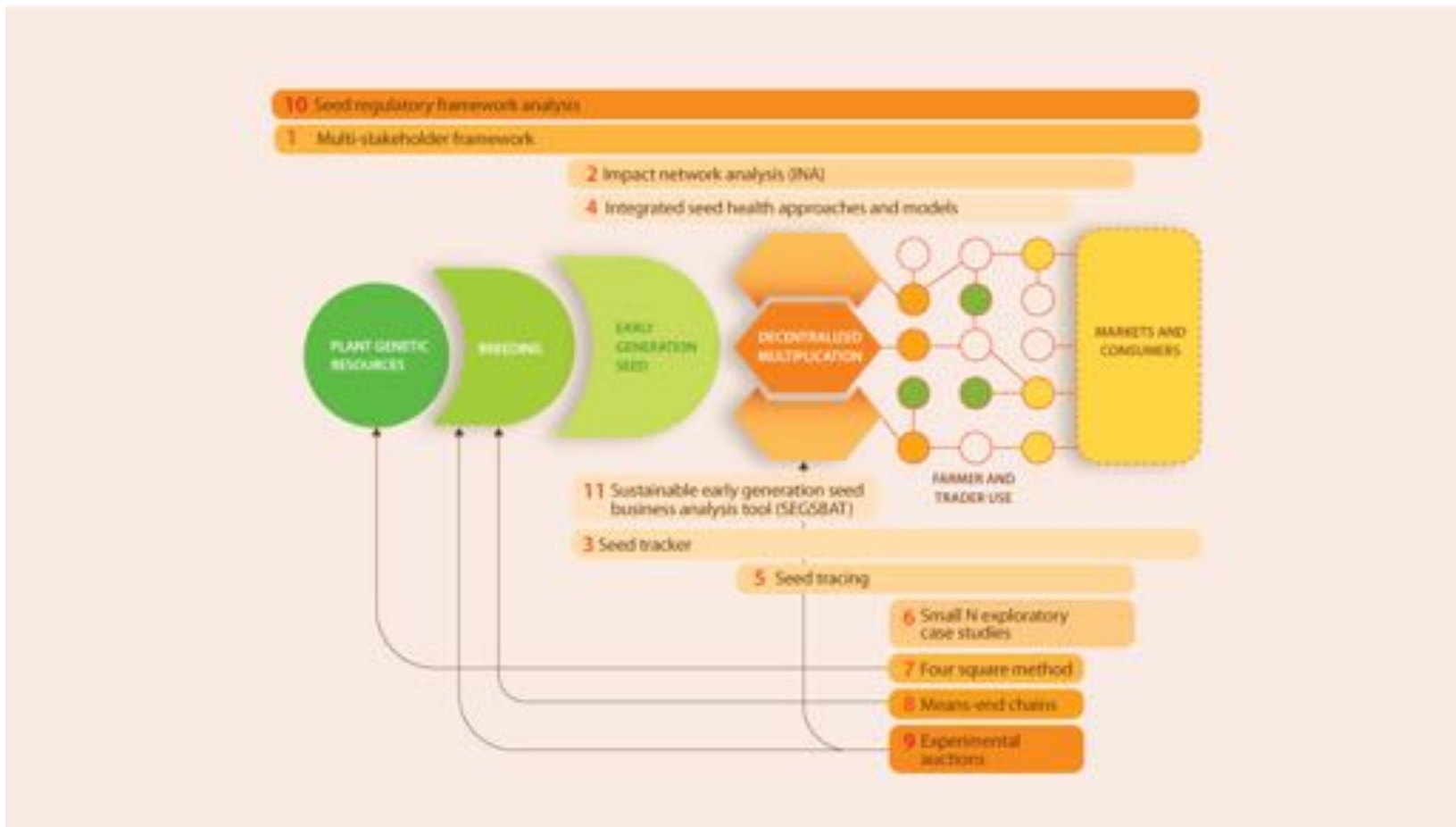


Photo: V. Atakos/CIP

Where to start: project cycle



Where to start: seed value chain



Use Tools4SeedSystems

- Design and implement more effective seed interventions
- Join us: training & mentoring in use of tools – July – November 2021
 - Development and humanitarian contexts



Building a better seed future - together

Thank you



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BILL & MELINDA
GATES foundation



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
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CGIAR Trust Fund contributors':
<https://www.cgiar.org/funders/>



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Monitoring Cassava Diseases Using PlantVillage Nuru

AKA: *The POWER of KNOWLEDGE*

James Legg, *Latifa Mrisho, Neema Mbilinyi, Mathias Ndalawa,*
Peter McCloskey, Annalyse Kehs, and David Hughes

Agrilinks Webinar: Enhancing root, tuber and banana crops' contribution to food and nutrition security – May 27th, 2021



Research
Program on
Roots, Tubers,
and Bananas



PlantVillage



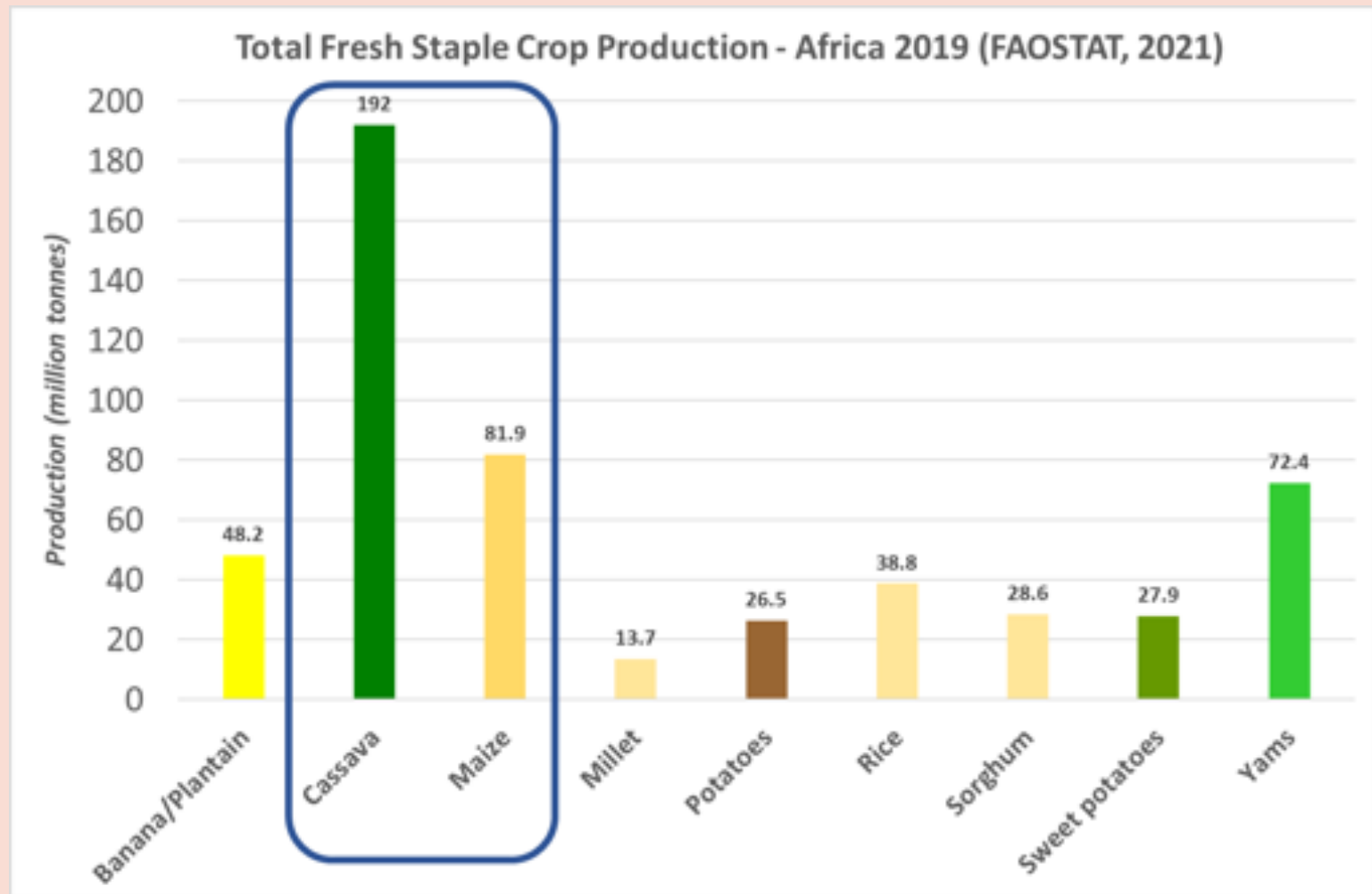
PennState
College of Agricultural Sciences

IITA

Transforming African Agriculture



- **African No. 1 Crop for Total Production**



- **Food Staple for 500 million Africans**

Cassava Mosaic Disease

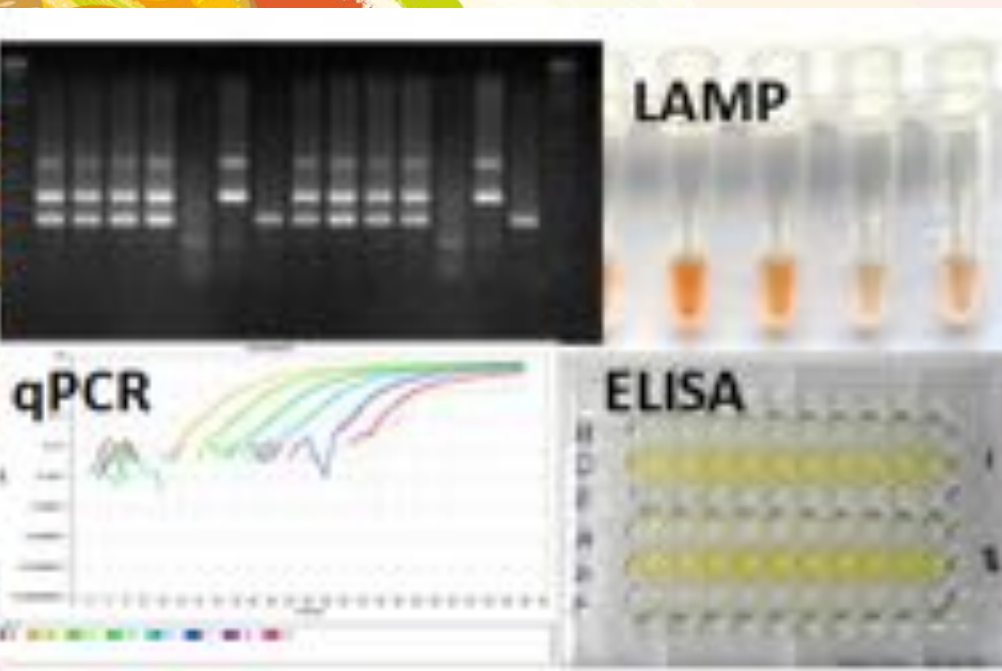


Fundamentals

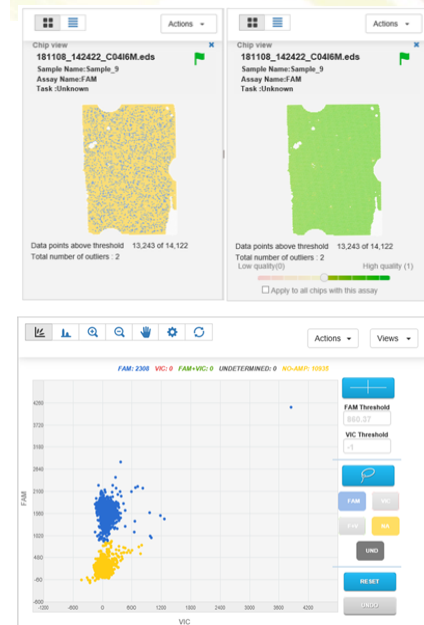
- 1. Diseases/Pests devastate cassava crops, particularly in Africa**
- 2. To manage them, we need to monitor them**
- 3. To monitor them, we need diagnostics**
- 4. The most important diagnostic technology in 2021 is?**



Diagnostics – Cassava Viruses

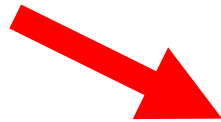


Digital PCR



Method	Application	Duration	Status for cassava pests
PCR-based methods (conventional and real time)	Mainly-lab based	≤ 1 day	Available for all known pathogens
Antibody-based methods (ELISA & LFDs)	Lab and field enabled	ELISA: ≤ 1 day LFD: 10 min	Cassava viruses (CMD and CBSD)
Isothermal amplification methods (LAMP and RPA)	Lab and field enabled	≤ 60 min	CBSD & CMD*
NGS (sRNA sequencing)	Lab-based	One week	Identification of new viruses
Digital PCR	Lab-based	≤ 1 day	Virus quantification

New Tech for a New Disease Detection Paradigm



Unique mobile subscribers



Mobile internet users



Smartphones

Percentage of total connections*



Major Cassava Diseases/Pests in Africa



Cassava Mosaic Disease



Cassava Brown Streak Disease



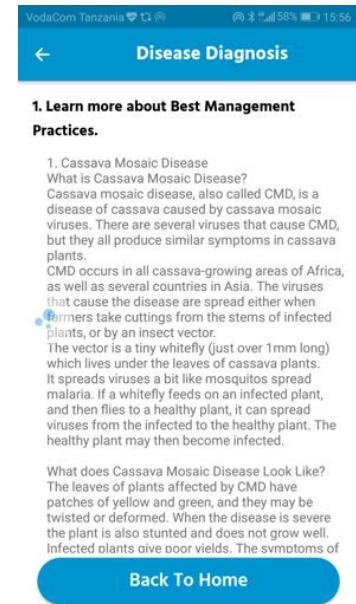
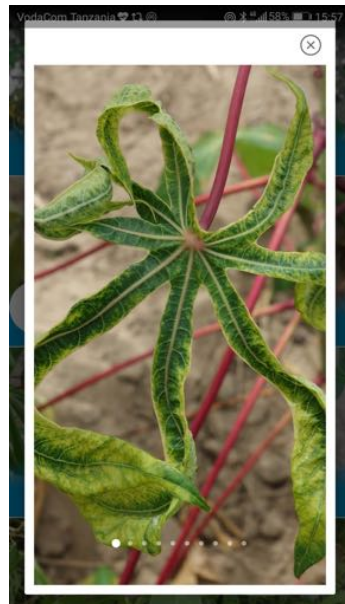
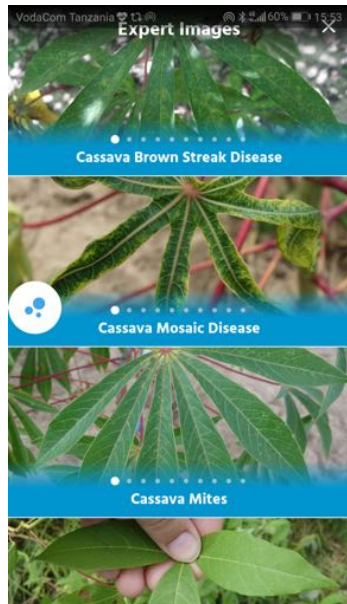
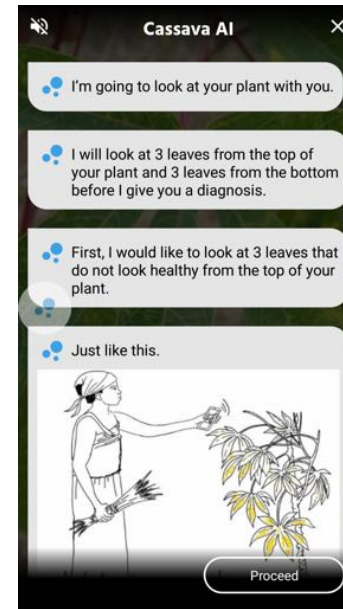
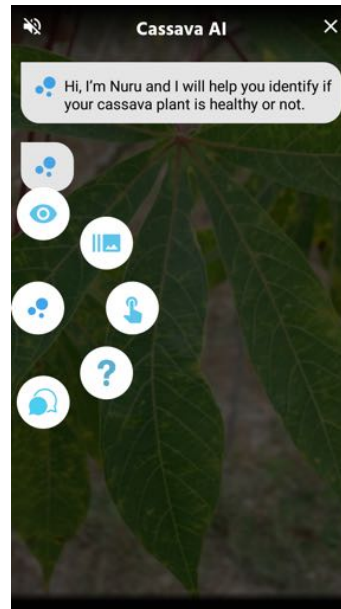
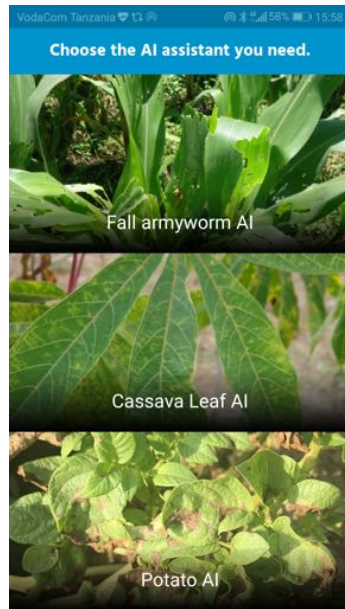
Healthy

*Cassava Viruses alone cause losses of
> US\$ 1 billion annually in Africa*



Cassava Mite Damage

Developing a Smartphone App “NuruAI”




Key Features of Nuru AI


- **Powered by:** TensorFlow object recognition
- **Hosted in:** PlantVillage phone app
- **Conditions:** CMD, CBSD, CGM, Healthy
- **Usage:** Offline for disease diagnosis
- **Languages:** English, Swahili, French soon
- **Status:** Being scaled across Africa
- **Rollout:** Rolled out on Google's PlayStore 2018

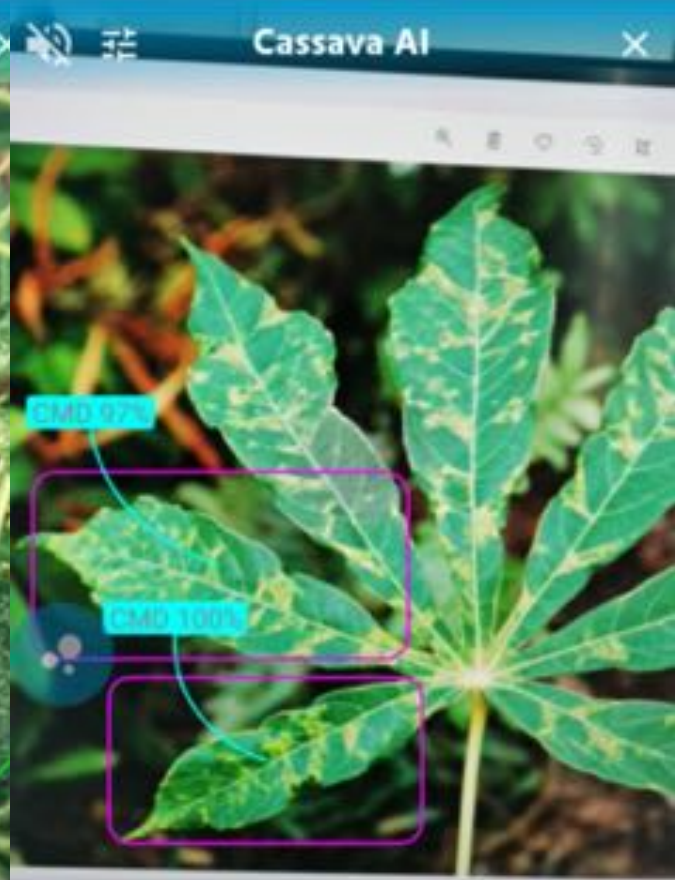





 You are in camera mode, looking at TensorFlow results.

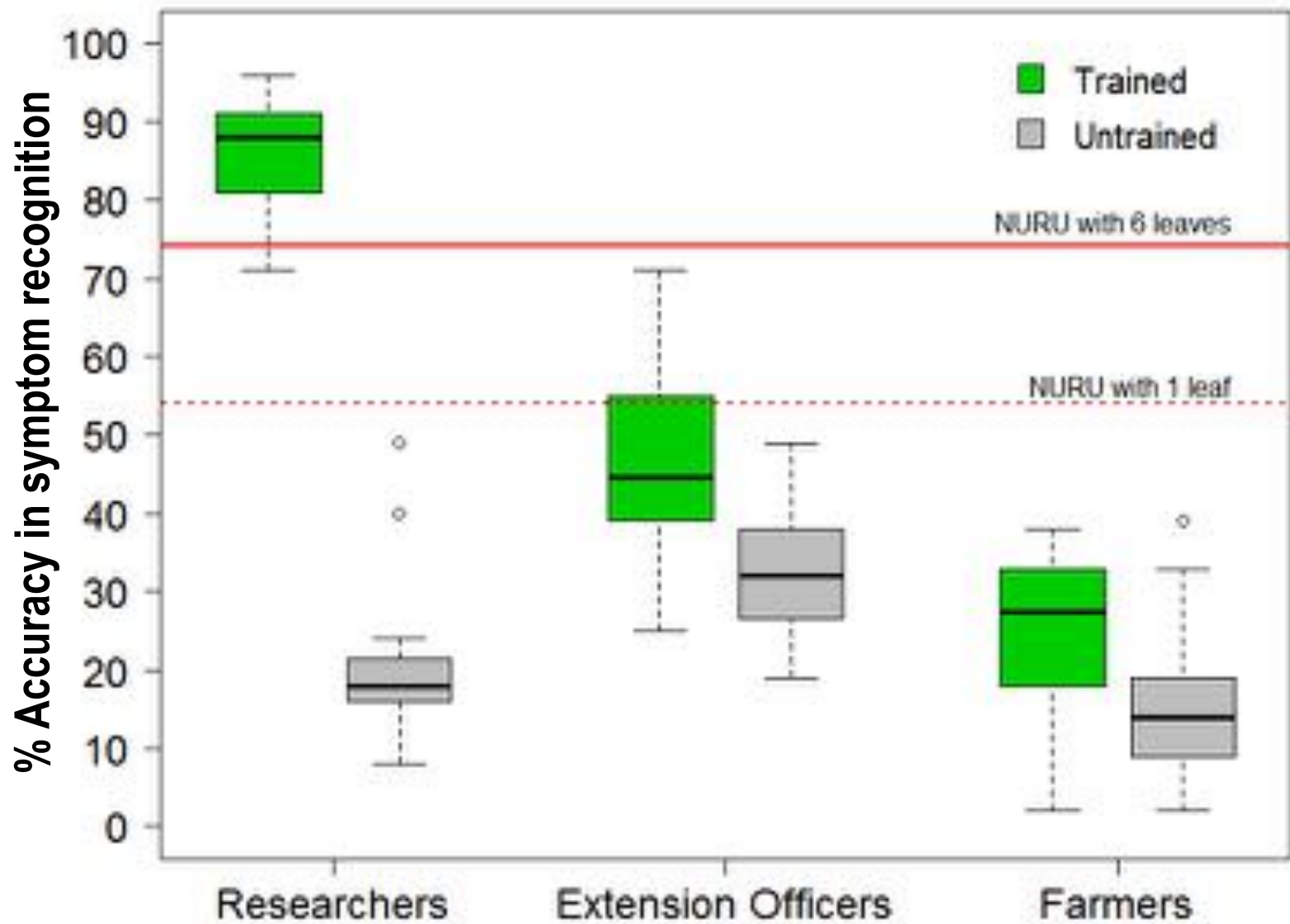


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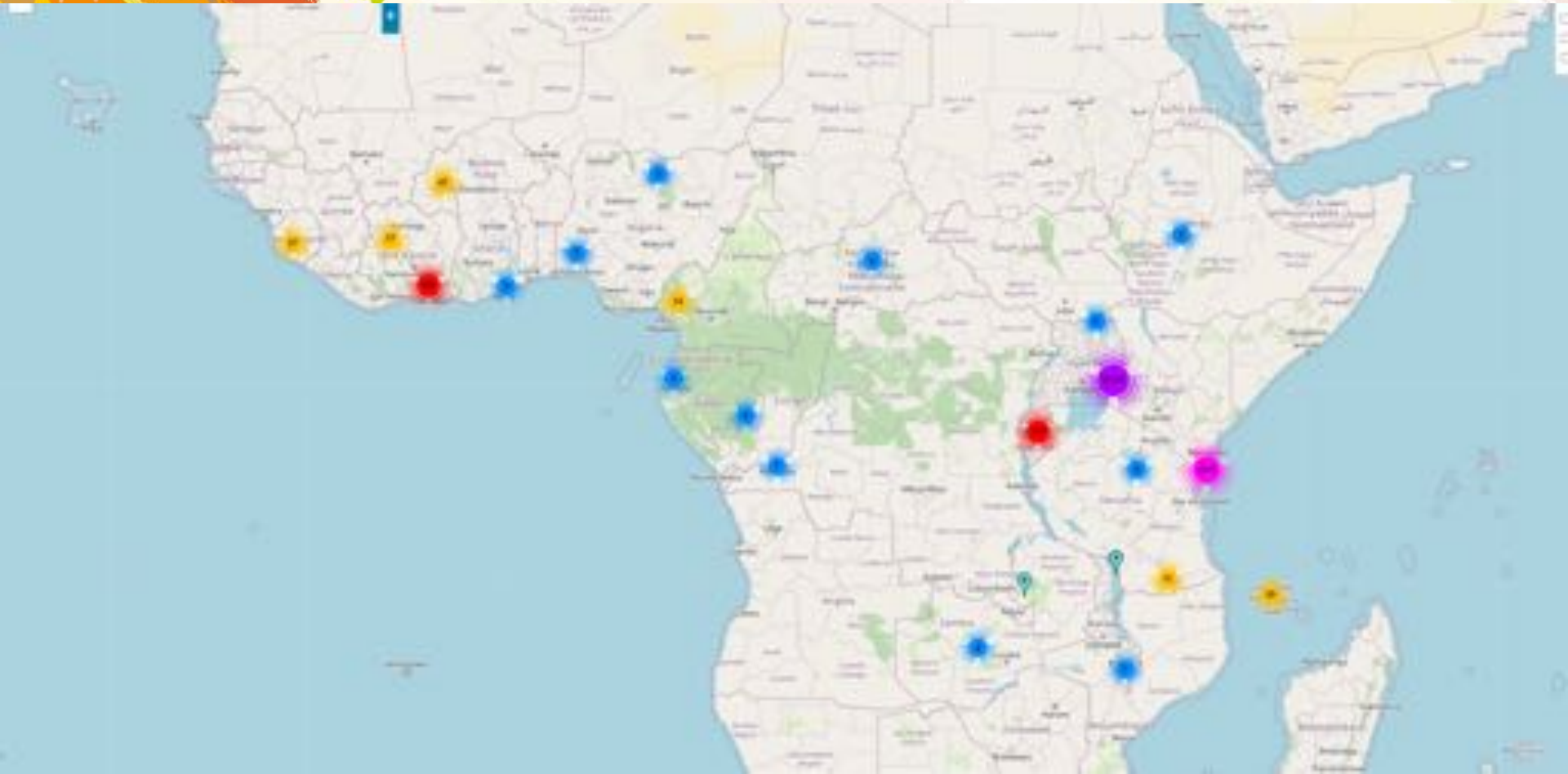


 You are in camera mode, looking at TensorFlow results.

Nuru vs People

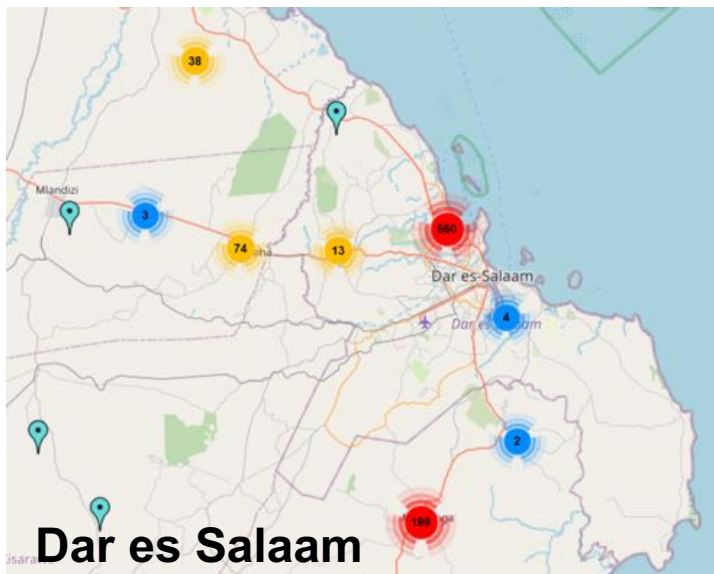
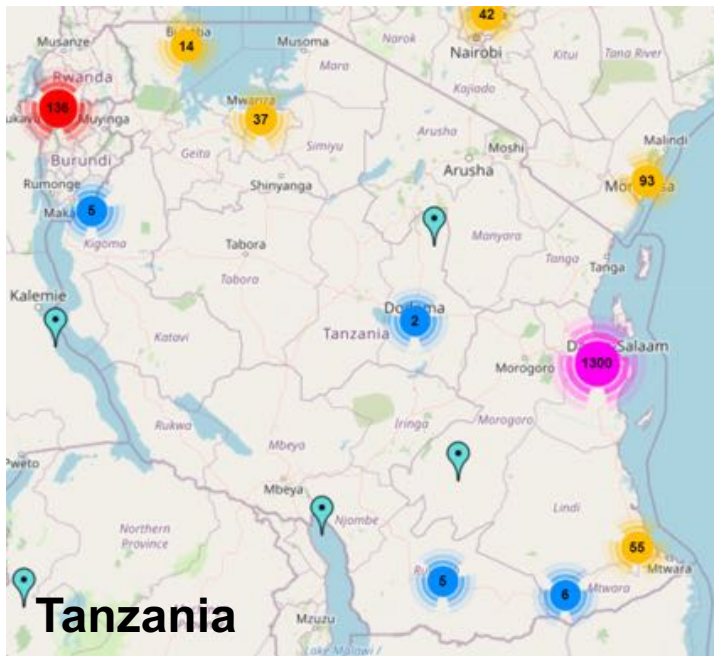


Remote Monitoring of Cassava Diseases

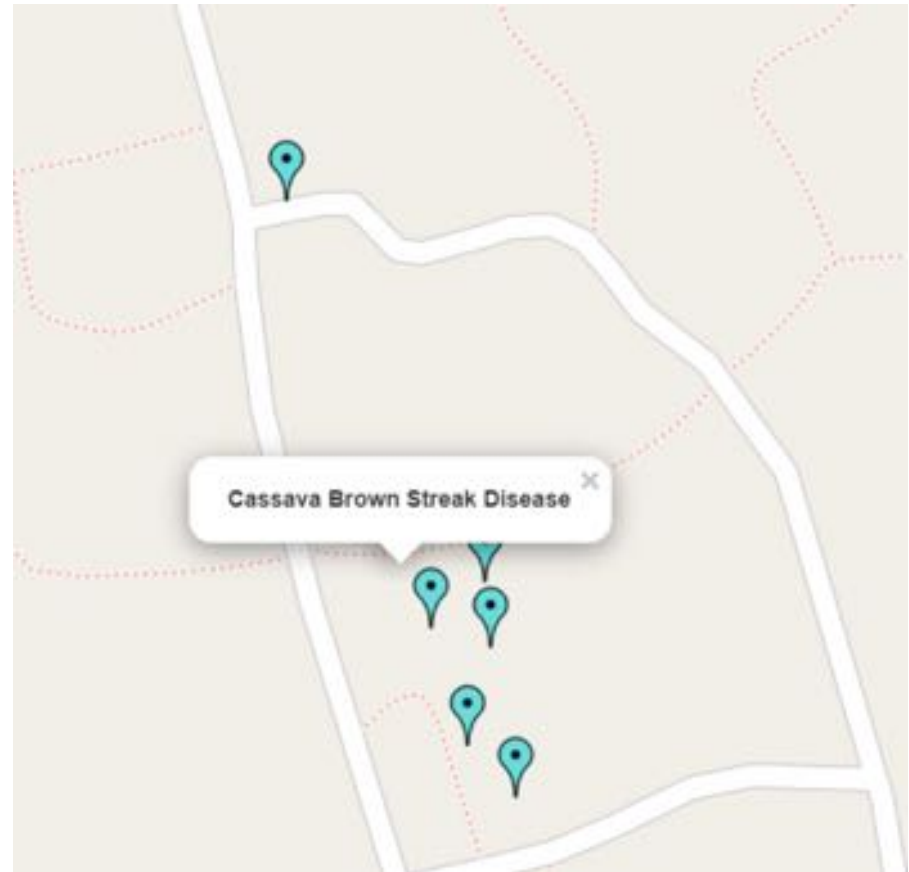


- **> 5,000 downloads; > 30,000 reports**
- **Reports from 20 countries in Africa**
- **Scaling through WAVE and CGIAR-Inspire Projects**

Remote Monitoring of Cassava Diseases



Mkuranga



- ICT platform for quality seed delivery
- Facilitating cassava seed entrepreneurs
- Promoting quality through certification
- Providing control solution (clean seed) for major cassava disease constraints



Cassava Seed Tracker Users



1 + 1 = 3 SeedTracker + Nuru Synergy



Helping farmers identify and control the main cassava disease and pest damage types, **linked to SeedTracker**, and **driving demand for high quality cassava seed**



Facilitating delivery of **certified cassava seed** of **disease-resistant varieties** through expanding networks of cassava seed entrepreneurs (CSEs)

Links for Impact

STEP 1. Trained Nuru users identify cassava disease

STEP 2. Nuru app advises to access clean seed of disease resistant varieties

STEP 3. Nuru links to Seed Tracker

STEP 4. Seed Tracker provides phone/WhatsApp contacts for CSEs

STEP 5. Farmers tackle disease through accessing & planting clean seed







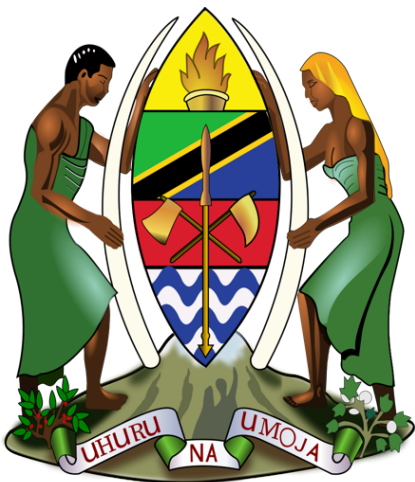
Knowledge is Power



ICT Tools will Deliver...

Acknowledgements

- Farmers & Extension of Mkuranga & Serengeti Districts
- Lava Kumar and IITA Seed Tracker team
- Government of Tanzania and TARI
- CGIAR BigData Platform – funded through a CGIAR-INSPIRE Challenge Award
- Roots, Tubers and Bananas Programme of the CGIAR





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The role of biofortified sweetpotato in nutrition humanitarian interventions in fragile environments

MAY 27, 2021



FRED GRANT

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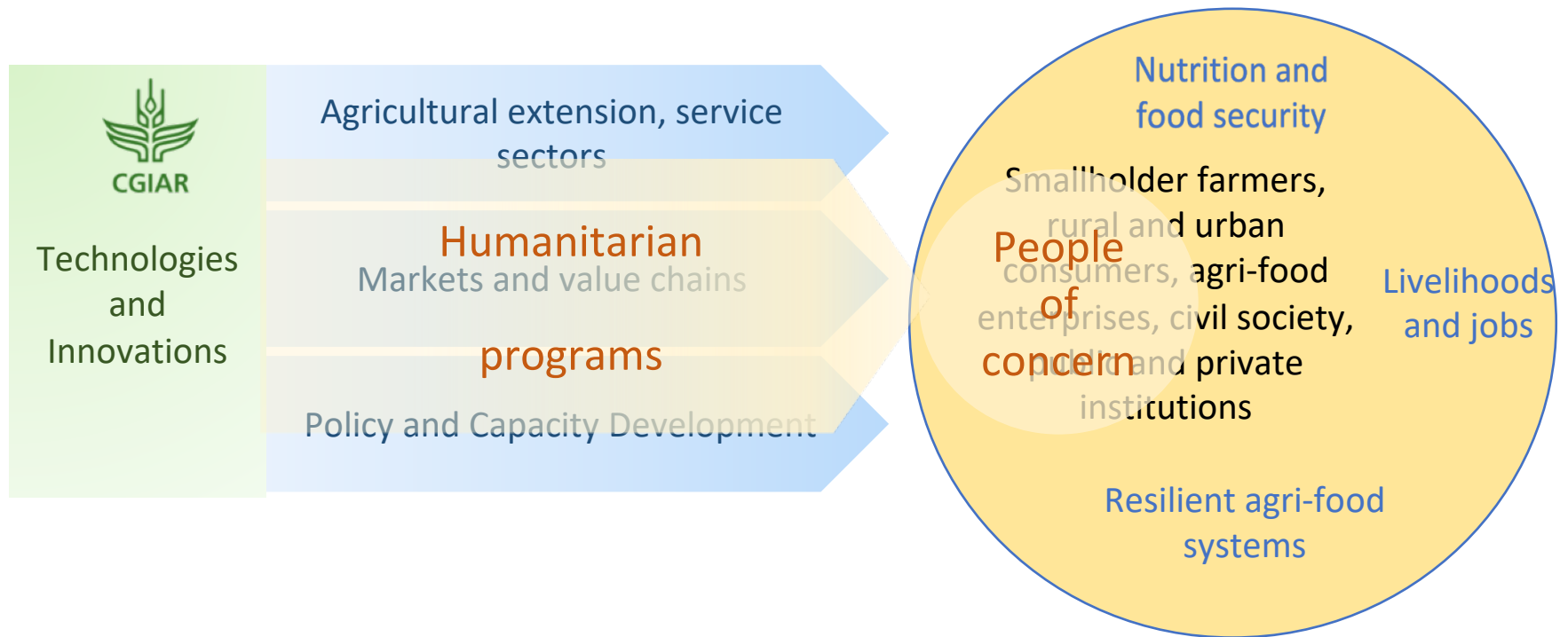
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International Center for Tropical Agriculture
CITA - CIAT: Science for a sustainable change

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Important of CIP/CGIAR work in humanitarian settings

= Making our work count for vulnerable populations



Different pathways = One Food System



Entry point: Biofortified, orange-fleshed sweetpotato (OFSP)

- Rich in vitamin A (beta-carotene >200ppm)
- 125gram = 100% daily Vit A needs of a school aged child
- Other vitamins (B6, C, E) and minerals (Fe, K, Mn)





Biofortified sweetpotato

= *Resilience during crisis*

- Reliable yields (8-20mt/ha)
- Short duration (3-4 months)
- Drought tolerance



Dorcas Kaunda in her garden. Photo: WFP/Martin Karimi

Variety selection
Local seed system
Farmer training

6.9 million households in Africa
and South Asia since 2010



Biofortified sweetpotato

= *Nutritious food systems*

- Fresh roots traded country-wide
 - Among most affordable foods
- Puree (cold chain to shelf stable)
 - Versatile use (school meals, food industry innovations)
 - >95% of nutrients



= *Nutrition for all*

- Vitamin A and other micronutrients
- Calories
- Easy fit in local diets

Guidelines for household utilization
Healthy Baby Tool Kit (6-23 mo)
As part of healthier diets



Updates of Highlights/ Activities with WFP from Kenya & Uganda

CIP: Biofortification Program

WFP: *Sustainable Food Systems Program, Agricultural Market Support Program, Nutrition-sensitive Cash Transfer Program, Sustainable School Meals Program*

Activities

- OFSP production at household level in ASAL Counties (Kenya) & drought prone areas (Uganda)
- Established seed system through local seed multipliers linked to NARS
- Strengthened technical capacities (GAP) targeting local seed multipliers and extension officers
- Technical support for maternal, infant and young child nutrition through ToT of frontline health workers



Other nutritious crops and foods

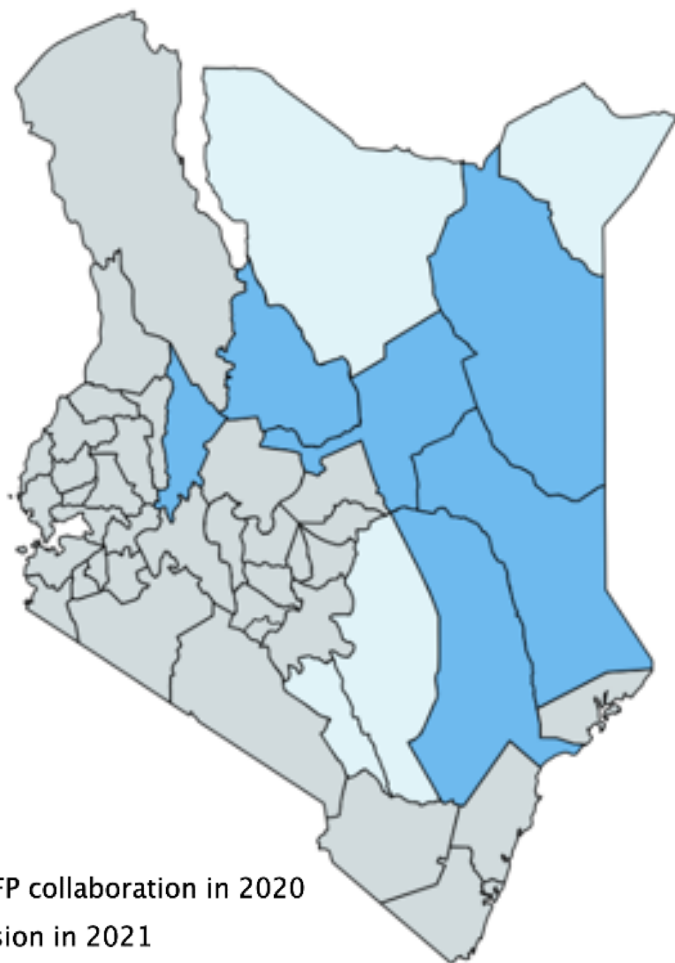
- Biofortified beans (high iron) and maize (Vit A)
- Vegetables (incl. traditional leafy vegs)

Integration

Production
Markets
Processing



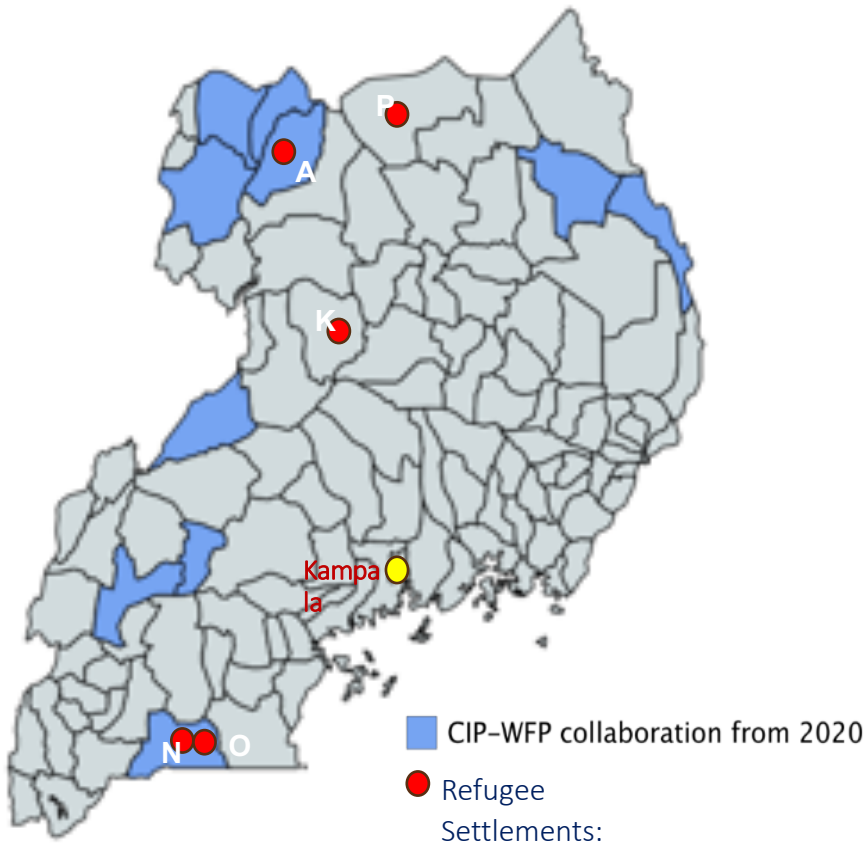
Kenya



- CIP-WFP collaboration in 2020
- Expansion in 2021

ASAL Counties:
 Baringo, Garissa, Isiolo, Samburu, Tana River, Wajir

Uganda



Region
 West Nile

Districts
 Adjumani, Arua, Moyo, Obongi, Yumbe

Karamoja

Kotido, Moroto

South-Western

Isingiro

Western

Kamwenge, Kikuube, Kyegerwa

- CIP-WFP collaboration from 2020
- Refugee Settlements:
 Adjumani
 Palabek
 Kiryandongo
 Nakivale
 Oruchinga



OFSP quality
foundation
material NARS



Establishing
sustainable seed
systems for OFSP
through local
multipliers linked to
quality foundation
material NARS



Sweetpotato crops cultivated at the homes of
refugees at Palorinya settlement, Moyo District.
Credit: R. Ackatia-Armah.



Healthy Baby Toolkit

Healthy Baby Toolkit

Improves young child (6-23 mo) feeding
OFSP as part of healthy diets
Guidelines for household utilization

1

A bowl with lines and symbols that cue age appropriate meal frequency and **volume** for children at different ages¹: 6-9 mos., 9-12 mos., 12-23 mos.



2

A slotted spoon to guide **optimal thickness/texture** of infant foods and complementary foods. If the food does not drip through the holes in the spoon, it is thick enough to ensure sufficient energy and nutrient density.



Highlights on achievements (2020): Kenya & Uganda

>300,000 consumers reached with OFSP through humanitarian programs in Uganda & Kenya



>70,000 HHs in fragile environments provided with clean OFSP planting materials in Uganda and Kenya



>50,000 HHs provided with HBTs and trained on improved MIYCAN





Ethiopia

New 2-yr project funded by USAID Bureau of Humanitarian Affairs

- “Emergency Response Recovery and Resilience with Nutritious Potato and Sweetpotato for Farmers Affected by Drought, Locusts, and Covid-19 in Amhara, Oromia and SNNP Regions in Ethiopia”
- Benefit 36,000 households and at least 50,000 children <5y
- This will be linked with our existing partnership with WFP
- These approaches are aligned



Next steps

- New connections with local food systems
- Link OFSP producers and traders to institutional markets
- Utilize locally/regionally manufactured shelf-stable OFS purees

Looking ahead

- Plan to utilize evolving One-CGIAR regional and programmatic structure
 - Expand this approach to capture a broader range of impactful technologies and innovations



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