Introduction to PlantVillage Nuru

What is PlantVillage Nuru
How it was made
What can it do
How to get Nuru
How to use Nuru
Things to consider when using NURU
Neema Mbilinyi
Research technician
International Institute of Tropical Agriculture
(IITA – Tanzania)

Work with a team of researchers at IITA and PlantVillage to develop Nuru, evaluate its performance and train its users - agricultural extension officers and farmers.
Latifa Mrisho
Research fellow
International institute of tropical Agriculture
(IITA – Tanzania)

Worked with Nuru team from IITA and worked with PlantVillage to develop Nuru, evaluate it’s performance and train it’s users (agricultural extension officers and farmers).
2017 & 2019 WINNER

PlantVillage Nuru: Pest and disease monitoring using AI
What is PlantVillage Nuru (Nuru)?
An **mobile app** for identification of disease symptoms and pest damage on plants

**NURU** – Swahili word for **Light**

‘The light that farmers can use to solve their agricultural problems’
HOW WAS PLANTVILLAGE NURU MADE?

The object and image detection technology (Tensor flow) developed by Google was modified such that it can detect objects (plant leaves) and patterns (disease symptoms).
The Cassava - Artificial intelligence system

Trained using thousands of images of healthy, diseased and mite-infested cassava leaves from different cassava varieties.

Nuru can differentiate healthy and diseased/infested plants.
What can Nuru do?
1. Determine presence of diseases symptoms or pest on the crop (CMD, CBSD and CGM-damage).

2. Gives feedback (real-time)

3. Shows you the symptoms of the disease/symptoms it has recognize (teaching tool)

4. Give you advice on management and/or control practices for the disease/pest it has recognize

All this can be done in absence of internet connection
Where to get PlantVillage NURU
Where to get **Plant Village NURU**

- **Install**
- **Update**
Where to get **PlantVillage NURU**

PlantVillage is a public good resource built at Penn State University. The goal of PlantVillage is to help farmers around the world access knowledge on crop health and make decisions that can improve the amount of food they grow and their ability to get that food to market for a fair price that helps farmers improve their livelihood.

In this app, you will receive advice on what to do on your farm. This advice is provided to you via scientists at UN FAO, CGIAR as well as from published material from non-profit groups like...
Nuru’s Features
Nuru’s Features

Plant Village Nuru

Register

Here you can Post a question to the Community

Resources

Here you can find
- Crops
- Farm Management
- Video Library
- Pests & Diseases
- Increase Yield

Settings

Here you can find
- Change Language
- My Account
- Notification settings
- Messages
- Terms and Conditions
- Share App
- Logout
Cassava AI – Disease diagnosis

Check your plants options

Hi, I'm Nuru and I will help you identify if your cassava plant is healthy or not.

Please press the proceed button to check your plant for cassava diseases or press the yellow button to scout your field.

Hi, I am Nuru. I will help you inspect your cassava plant.

Real time diagnosis

Disease comparison

How to use Nuru

Advice

Chat

Procedures

Scout

Proceed

Home Nuru Community Resources Settings
Cassava AI – Disease diagnosis

Check your plants options

Hi, I’m Nuru and I will help you identify if your cassava plant is healthy or not.

Please press the proceed button to check your plant for cassava diseases or press the yellow button to scout your field.

* Add Farm *

**Farm Name**

Dar es Salaam

**City**

Dar es Salaam

**Country**

Tanzania

**Farm Latitude**

-6.772435

**Farm Longitude**

39.258892

**My Farm**

Neighbor/ Following Farmer Farm
Cassava AI – Disease diagnosis

Adding farms
Cassava AI – Disease diagnosis

Whole plant diagnosis

Please show me the first leaf that does not look healthy from the top of the plant. Press start when the leaf is in focus.

Now let's look at three leaves from the bottom of the plant. When you show me the leaf, please hold the phone so you can see the whole leaf and be sure the leaf is in focus. It may be easier to focus if you hold your hand behind the leaf.
Cassava AI – Disease diagnosis

Whole plant diagnosis

The connecting with SeedTracker requires you to be connected to the internet
We will look at six leaves; three leaves on the top and three leaves on the bottom, then I will give you a diagnosis.

When you show me the leaf, please hold the phone so you can see the whole leaf and be sure the leaf is in focus. It may be easier to focus if you hold your hand behind the leaf.
Cassava AI – Disease diagnosis

‘Field inspection’ option

Hi, I’m Nuru and I will help you identify if your cassava plant is healthy or not.

Please press the proceed button to check your plant for cassava diseases or press the yellow button to scout your field.

Welcome LATIFA MRISHO, carry me over 10 different cassava plants on your farm.
Cassava AI – Disease diagnosis

Field inspection

Cassava Scouting Assistant

Welcome LATIFA MRISHO, carry me over 10 different cassava plants on your farm.

1. Are you at Plant 1?
   - No damage detected.

2. Please move me over 1 damaged leaf.
   - No damage detected.

3. Are you at Plant 2?
   - No damage detected.

4. Please move me over 1 damaged leaf.
   - No damage detected.

5. Connect with other farmers and seed suppliers?
   - 'Yes' or 'No'
Things to consider when using Nuru
Things to consider when using Nuru

1. Time
   - Reflection of sunlight makes the leaves appear shiny and may lead to failure of diagnosis or misdiagnosis.
   - Early morning (before 10 am) or late afternoon (after 4 pm)

2. Leaf selection
   - Make sure you select leaves that appear to be unhealthy to give Nuru higher chances of identifying the diseases in your plant.
   - Make sure the leaf is focused and you hold the phone steady during diagnosis (hold the leaf on your palm when necessary).
3. Disease type or severity

- Mild infections are not easily identified
- Bacterial infections, fungal infections and nutrient deficiencies can also not be identified

There is possibility of adding more diseases/conditions depends on availability of funds
Things to consider when using Nuru

4. Type of phone
   - Android phone ≥ 2 GB RAM - Technology developments allows for smaller apps >> more affordable phones
   - Sensitivity of the camera – Newer versions of smart phones tend to have more sensitive cameras (test the phones before purchasing bulk orders)
   - Nuru is continuously being updated to account for the changes in phone capabilities
Things to consider when using Nuru
Diagnosis feedback
The images uploaded in the database are used to improve diagnostic capability of Nuru hence do your best to use Nuru while connected to the internet.
Only possible if you use Nuru while connected to the Internet, so please opt for this method.
How effective is the cassava AI
Ability of different groups to identify symptoms of cassava diseases on leaves

Refer Article: mrisho et al. 2020
Thank you!

Neema Mbilinyi & Mathias Ndalahwa

Prof. David Hughes

DR. James Legg

IITA
Transforming African Agriculture

CGIAR
Platform for Big Data in Agriculture

PENNSTATE
For any question /clarification/comment please contact

Neema Mbilinyi

n.mbilinyi@cgiar.org