**Manual on Standard Operating Procedures (SOP’s) and Critical Control Points for Phenotyping**

# **PESTS AND DISEASE EVALUATION**

Objective foliar and harvest traits evaluation

* To screen clones for pest and diseases resistance and other agronomic traits (yield, DMC etc)

Materials needed

* Tablet or mobile with barcode scanner for data capture, power bank

Time of evaluation (incidence and severity)

* CMD = 3and 6 months after planting (MAP)
* CBSD= 3, 6 and 12 MAP
* CGM = 3, and 6 MAP

Materials needed:

* Tablet (electronic field book), and Power bank

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| **s/n** | **Standard Operating Procedures** | **Critical Control Points** |
| 1 | Generate the layout file on cassavabase following specific parameter requirements | Ensure that the specific field trial is in the cassavabase |
| 2 | Download the fieldbook and trait file from cassavabase | Ensure tablet is functioning well. |
| 3 | Experienced personnel must be in charge of the data collection and properly supervise the evaluation | A minimum 2 personnel to evaluate a trial per time |
| 4 | Phenotyping should adhere to the known standard protocol | Only technician familiar to the phenotyping protocol should be deployed |
| 5 | Evaluation in the morning hours when technicians are not tired | Adhere to the time limit standardized in each parameter |
| 6 | Make sure all traits to be collected in a device are present before actual time for data collection | Re-confirm that all needed traits are captured on the tablet |
| 7 | Evaluator must be familiar with the field design, layout, plot size and orientation of the field | Visit field at least a day before evaluation date |
| 8 | Decide appropriate collecting strategies within a net plot e.g. starting from right to left in a serpentine fashion). | Ensure that data is always collected in a net plot starting from right to left in a serpentine fashion. |
| 9 | Scan the barcodes to get plot identifiers on the field while collecting data. | Ensure all barcode labels are visible and scanned |
| 10 | Export data and send through email, goggle drive at the end of each day activity. | Keep track of your data in another device (P.C) as back up. |
| 11 | Data are ready for analysis | Submission of data for analysis |

Standard Operating Procedures and Critical Control Points for phenotyping 3 and 6 MAP

# HARVEST DATA COLLECTION

Standard Operating Procedure (SOP) and Critical Control Point (CCP) for harvest data collection

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| **s/n** | **Standard Operating Procedures** | **Critical Control Points** |
| 1 | Assemble all necessary materials which will be used during harvesting | Ensure all equipment are functioning properly |
| 2 | Harvest net plot and avoid border plants | Consult the field records |
| 3 | Harvest plot by plots to avoid plot mixtures | Validate each plot before harvest |
| 4 | Observe standardized time limit set for data collection in each day | Be guided by the quantity of plants/plots that can be phenotyped per day |
| 5 | Collect data on each parameter based on the prescribed standard protocol | Trained personnel should be involved in phenotyping |
| 6 | Export and upload data into cassavabase |  |

# Dry Matter content determination

SOP for dry matter (DM) using oven dry and specific gravity methodology

**Sampling procedures**

1. Oven dry method:

* label all samples for dry matter determination.
* Select about 3-5 medium sized root samples
* Carefully peel the roots removing outer and inner skin (do not scrape flesh)
* Remove dirt from the root and shred
* Weigh 100 or 200 grams into well labelled paper bag and oven dry at a temperature of 700C for 72 hours
* Take final weight and compute % DM using calculation
* Formula = (final wt/fresh wt) X 100%

1. Specific gravity method:

* label all samples for dry matter determination
* Calibrate scale before use and ensure the unit of measurement is in grams
* Ensure the sensitive scale is shielded from wind and standardize scale (zero) before taking the measurement.
* Select roots weighing between 4-5kg (medium or large sized root)
* Carefully remove dirt from root skin
* Take the weight of root samples with mettle balance using basket or net and re-suspend the container in water and take weight under water
* Change the water if the water is getting turbid sand and dirt will influence the result
* Compute DM on specific gravity basis using formula
* Specific gravity (X) = Wt air

Wt air – wt water

DM content = 158.3 \*X – 142.0 (Kawano *et al*., 1987)

Formula derivation for Starch content (Y):

Y = 210.8\*X – 213.4 (IITA, NRCRI) Kawano *et al*.,

Y= 0.867\*X – 2.8082 (IITA)

Y= 112.1\*X – 106.4 (Kawano *et al.*, 1987)