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**OFRA Data Entry Protocol**

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**Introduction**

**About OFRA;**

The Optimizing Fertilizer Recommendations in Africa (OFRA) project is administered through the CABI-coordinated Africa Soil Health Consortium (ASHC) in partnership with the University of Nebraska, Lincoln (UNL). The project is implemented by 13 National Agricultural Research Systems (NARS) in Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Niger, Nigeria, Mozambique, Rwanda, Tanzania, Uganda and Zambia. The project aims to improve profitability of fertiliser use by smallholder farmers within an integrated soil fertility management (ISFM) framework.

The fertilizer use optimization in the project targets the staple food crop systems, i.e. maize, sorghum, pearl and finger millet, teff, rice, cassava, bean, groundnut, soybean, pigeonpea, chickpea, and cowpea, depending on importance in agro-ecological zones. OFRA is funded by the Alliance for the Green Revolution in Africa (AGRA).

**OFRA data collection**

OFRA is consolidating existing research data on fertilizer response trials across sub-Saharan African region. To address gaps emerging from previous work, fertilizer response trials are set up in the 13 OFRA countries across different AEZs. All these data are collected using standard excel templates and uploaded into a central database. The templates can be downloaded from the database online portal after logging in with a user name and password, the same are required when uploading data. All country project partners have been set up with these login credentials. The data are used to develop crop nutrient response functions that are applied for profit maximization using a linear programming routine implemented in Microsoft Excel and packaged as a fertilizer optimization tool (FOT). Dataset and attribute level Meta data will be developed and availed as a separate document.

**Trial, block and plot definitions**

A location has one or more trials. Each trial has a site which needs to be characterized separately for each trial at a site. A trial will commonly have three blocks if conducted on station or on other larger fields. On-farm trials on the other hand will have a single block per farm because of land availability and suitability constraints and such trials should be replicated successfully on five on more farms to meet the requirements of a fully replicated trial. These single block on-farm trials will be geographically dispersed within a location and each block therefore needs its own site characterization. These clusters of single block on farm trials are treated as the equivalent of a fully replicated trial conducted at a given site.

Plots are the physical areas where the treatments are applied and harvest information obtained. Coordinates are recorded at the 4 corners of a block although there is a provision at the trial site description template to record a single set of coordinates at the trial level. At the request of GYGA, crop yield data from farmers’ fields nearing OFRA trials are collected and recorded as part of trial description information.

**OFRA data collection templates**

The templates can be downloaded after logging into the OFRA data portal at; <http://ec2-54-93-187-255.eu-central-1.compute.amazonaws.com/> in the Download templates section.

There are options to download all the trial templates as a single zip folder or to download a required/ specific template.

Generally, the templates have been designed to collect data at trial, block and plot levels. Weather data is collected at the block level in anticipation of different weather data collected at single block on farm trials. Where a single set of weather data is collected at a cluster of such single replication on farm trials forming a fully replicated trial, then the weather data shall be aggregated at the trial level.

Legacy data on fertilizer response trials are captured using the legacy data template, data in this template are captured as treatment means. These data are used to calculate asymptotic response functions. The coefficients estimates are recorded in the asymptotic response functions template. Based on this, AEZ specific fertilizer optimization tools will be developed.

AfSIS data template relies on legacy and trial data coordinates to fetch spatial covariates from the AfSIS database using an R function which has been developed outside the database.

The diagram below shows the relationship between templates; the number in brackets refers to a part of the document where the template is described further.

Trial Level



Trial site characterization

Soil samples

Block level

Observations

Plot level

Foliar analysis

Activities

Fertilizer treatment

(N, P, K, MicroNut, ISFM)

Harvest data

**Nomenclature (templates colours)**

**Colour codes on the templates**

The colour denotes a field containing a unique identifier for the excel template, these is used to identify each row of data in the database.

The colour denotes a unique identifier coming from another template; it forms the basis for the construction of the unique identifier denoted by the colour above.

The unique identifiers are used to bind data across different templates. For example block to plot and plots to plot-activities and form the basis of the relationships in the database schema.

The colour denotes a field that cannot be left blank in the excel template

**Template description and generation of unique identifiers -UID**

**Trial level**

The trial site characterization folder or simply trial folder carries the **trial definition**, **trial soil sample** and **trial soil results** templates

The trial site characterization templates are the first to be filled once a site has been identified in the respective countries that meets the conditions outline in the protocol. Below is a demonstration of how to go about filling the first few entries of the trial definition template. Once the mandatory entries (in red) are made, the Trial Unique Identifier (UID) is automatically generated within the template.

|  |  |  |
| --- | --- | --- |
| **Identification** | **Value** | **Data entry notes** |
| Country | KE | (Required)See list of countries in "Lists" sheet |
| Region Name | CENTRAL |  |
| Region Code | CEN | (Required)A three character code given for the Region |
| District Name | KANDARA |  |
| District Code | KAN | (Required) A three character code given for the District |
| Village Name | KARITI |  |
| Village Code | KAR | (Required)A three character code given for the Village |
| Crop One | MZ | (Required)See list of crops in "Lists" sheet |
| Variety of crop One | Local Maize |  |
| Crop Two | BN | If inter-crop. See list of crops in "Lists" sheet |
| Variety of crop Two | Local beans |  |
| Crop Three | SG | If inter-crop. See list of crops |
| Variety of crop Three | Local Sorghum |  |
| Year | 2014 | (Required)In full e.g. 2014 |
| Season | LR | (Required)Season: (LR) Long Rain, (SR) Short Rain, (UM) Unimodal |
|  |  |  |
| Trial Unique Identification (UID) | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR | IMPORTANT!!!Use this to identify the trial in other templates. Used in Block and Plots sheets |

**UID;**

**KE**- Country code, **CEN**-Region Name code, **KAN**-District Name code, **KAR**-Village Name code, **MZBNSG**-Crop name code, **2014LR**- Year and season

**Appendix 8 of OFRA protocol details how to go about naming of trials. Country and crop codes have been developed in the list section of the excel workbook.**

Note that the data below concerning block and plot are needed at the trial description stage of data collection. So after completing the trial excel sheet, move to the **blocks** and finally the **plots** and refer to the **lists** sheet for crop and country codes.



**Block data collected at trial site characterization**

|  |  |
| --- | --- |
| **Trial UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR |
| **Block Number** |  |
| **Latitude point 1** |  |
| **Longitude point 1** |  |
| **Latitude point 2** |  |
| **Longitude point 2** |  |
| **Latitude point 3** |  |
| **Longitude point 3** |  |
| **Longitude point 4** |  |
| **Longitude point 4** |  |
| **Elevation** |  |
| **Data entry notes** |  |
| **Block UID (IMPORTANT! Used to identify a block in other templates)** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1 |

**Plot data collected at the trial site characterization**

|  |  |
| --- | --- |
| **Trial UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR |
| **Block Number** |  |
| **Plot Number** |  |
| **Area (M2)** |  |
| **Nitrogen (kg/ha)** |  |
| **Phosphorus (kg/ha)** |  |
| **Potassium (Kg/ha)** |  |
| **Sulphur (Kg/ha)** |  |
| **Zink (Kg/ha)** |  |
| **Magnesium (Kg/ha)** |  |
| **Boron (Kg/ha)** |  |
| **Manure (Kg/ha)** |  |
| **Crop One** | **See codes in "Lists" sheet** |
| **Crop Two**  | **See codes in "Lists" sheet** |
| **Crop Three**  | **See codes in "Lists" sheet** |
| **Observations**  | **If any** |
| **Plot UID (IMPORTANT! Used to identify a plot in other templates)** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101 |

**Trial soil sample**

This template is filled once the soil samples are collected. All the fields in the template are mandatory.

|  |  |
| --- | --- |
| **Trial UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR |
| **Trial soil sample code** | TSS001 |
| **Collection Date (yyyy-mm-dd)** | 2014-02-02 |
| **Depth (cm)** | 20-50 |
| **Trial Soil sample UID (IMPORTANT! Used to identify a sample in the block trial results template)** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_TSS001 |

**TSS001-** Sample Serial Number running from 000001 through to 999999 with a prefix of the laboratory name where spectral measurement were done

**Trial soil results**

The template is completed after receiving results from ICRAF. The first column of the template is a UID that corresponds to the UID generated at the trial soil sample template

|  |  |
| --- | --- |
| **Trial Soil Sample** **UID** | BF\_HOU\_BOB\_FAR\_MZBNSG\_2014LR\_ TSS001 |
| **SSN** | TSS001 |
| **Analysis Date (yyyy-mm-dd)** | 2014-02-02 |
| **Analysed soil parameters** |  |

**Block level**

The block folder contains; **block activities**, **observations**, **soil results**, **soil samples** & **weather data** templates

**Block Activity**

This template capture activities done at the block level

**Note**; the unique ID in this template builds on the UID from the trial definition template above

|  |  |
| --- | --- |
| **Block UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1 |
| **Activity ID** | Generate a sequential series of numbers for the activity ID e.g. 1, 2, 3…. |
| **Activity Date (yyyy-mm-dd)** | 2014-11-05 |
| **Activity Type (See codes in "Lists" sheet)** | Should match the activity type codes in "Lists" sheet |
| **Notes (Important short Notes on the activity)** |  |

**Block observations**

The template captures general observations made at the block level

|  |  |  |
| --- | --- | --- |
| **Bock UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1 |  |
| **Observation ID** |  | Generate a sequential series of numbers for the observation ID e.g. 1, 2, 3…. |
| **Observation Date (yyyy-mm-dd)** | 2014-10-05 |  |
| **Observation** | e.g. Block was flooded  |  |
| **The observation is related to a disease (Y or N)** |  |  |

**Block soil samples**

This template is filled once the soil samples have been collected.

|  |  |  |
| --- | --- | --- |
| **Block UID**  | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1 |  |
| **Block soil sample code** | TSS00001 |  |
| **Collection Date (yyyy-mm-dd)** | 2014-02-02 |  |
| **Depth (cm)** |  |  |
| **Block Soil sample UID**  | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1\_ TSS00001 | **(IMPORTANT! Used to identify a sample in the block soil results template)** |

**Block soil results**

This template should be filled once analysis results are obtained from ICRAF

|  |  |
| --- | --- |
| **Block Soil Sample UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_ TSS00001 |
| **SSN** | TSS00001 |
| **Analysis Date (yyyy-mm-dd)** | 2014-02-02 |
| **Analysed soil parameters** | xxxx |

**Block weather data**

Used to record weather data where this is available

|  |  |
| --- | --- |
| **Block UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1 |
| **Collection Date (yyyy-mm-dd)** | 2014-02-01 |
| **Measured Weather Parameters** |  |

**Plot level**

The unique ID at the plot level is a combination of the block UID and the plot number

|  |  |
| --- | --- |
| **Dates Folder** | Legumes-plot-flowering-date |
| Maize-plot-silk-date |
| RiMilWhTeff-plot-booting-date |
| SorPMillet-plot-panicle-date |

**The tables below show an example of how the UIDs in the templates are generated. Refer to the list in the trial for country and crop codes**

**Legumes-plot-flowering-date**

|  |  |
| --- | --- |
| **Plot UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1\_101 |
| **Date when 50% of plants has flowered** | yy-mm-dd |

**Maize-plot-silk-date**

|  |  |
| --- | --- |
| **Plot UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1\_101 |
| **Date when 50% of the plants silk** | yyyy-mm-dd |

**RiMilWhTeff-plot-booting-date**

|  |  |
| --- | --- |
| **Plot UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1\_101 |
| **Date of booting** | yyyy-mm-dd |

**SorPMillet-plot-panicle-date**

|  |  |
| --- | --- |
| **Plot UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR \_B1\_101 |
| Date of 50% panicle initiation | yyyy-mm-dd |

**Harvest folder**

The folder contains a number of sub-folders with various templates to accommodate for differences in data collected from different crops. These are outlined below;

|  |  |  |
| --- | --- | --- |
| **Harvest Folder** | Beans | plot-harvest-beans |
| plot-harvest-beans-moisture-content |
| Cassava | plot-harvest-cassava |
| plot-harvest-cassava-dry-weights |
| Maize | plot-harvest-Maize |
| plot-harvest-Maize-moisture-content |
| plot-harvest-Maize-silk-date |
| plot-harvest-Maize-stover-dry-weight |
| Other legumes | plot-harvest-othlegumes |
| plot-harvest-othlegumes-moisture-content |

**What follows below is how the unique ID are constructed in the respective templates**

**Plot harvest beans**

|  |  |
| --- | --- |
| **Plot UID** | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101 |
| Harvest Date (yyyy-mm-dd) |  |
| Plant count in harvested area |  |
| Above ground biomass weight in Kg |  |
| Grain yield Kg |  |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |

**Plot-harvest-beans-moisture-content**

|  |  |
| --- | --- |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |
| Grain moisture content in percentage |  |

**Plot-harvest-cassava**

|  |  |
| --- | --- |
| Plot UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101 |
| Harvest Date (yyyy-mm-dd) |  |
| Plant count |  |
| Tuber Count |  |
| Tuber yield (Kgs) |  |
| Fresh tuber Sub-sample (Kgs) |  |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |

**Plot-harvest-cassava-dry-weights**

|  |  |
| --- | --- |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |
| Peeled dry tuber sub-sample (Kgs) |  |
| Dry weight of peeled tuber (Kgs) |  |

**Plot-harvest-Maize**

|  |  |
| --- | --- |
| Plot UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101 |
| Harvest Date (yyyy-mm-dd) |  |
| Plant count |  |
| Ear count |  |
| Ear weight in Kg |  |
| Grain yield in Kg |  |
| Stover yield in kg |  |
| Stover sub-sample weight in Kg |  |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |

**Plot-harvest-Maize-moisture-content**

|  |  |
| --- | --- |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |
| Grain moisture content in percentage |  |

**Plot-harvest-Maize-Stover-dry-weight**

|  |  |
| --- | --- |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |
| Stover sub-sample dry weight (kg) |  |

**Plot-harvest-other legumes**

|  |  |
| --- | --- |
| Plot UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101 |
| Harvest Date (yyyy-mm-dd) |  |
| Plant count in harvested area |  |
| Above ground biomass weight in Kg |  |
| Grain yield per plot in Kg |  |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |

**Plot-harvest-other legumes-moisture-content**

|  |  |
| --- | --- |
| Harvest UID | KE\_CEN\_KAN\_KAR\_MZBNSG\_2014LR\_B1\_101\_2014-02-02 |
| Grain moisture content in percentage |  |

**Data flow model**

The figure below illustrates the data flow process from excel data entry to the final stage where the data is available in the online portal. Note that the online portal provides a way to visualize the data stored in the MSQL tables.

********

Database

Dataset Input & output

SQL

Online Portal

CSV, xlsx

Excel Processing

(Custom tool)

Query

Excel data entry

Customized CKAN

Paper template

**Navigation through the portal**

The data portal provides end user with the ability to visualize the data stored in the MySQL database. The portal can be accessed using the link below;

<http://ec2-54-93-187-255.eu-central-1.compute.amazonaws.com/>

The top ribbon of the portal as shown below has a number of sections discussed below;

 

**Datasets section**

Dataset section gives an overview of all data in the portal. There are tags on the left had side of the page that allows users to narrow a dataset search by country, crop, data set type (trial, Legacy, response functions) and cropping system type (mono or intercrop). From this section, data that was uploaded into the database as private data cannot be accessed by a third party.

**Organizations section**

Each OFRA country has been provided with a space in this section. Partners can only access their respective spaces by successfully logging in into the portal in the **log in** section at the top right hand corner of the page. A username and password will be provided for this and can be changed to fit the user need. All data uploaded in the portal is the property of the organization and hence attached to the organization’s space.

**Accessing data**

Once the user is successfully logged in, the upload datasets and download templates sections of the portal become visible.



**Upload datasets section**

Below is a snapshot of the upload data page. The upload type – refers to the type of data the user intends to upload. The type corresponds to the name given to the template. The template file selects allows the use to select the relevant file to upload. The final stages are for the use to select their organization and set the visibility type on the data, data set as public will be accessible to 3rd parties. Then click on the upload button.



**Download data templates section**

This section provides the use with the opportunity to download the OFRA data collection templates. Strict adherence to these templates is required in order to successfully upload data in the portal.