



AGROFIMS v.2.0

# USER MANUAL



Platform for  
Big Data  
in Agriculture



Alliance



AgroFIMS - 2020

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## GETTING STARTED

This documentation provides instructions to help you get familiarized with the interface and to produce a fieldbook that you can use to collect well-described, standards-compliant data in the field.

### About AgroFIMS

The Agronomy Field Information Management System (AgroFIMS) allows users to create fieldbooks to collect agronomic data. The fieldbook is already tied to a metadata standard (the [CG Core Metadata Schema](#), aligned with the industry standard Dublin Core Metadata Schema and required by CGIAR and many other repositories). The data variables and protocol parameters in AgroFIMS fieldbooks align with semantic standards like the [Agronomy Ontology](#) (AgrO). This *a priori* compliance with data standards facilitates data to be Findable, Accessible, Interoperable, and Reusable (FAIR) at collection, making it easier to interpret and aggregate.





Data collection is currently available via the Android-based [KDSmart](#) or [Field Book](#) applications, and the collected data can be imported back to AgroFIMS for statistical analysis and reports. By mid-2021 you will be able to easily upload this collected data through AgroFIMS to a Dublin Core or CG Core-compliant Dataverse repository. In 2021 AgroFIMS will also allow you to set up agronomic survey questionnaires, for data collection via ODK.

To enable access, exchange, and integration of agronomic data across systems and applications we have made available the Agronomy API or AgrAPI, which is a RESTful web service API specification. The AgrAPI blueprint can be implemented in different programming languages, but is currently implemented in the R statistical programming language, allowing you to analyze your data with the R packages and graphics of your choice.

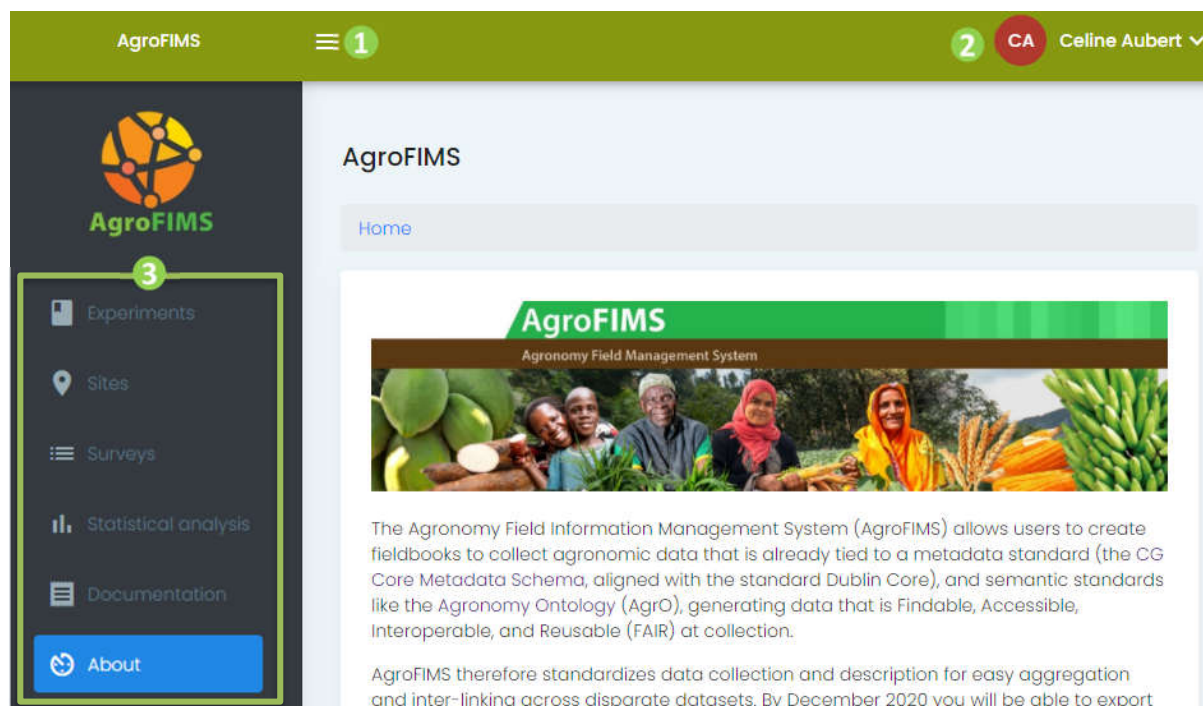
Funding for AgroFIMS was provided by the Bill and Melinda Gates Foundation's Open Access, Open Data Initiative, and the [CGIAR Platform for Big Data in Agriculture](#). AgroFIMS is available for use under a [GPL license](#).

### AgroFIMS workflow

AgroFIMS works in collaboration with Android applications like KDSmart, ODK Collect and Field Book to provide a complete standards-compliant workflow, from picking data variables and experimental protocol parameters to create an Excel fieldbook, through data analysis and upload to data repositories. Below are the different steps to follow to create, collect, analyze and save data using AgroFIMS:

-  1. Fieldbook creation in AgroFIMS
-  2. Digital data collection with KDSmart, ODK or Field Book mobile apps
-  3. Data analysis via AgroFIMS statistical analysis module
-  4. Data archiving in a standards-compliant institutional repository (for v.3.0)

## Home screen

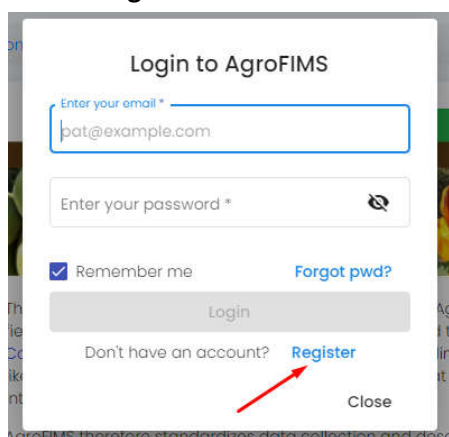


- 1 Button to open and close the Menu
- 2 Profile settings, log in and to log out
- 3 Navigation menu

## SETTING UP AND MANAGING YOUR ACCOUNT

### Signing up

1. Go to <https://agrofims.org/>
2. Click on **Register**.



3. Enter your email, first name, last name, email, affiliation, and country.
4. Click **Register**.

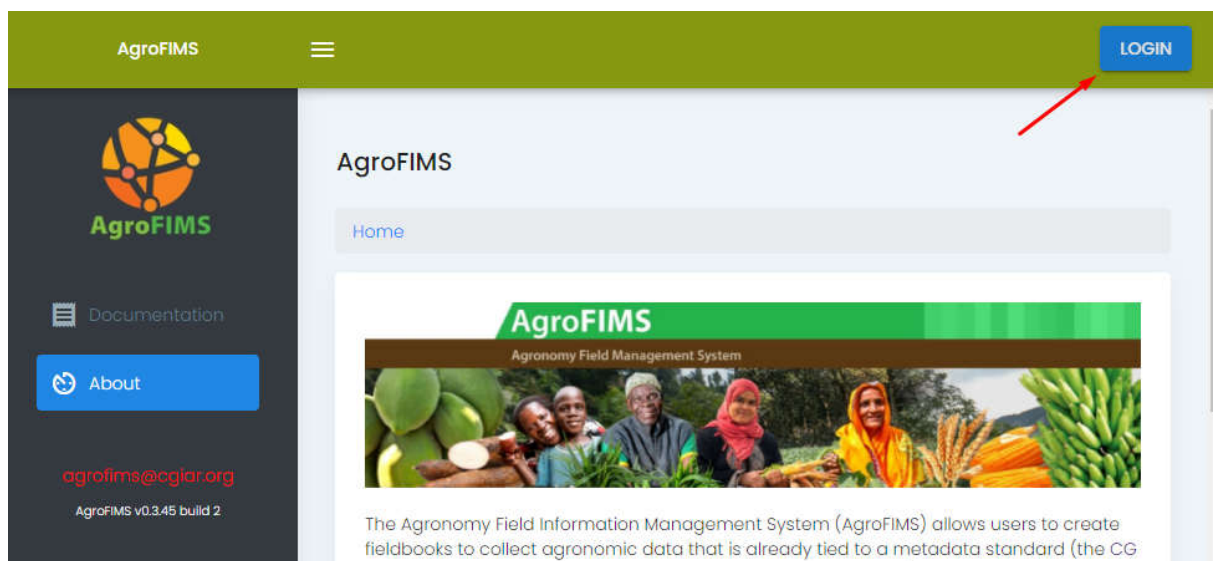
5. An email will be sent to your mailbox with a link to activate your account and a password.
6. Click on the link to activate your password.
7. Go to <https://agrofims.org/> to log in. We recommend that you modify the password sent and change it frequently.

*Note:* Don't forget to check your spam folder if you don't see the email in your inbox!

## Logging in

1. Go to <https://agrofims.org/>
2. Enter your email and your password.
3. Click on **Login**.

*Note:* If the login screen is not open when you reach AgroFIMS, click on **LOGIN** at the top right corner of the Home page.



## Updating your password

1. Log in.
2. Click on Profile settings at the top right corner of the Home page.
3. Select **Authentication**.
4. Enter your current password and a new one.
5. Click **Update password**.
6. Your password has been updated and you can now log in with your new password.

## Requesting a new password

1. Go to <https://agrofims.org/>
2. On the login screen select "**Forgot your pwd?**".
3. If the login screen is not open when you reach AgroFIMS, click on **LOGIN** at the top right corner of the Home page.
4. Enter your email and click on **Reset my password**.
5. A new password will be sent to your email address. Don't forget to check your spam folder.

## Modifying profile information

You can only view your profile information by selecting **Profile settings** at the top right corner of the Home page, and then **Profile**. If you wish to update your profile information, please send an email to [agrofims@cgiar.org](mailto:agrofims@cgiar.org).

## CREATING AND MANAGING SITES

Before creating your fieldbook, you may want to create the site where your experiment is to occur.

### Creating a new site

1. Select **Sites** in the navigation menu at left on the home page.
2. Click on the button **New site**.
3. Add information about the site type, site name, country name and administrative divisions using text boxes and picklists as appropriate. You can zoom into the map to find the name of your location, but you cannot use the map to directly pinpoint the site and have all the administrative information automatically filled.
4. Once you have filled in information about the site, it should be pinpointed on the map.
5. Click **Create** at the bottom left of the page.

### Viewing site information

1. Go to **Sites** in the navigation menu at left of the home page.
2. Click on the blue eye icon next to the site about which you want information.

### Deleting a site

1. Go to **Sites** in the navigation menu.
2. Click on the red bin icon next to the site you want to delete.

### Updating information for a site

A site cannot be updated. You must create a new site.

### What is a site ID?

The site ID is a unique identifier automatically generated by AgroFIMS to distinguish the sites in your list.

# CREATING A NEW FIELDBOOK

## STEP 1. EXPERIMENT

An experiment embraces your global project and can include multiple fieldbooks. In the tab **Experiments** you can detail the metadata of the experiment.

### Creating a new experiment

1. In the navigation menu select **Experiments**.
2. Click on the button **New Experiment**.
3. Enter an experiment name.
4. Click on the button **Create** to validate your new entry.

### Experiment ID

The Experiment ID is a code generated by AgroFIMS to uniquely name experiments. It is made up of the first two letters of experiment name + the first two letters of experiment project name + a unique number.

### Leaving a field blank

Mandatory fields are marked with an asterisk. All other fields may be left blank. However, we recommend that you provide as much information about your experiment as possible. Robust metadata will allow better understanding and interpretation of your data set, and greatly augment its discovery and re-use in the immediate and distant future, assuring that your data continues to provide value well after collection.

### Adding a Funding agency – Project management entity – Experiment lead

Click on the **+Add** button to add a new line.

### Removing a Funding agency– Project management entity – Experiment lead

Click on the red **x** at the upper right of an information field to remove it.

## STEP 2. PERSONNEL

In this section you can add information about the personnel linked to the experiment.

Experiment Personnel Fieldbooks

---

Personnel associated with the experiment 1 [Load my info](#)

<p>Person type Researcher</p> <p>First name Emma</p> <p>Last name Ngongang</p>	<p>Email e.ngongang@cgiar.com</p> <p>Affiliation CGIAR center</p> <p>Choose CGIAR center IITA - International Institute of Tropical Agriculture</p> <p>ORCID ORCID-15620156455</p>
--	--

[+ Add personnel](#) 2 3 ✕

### Loading my info

You can start by adding your profile information using the button **Load my info** 1. This will auto-fill the boxes with information registered in your profile.

### Adding personnel

Click on 2 to add a new person to the experiment, and then add information about him/her.

### Removing personnel

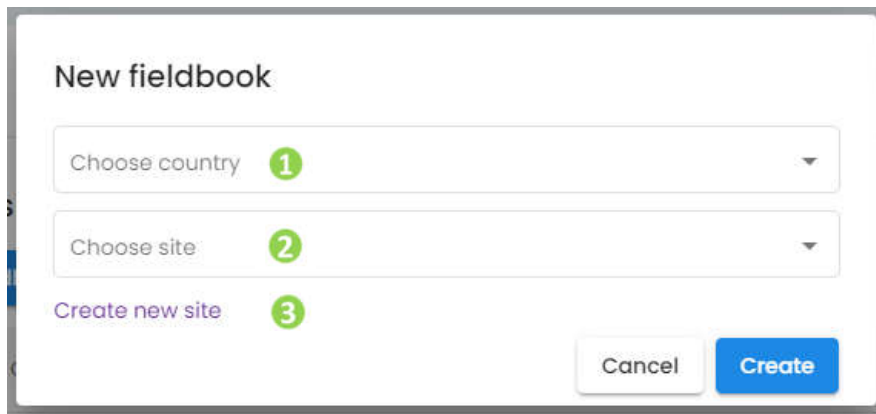
Click on the red ✕ 3 at the top right of the personnel box to remove a person's information.

## STEP 3. FIELDBOOKS

An experiment may have multiple fieldbooks to accommodate multi-location or multi-season experiments. In that case, you may create one fieldbook per location and per season.



## Creating a new fieldbook



The screenshot shows a 'New fieldbook' dialog box. It contains two dropdown menus: 'Choose country' (marked with a green circle 1) and 'Choose site' (marked with a green circle 2). Below the dropdowns is a link 'Create new site' (marked with a green circle 3). At the bottom right are 'Cancel' and 'Create' buttons.

1. Click on the button **Add Fieldbook**
2. Choose a country in the drop-down list. **1**
3. Choose a site in the drop-down list. **2**

*Note:* To be able to create a new fieldbook, you must have created your site first. To create your site, click on **Create new site** **3**

## I don't find my site

1. If your site doesn't appear in the site list, check the list by clicking on **Sites** in the navigation menu.
2. If the site is not listed, it may not have been saved during its creation. You may create the site again by clicking on the blue button **+ New site**.

## Editing a fieldbook

1. Click on **Experiments** on the navigation menu.
2. Open the experiment of your choice by clicking on the **Open** icon on the right side of the experiment line.
3. Go to the **Fieldbooks** tab.
4. Click on the **Open** icon on the right side of the Fieldbook line to open it.

*Note:* When you edit a fieldbook, only the edited version is saved. You won't be able to retrieve the original version. A **duplicate fieldbook** option will soon be available.

## Removing a fieldbook

1. Click on **Experiments** on the navigation menu.
2. Open the experiment of your choice by clicking on the **Open** icon on the right side of the experiment line.
3. Go to the **Fieldbooks** tab.
4. Click on the red bin icon on the right side of the fieldbook line to remove it.

## Importing an existing fieldbook?

It is currently not possible to import a fieldbook into AgroFIMS.

### STEP 4. SITE

Once you have created a fieldbook, you can describe your experimental site and its surroundings

- Site information - specifies the country and name of your experiment site.
- Site description - provides details on the surroundings of your experiment site.
- Soil classification might be known before the experiment starts and detailed in this section.

### STEP 5. CROP

This section is dedicated to the description of the crops cultivated in the experiment.

#### Adding a crop or a variety to the experiment

1. Select the type of cropping system of your experiment. Currently the choices are: Monocrop, Intercrop or Relay crop.
2. Select the crop's common name. If the crop is not listed, select "Other" and specify the crop common name. If "Intercrop" or "Relay crop" are selected, AgroFIMS will require you to add at least 2 crops. To add more, click on **+ Add crop**.
3. Enter the variety name. You can enter as many varieties as needed.

*Note:* the code next to the cropping system box is the Fieldbook ID, a unique identifier created by AgroFIMS to identify your experiment. It is a concatenation of the following information: F\_Cropping type\_Crop name\_Experiment start date\_Country. "F" stands for Fieldbook in this case

#### Importing a list of varieties or genotypes

It is not currently possible to import a list of varieties or genotypes. You will need to manually enter or paste on by one your variety names in the text box: Variety name(s).

### STEP 6. DESIGN

In this section you can specify the design of the experiment, including treatments, levels etc.

## Specifying the design of the experiment

The screenshot shows the 'Design' tab in the AgroFIMS interface. It includes a navigation bar with options: Site, Crop, Design (selected), Fertilizer, Management practices, Crop Measurement, Crop Phenology, and Weather. The main content area is titled 'Experimental design' and contains a dropdown menu for 'Experiment design' set to 'Completely Randomized Design (CRD)'. Below this is the 'Experimental unit' section, which has a dropdown menu set to 'plot'. Underneath, there are two pairs of input fields: 'Length' and 'Width', both set to '10', and 'Unit' dropdowns for both, both set to 'm'.

1. Select the experimental design of your experiment using the drop-down list. 1
2. Select the experimental unit (plot, field, pot). 2
3. Enter the dimensions of the experimental unit selected and select a unit to express the size of the experimental unit using the dropdown list. 3

## Creating an experiment with only 1 replication

It is not possible to design an experiment with only one replication, thus, AgroFIMS requires that you add at least two replications. Currently AgroFIMS does not allow data collection from demonstration experiments and farmer surveys, which may not be replicated. This capability will be developed in the next version.

## Defining the treatment of the experiment

A treatment is a combination of factor levels. A factor is a controlled independent variable whose levels are set by the experimenter. Each factor has two or more levels (i.e. two or more different values)<sup>1</sup>.

The screenshot shows the 'Treatment description' form. It includes a 'Number of treatments' dropdown set to '3' and a 'Repetitions' dropdown set to '2'. Below these is the 'Factor' section, which has a 'Crop variety' dropdown. To the right of this is the 'Crop variety' section, which has an 'Enter levels' input field with two buttons: 'HighZinc' and 'LowZinc'. Below this is a 'Notes' text area. At the bottom of the form is a blue '+ Add factor' button.

<sup>1</sup> <https://stattrek.com/statistics/dictionary.aspx?definition=treatment>

1. Specify the number of treatments and repetitions (or blocks). **1**
2. Select a factor in the list. **2** If the factor is not listed, select “Other” and specify the name of the factor.
3. Enter the levels of the factor. **3**
4. To add another factor, click on **+ Add factor**. **4**
5. For the CRD and RCBD designs, define the treatments by assembling the factors and their levels using the dropdown menus at the bottom of the page.

### Treatment

Treatment LowZinc / 0	Crop variety LowZinc	Number of irrigations 0
Treatment HighZinc / 5	Crop variety HighZinc	Number of irrigations 5
Treatment LowZinc / 5	Crop variety LowZinc	Number of irrigations 5

## Finding your factor

1. Scroll through the dropdown menu or start typing the name of the factor; AgroFIMS will narrow down the possibilities for you. The factors are listed using broader categories. This means that if you want to test different amounts of urea, the factor you should select is “Fertilizer amount”. If you want to test different potato varieties, the factor will be “Crop variety”.
2. If the factor is not in the list, select “Other”. Then type the name of the factor in the text box, select the type of input, the unit if needed, and the levels.

**Factor**

Other

Other

Days without light

**Other**

Type of input  
levels + units

Enter levels  
0 10 15

Unit  
days

Notes

## Type and amount factor

To allow a wide range of treatments, some factors have been grouped together. For example, the fertilizer amount factor has been grouped with the fertilizer type factor. This way it is possible to compare different types of fertilizer with different amounts (Urea super granule 100kg/ha and 50kg/ha vs urea phosphate 100kg/ha).

*Note:* This is the case for mulch, fertilizer, irrigation, weeding product, crop residue, nutrient element, biotic stress, and biotic stress control product.

For these factors:

1. Select the factor in the list.
2. Specify the type of factor.
3. Enter the level and their units.
4. Click **+**, if you need to add another type of the same factor.

The screenshot shows a 'Factor' configuration panel. On the left, a dropdown menu is set to 'Mulch type and amount'. On the right, a detailed configuration box titled 'Mulch type and amount' is visible. It contains a 'Type' dropdown set to 'Bark', an 'Enter levels' section with two input fields containing '100' and '200', a 'Unit' dropdown set to 'kg/ha', and a 'Number of splits' dropdown set to '1'. A red arrow points to a blue circular button with a white plus sign located at the bottom left of the configuration box.

## Fertilizer type and amount factor

For this factor you have the possibility to calculate the nutrient amount that will be applied to the field and to specify the management practices.

1. Select "Fertilizer type and amount" in the factor list.
2. Select the crop to which you will apply the fertilizer, in intercrop and relay crop experiments
3. Once you have specified the fertilizer type, levels and number of application splits, click on **Application details**.

The screenshot shows a 'Factor' configuration panel. On the left, a dropdown menu is set to 'Fertilizer type and amount'. On the right, a detailed configuration box titled 'Fertilizer type and amount' is visible. It contains a 'Type' dropdown set to 'Urea', an 'Enter levels' section with two input fields containing '100' and '200', a 'Unit' dropdown set to 'kg/ha', and a 'Number of sp...' dropdown set to '1'. At the bottom of the configuration box, there is a blue circular button with a white plus sign and a blue rectangular button labeled 'Application details'. A red arrow points to the 'Application details' button.

4. A pop-up window will appear.

5. The nutrient content in the product is added by default. Update it if it does not correspond to your specific fertilizer product.
6. Optionally, specify the fertilizer application timing, technique and traction used to apply the fertilizer.
7. Click on **Calculate** to get the amount of nutrient that will be applied in the field for each level. This information will be displayed in the Protocol tab of the Excel fieldbook that is generated, and in “Trial attributes” in the KDSmart app.

*Note:* (1) This calculation is currently on a per hectare basis; you will need to use this to calculate the amount required for the area over which you are applying the fertilizer. We will incorporate plot size into the calculation in an upcoming version.

(2) In case of P<sub>2</sub>O<sub>5</sub> phosphorous fertilizer, the calculation provides the amount of elemental phosphorous.

## Nutrient type and amount factor

For this factor you have the possibility to calculate the amount of product to be applied in the field and to specify the management practices.

1. Select “Nutrient type and amount” in the factor list.
2. Select the crop to which you will apply the nutrient, in intercrop and relay crop experiments.
3. Once you have specified the type, levels and number of splits, click on **Application details**.
4. A pop-up window will appear.
5. Optionally, specify the fertilizer product application timing, the technique and traction that will be used to apply the product.
6. Select the product to apply from the list. If the product is not listed, select “Generic fertilizer”.
7. Check if the **Nutrient content in product** data corresponds to your fertilizer product. Modify the nutrient content in the product if needed.
8. Click on **Calculate** to get the amount of product that must be applied in the field to get the level of nutrient desired. This information will be displayed in the Protocol tab of the Excel fieldbook and in “Trial attributes” in KDSmart.

*Note:* This calculation is currently on a per hectare basis; you will need to use this to calculate the amount required for the area over which you are applying the fertilizer. We will incorporate plot size into the calculation in an upcoming version.

## STEP 7. FERTILIZER

In this section you can describe the fertilizers and nutrients that will be applied to the experimental field. Work in the tab called Field if the input will be added to the entire experimental field. Work in a specific crop tab if different inputs or parameters relate to different crops in case of intercropping or relay cropping.

## Adding a fertilizer application

Site Crop Design **Fertilizer** Management practices Crop Measurement Crop Phenology Weather Soil

Fertilizer  
Rice

1 Product Nutrient

2 unit  
kg/ha

3 Add Application

Split application #1 ⊗

Product 4 (kg/ha)

5 Nutrient content in product (%)

N	P	K	Ca	Mg	S	Mb	Zn	B	Cu	Fe	Mn	Ni	Cl
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

+

Timing Technique Traction

Calculate

1. Select **Product** at the top of the window. 1
2. Select the unit you will use. 2
3. Click on the button **Add Application**. 3
4. Select the product you will apply to the field. If your product is not listed, select “Generic product” 4
5. If your application is a mix of multiple products, click on the + button to add the complementary products.
6. Check if the **Nutrient content in product** data corresponds to your fertilizer product. Modify the nutrient content in the product if needed. 5
7. Optionally, specify the fertilizer product application timing, technique and traction that will be used to apply the product.
8. You can add as many applications as needed by clicking on **Add Application**. 3
9. Once, you have added all the products that will be applied to the field, click on **Calculate** to get the amount of nutrient that will be applied in the field for each level. This information will be displayed in the Protocol tab of the Excel fieldbook and in “Trial attributes” in KDSmart.

## Adding a nutrient application

Site Crop Design **Fertilizer** Management practices Crop Measurement Crop Phenology Weather Soil

Fertilizer  
Rice

Product Nutrient 1

+ Add Application 2

Split application #1

3	N	P	K	Ca	Mg	S	Mb	Zn	B	Cu	Fe	Mn	Ni	Cl
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Product 4

5 Nutrient content in product (%)	N	P	K	Ca	Mg	S	Mb	Zn	B	Cu	Fe	Mn	Ni	Cl
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

+

Timing Technique Traction

Unit  
kg/ha

Calculate

1. Select **Nutrient** at the top of the window. 1
2. Click on the button **Add Application**. 2 You can add as many applications as needed.
3. Edit the table with the quantity of nutrient you want to apply 3
4. Select the product you will apply to the field. If your product is not listed, select "Generic product". 4
5. If your application is a mix of multiple products, click on the + button to add the complementary products.
6. Check if the **Nutrient content in product** data corresponds to your fertilizer product. Modify the nutrient content in the product if needed. 5
7. Optionally, specify the fertilizer product application timing, technique and traction that will be used to apply the product.
8. Select the unit you will use.
9. Once you have added all the nutrient that will be applied to the field, click on **Calculate** to get the amount of product that must be applied in the field to get the level of nutrient desired. This information will be displayed in the Protocol tab of the Excel fieldbook and in "Trial attributes" in KDSmart.

## STEP 8. MANAGEMENT PRACTICES

In this section you can describe the experimental protocol and the information to be collected about practices or interventions made in the field over the course of your experiment. In case of intercropping or relay cropping, work in the tab called **Field** if the practice or intervention relates to the entire experimental field or work in a specific crop tab if the practices vary by crop.



## Management practices

Choose management practices relevant to the experiment from the list below. Then choose more specific practices and assign values to them below as part of the planned protocol (guidelines on how experiment should ideally be managed) and/or actual management (what was actually done in the field/plot). Check one or both of the Planned protocol, Actual management radio buttons as relevant.

Field-level/all plots Chickpea

The screenshot shows the 'Management practices' interface. At the top, there are two dropdown menus: 'Select management practices' (1) and 'Select specific practices' (2). To the right is a blue 'Add' button (3). Below these is a form for 'Harvest cut height'. It has a 'Value' input field with '10' (4) and a 'Unit' dropdown menu with 'cm'. To the right of the form are two radio buttons: 'Planned protocol' (5) and 'Actual management'. The 'Planned protocol' radio button is highlighted in blue.

## Creating a protocol

1. Choose your management practices in the drop-down menu **Select management practices**. 1
2. Select the **specific practices**. 2
3. Click **Add**. 3
4. Complete the information for each of them. 4
5. To add a practice to your protocol, slide the **Planned protocol** button to the right to highlight it in blue. 5
6. Repeat the above steps for each practice you which to add to your protocol.

*Note:* The management practices with the Planned protocol button highlighted in blue will be exported in the tab Protocol of the Excel file, and will be listed under “Trial attributes” in KDSmart. However, they will not appear in Field Book nor in ODK as these two applications do not allow this feature.

## Actual management

If you wish to get information about a management practice that will be done in the field, like the date of sowing or the depth of tillage:

1. Choose your management practices in the drop-down menu **Select management practices**. 1
2. Select the **specific practices**. 2
3. Click **Add**. 3
4. Slide the button **Actual management** to highlight it in blue. 5 The practice will appear in the fieldbook as a measurement to be noted in the field.
5. Repeat the above steps for each parameter for which you will collect information in the field.

*Note:* If both the **Planned protocol** and the **Actual management** are highlighted in blue, the management practice will be listed in the protocol tab with the value you have entered, and will also be listed as a measurement to be taken in the field. This is a way to control if the planned protocol has been followed or not.

## I don't find the management practice I am looking for

If the management practice you are looking for is not listed, you have two options.

1. The first option is to select the broad group of practices related to your practice and select **Note** (ex: Irrigation notes) in the **Select specific practices** drop-down menu. This type of input is free text, allowing you to enter details about the practice.

2. The second option is to select "Other" in the **Select management practices** and **Select specific practices** drop down menus, click **Add**, and then enter the name and value of your practice. Don't forget to slide the **Planned protocol** button if you wish to add the practice to your protocol.

## STEP 9. CROP MEASUREMENT

In this section you can select and describe the measurements to be made on the crops. In case of intercropping or relay cropping trial, the measurements must be separately selected for the individual crops.

*Note:* You must add at least one measurement to create your fieldbook.

## Crop measurement

Common bean Barley

1. In case of intercropping or relay cropping trial, start by selecting the tab corresponding to one of the crops of the trial.
2. Select a measurement in the **Crop measurement** drop-down list. **1** You can either scroll through the list or type the name of the measurement – the auto-complete feature will select the term if the measurement is in the list.
3. If the drop-down list is empty, it may be that you have forgotten to select a crop. Verify that you have selected a crop in the **Crop** section. **2**
4. Once you have found your measurement, select it and click on **Add measurement**. **3** The measurement will be added to the list of measurements for this experiment.
5. Indicate on which part of the plant the measurement will be done (parameter measured **4**), the unit of measurement **5**, the number of times it has to be measured during the season **6**, how many samples have to be taken per plot each time **7** and the measurement timing **8**.
6. You can add as many crop measurements as needed.
7. To remove a measurement, click on the red **x** at the upper right side of the measurement box.

*Note:* Currently, AgroFIMS doesn't allow users to create their own crop measurement nor to change their unit. Please contact us at [agrofims@cgiar.org](mailto:agrofims@cgiar.org) if you would like to discuss measurements you feel should be in AgroFIMS.

## STEP 10. CROP PHENOLOGY

In this section you can select phenological measurements to be made in the field. In case of an intercropping or a relay cropping trial, the measurements will be specified separately for each crop.

1. Select a measurement in the drop-down list. You can either scroll through the list or type the name of the measurement – the auto-complete feature will select the term if the measurement is in the list.
2. If the section is empty, verify that you have selected a crop in the **Crop** section.
3. Click on **Add measurement**.
4. To remove a measurement, click on the red **x** at the upper right side of the measurement box.

Note: Currently, AgroFIMS doesn't allow users to create their own phenological measurements or to change their unit. Please contact us at [agrofims@cgiar.org](mailto:agrofims@cgiar.org) if you would like to discuss measurements you feel should be in AgroFIMS.

< Fertilizer Management practices Crop Measurement **Crop Phenology** Weather >

### Crop phenology

Maize Common bean

Crop phenology + Add measurement

100% pod date TraitUnit: dd/mm/yy ✕

Emergence start date TraitUnit: dd/mm/yy ✕

## STEP 11. WEATHER

This section is dedicated to the selection of weather measurements to make during the experiment.

1. Select a measurement in the drop-down list. You can either scroll through the list or type the name of your measurement – the auto-complete feature will select the term if the measurement is in the list.
2. Once you have found your measurement, select it and click on **Add measurement**. The measurement will be added to the list of measurements for this experiment.
3. You can then indicate its unit, the number of times it has to be measured during the season, and its timing.
4. You can add as many weather measurements as needed.
5. To remove a measurement, click on the red **x** at the upper right side of the measurement box.

< Fertilizer Management practices Crop Measurement Crop Phenology **Weather** Soil >

### Weather measurement

Weather measurement + Add measurement

Air temperature daily ✕

Unit: °C Samples per season: 1 Timing: Frequency Frequency: daily

## STEP 12. SOIL

This section is dedicated to the selection of soil measurements to make during the experiment.

1. Select a measurement in the drop-down list. You can either scroll through the list or type the name of your measurement – the auto-complete feature will select the term if the measurement is in the list.
2. Once you have found your measurement, select it and click on **Add measurement**. The measurement will be added to the list of measurements for this experiment.
3. You can then indicate its unit, the depth of the measurement, the number of times it has to be measured during the season, and its timing.
4. You can add as many soil measurements as needed.
5. To remove a measurement, click on the red **x** at the upper right side of the measurement box.

< Fertilizer Management practices Crop Measurement Crop Phenology Weather **Soil** >

Soil

Field-level/all plots Maize Common bean

Soil measurement + Add measurement

**Soil pH** x

Unit: pH

Depth: 0 x Depth Unit: cm

Samples per season: 1 Samples per Plot: 1

Timing: Other

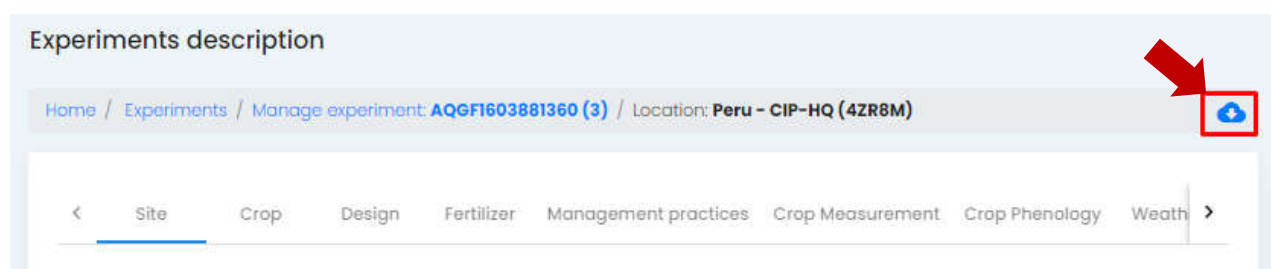
Other: At seeding x

## EXPORTING A FIELDBOOK

### Exporting a fieldbook

To use AgroFIMS fieldbooks with a data collection tool on a mobile device you need to export the fieldbook in a format readable by the mobile application. Currently AgroFIMS is compatible with the Android mobile applications KDSmart and Fieldbook.

1. Select **Experiments** in the navigation menu and select the experiment of your choice.
2. Go to the **Fieldbooks** tab.
3. Open the fieldbook of your choice by clicking on the blue open icon.
4. Click on the cloud icon at the top right of the window.



5. Click on **Build**.
6. If the fieldbook is correctly built, click on **Save**.
7. You can now choose the format you wish to export your fieldbook in:
  - a. If you click on **KDSmart App** a .kdx file will be downloaded to your laptop.
  - b. If you click on **Excel**, an Excel file will be downloaded to your laptop.
  - c. If you click on **Field Book App** a .zip file will be downloaded to your laptop.
  - d. ODK is not yet available.
8. You can send the downloaded files to the data collector or transfer it to the device where the mobile application is installed (via email, a cloud storage service, or direct USB transfer).

## Content of the Excel file tabs

Excel file sheet name	Origin of the content from AgroFIMS interface
Metadata (aligned with the CG Core/ Dublin Core Metadata Schema)	Information from the AgroFIMS tabs: Experiment, Personnel, Site, Crop, Design.
Protocol	Management practices tab with Planned protocol button highlighted in blue.
Notes_Deviations	Sheet designed to note down unexpected events that could happen in the field.
Crop_measurements	Crop measurements tab
Practices	Management practices tab with Actual management button highlighted in blue.
Phenology	Crop Phenology tab
Weather	Weather tab
Soil	Soil tab
TraitList	List of all measurements selected in the Management practices, Crop measurements, Crop phenology, Soil and Weather tabs with their unit, validation rule, data type and timing.

# COLLECTING DATA WITH THE FIELD BOOK MOBILE APP

## STEP 1. DOWNLOADING FIELD BOOK

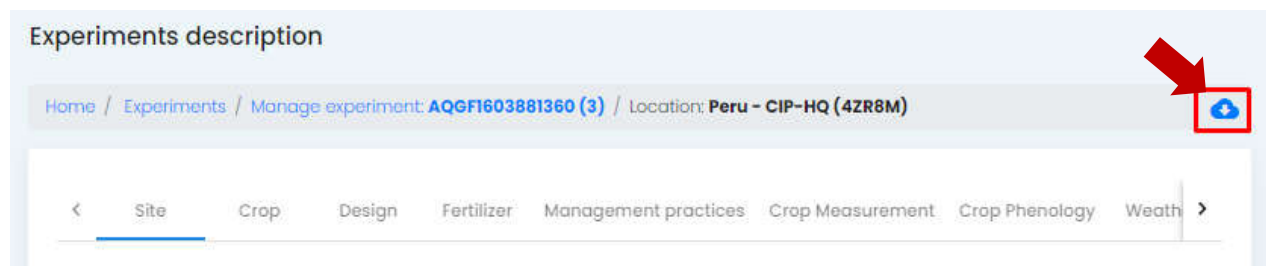
1. Download and install the application on an Android device (tablet, phone etc.) from: <https://play.google.com/store/apps/details?id=com.fieldbook.tracker&hl=en&gl=US>
2. A tutorial for using the Field Book app is available on CGIAR's Excellence in Breeding website: [https://excellenceinbreeding.org/sites/default/files/manual/field\\_book\\_manual\\_v3.pdf](https://excellenceinbreeding.org/sites/default/files/manual/field_book_manual_v3.pdf)

## STEP 2. UPLOADING AN AGROFIMS FIELDBOOK TO THE FIELD BOOK APP

### Exporting AgroFIMS fieldbook in a format readable by Field Book

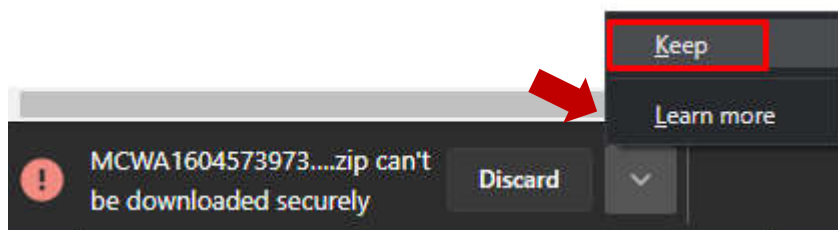
To upload an AgroFIMS fieldbook to Field Book, you have to first export the AgroFIMS fieldbook as a .zip file and then unzip it.

1. Go to **Experiments** in the navigation menu and select the experiment of your choice.
2. Go to the **Fieldbooks** tab and open the fieldbook of your choice by clicking on the blue open icon (square with an arrow through it).
3. Click on the cloud icon at the top right of the window, indicated by an arrow in the figure below.



4. Click on **Build**.
5. If the fieldbook is correctly built, click on **Save**.
6. Click on **Field Book App** and a .zip file will be downloaded to your laptop.
7. Unzip the .zip file to extract the .cvs and .trt files.

*Note:* if during the download an alert message says it is not possible to download the .zip file securely, you may force the download by clicking on the arrow next to the message and selecting "**Keep**", as indicated by the arrow in the figure below.





## Sending the files to the mobile device

Once you have created a .zip file, you have to send it to the device where Field Book is installed:

- **Via email:** send an email to yourself or the data collector, with the .csv and .trt files attached. Open this email on the mobile device where Field Book is installed and download the files.
- **Via a cloud storage service:** On your laptop save the .csv and .trt files on a cloud storage service (OneDrive, Dropbox, Google Drive, etc.). Open the same service on the mobile device and download the files.
- **Via USB transfer:** Connect the mobile device to your laptop to transfer the .csv and .trt files.

## Saving the files in your mobile memory

1. Save the .csv file in the folder *field\_import* of the main folder *fieldBook* created by the app on the mobile device.
2. Save the .trt file in the *trait* folder of the folder *fieldBook* created by the app on the mobile device.

## Opening the files in Field Book

1. Open Field Book.
2. Go to **Fields**.
3. Click on the **+** at the top right and select Local storage.
4. Select the .csv file exported from AgroFIMS, and then validate the radio button next to it.
5. Go back to the main menu and select **Traits**.
6. Click on the three dots at the top right and select **Import/Export**.
7. Select **Import** and then **Local storage**.
8. Select the .trt file exported from AgroFIMS.
9. Select the traits you want to annotate by clicking on the radio button next to them.
10. Go back to the main menu and go to **Collect** to start collecting data.

You can find more instructions on how to use Field Book on the tutorial:

[https://excellenceinbreeding.org/sites/default/files/manual/field\\_book\\_manual\\_v3.pdf](https://excellenceinbreeding.org/sites/default/files/manual/field_book_manual_v3.pdf)

# COLLECTING DATA WITH THE KDSMART MOBILE APP

## STEP 1. DOWNLOADING KDSMART

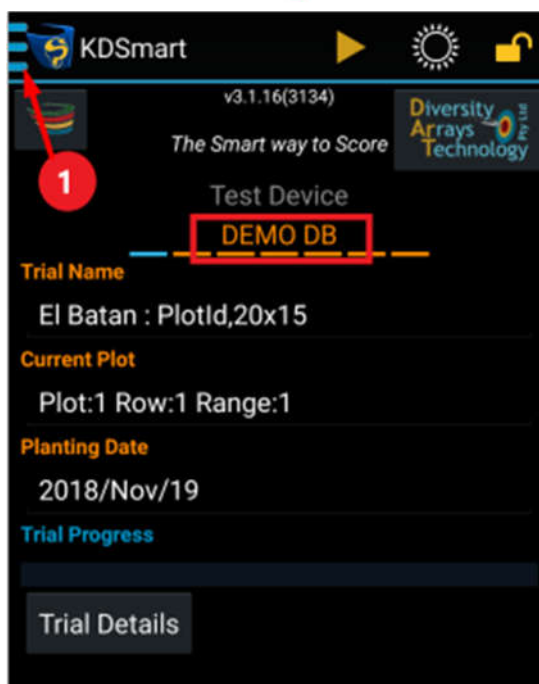
1. Download and install the application on an Android device:  
[https://play.google.com/store/apps/details?id=com.diversityarrays.kdsmart&hl=en\\_US](https://play.google.com/store/apps/details?id=com.diversityarrays.kdsmart&hl=en_US)
2. A tutorial for KDSmart is available on the website of KDDart:  
<http://www.kddart.org/help/kdtutorials/html/KDSTutorial.html#>

## STEP 2. SETTING UP KDSMART

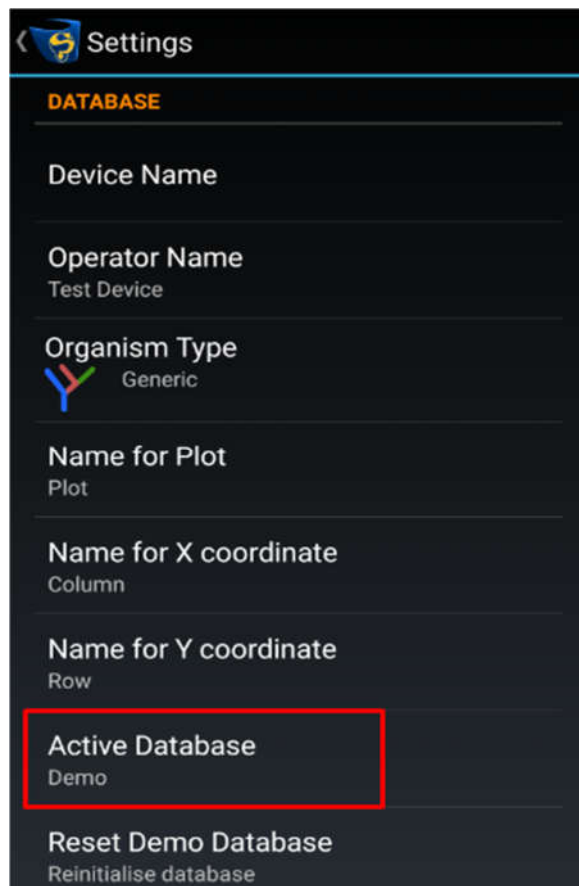
### Setting the app in production mode

The application is in Demo DB mode. To enable all the functionalities the mode Production has to be enabled.

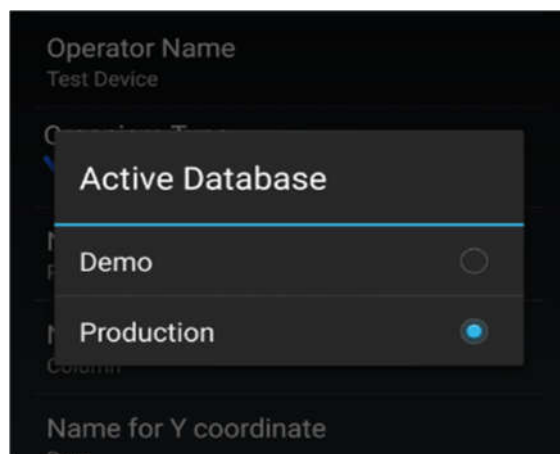
1. In the home screen, click on the menu icon **1** on the top left, and select Settings.



2. In the Settings menu, click on Active Database



3. Select Production

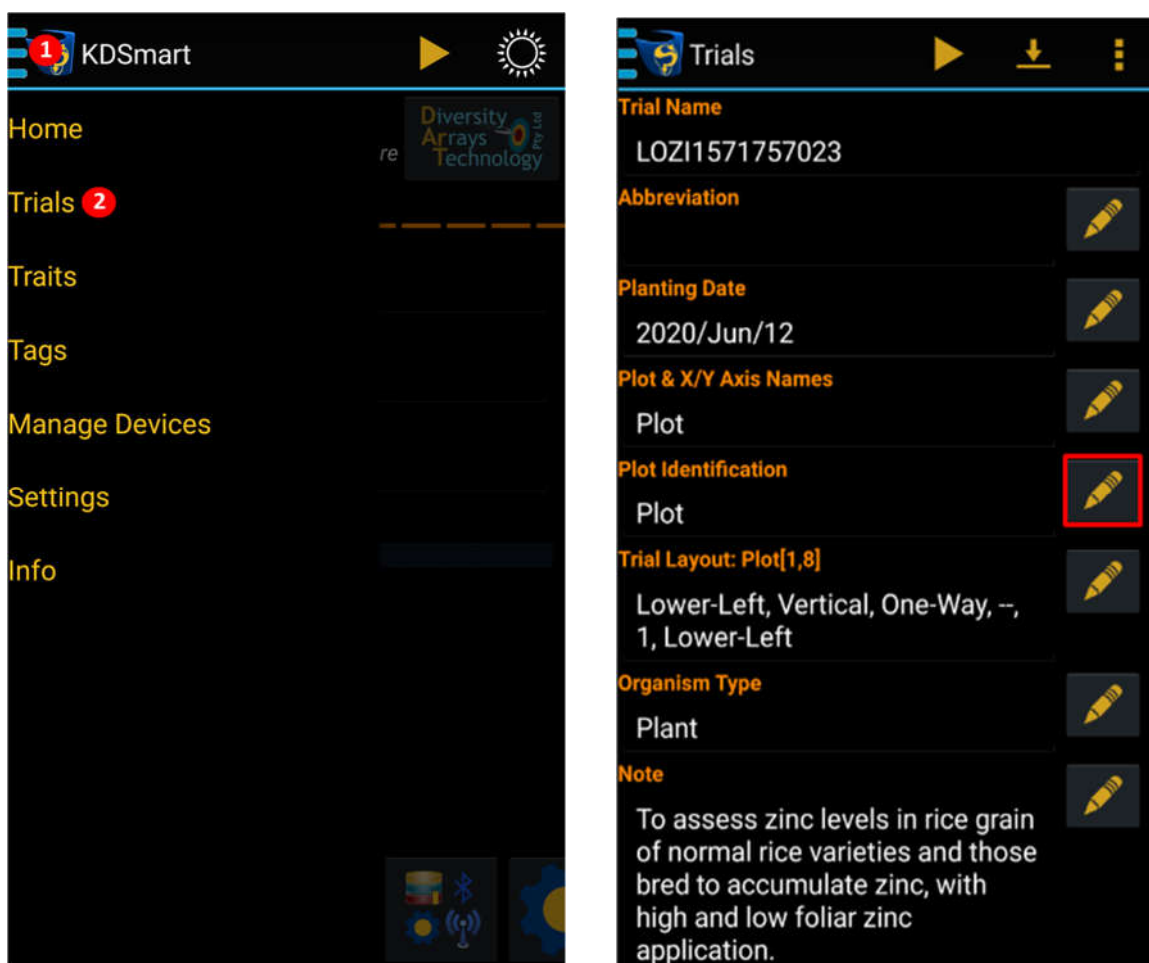


4. To go back to the home screen, click on the arrow at the top left.

## Identifying the plots

In KDSmart the plots can be named either by their number or by the number of their column, row and block.

1. Download a trial (cf. KDSmart tutorial).
2. Click on the three dots at the top left. **1**
3. Select “Trials”. **2**
4. Select your trial in the list to open “Trial Details”
5. Click on the edit icon next to “Plot identification”



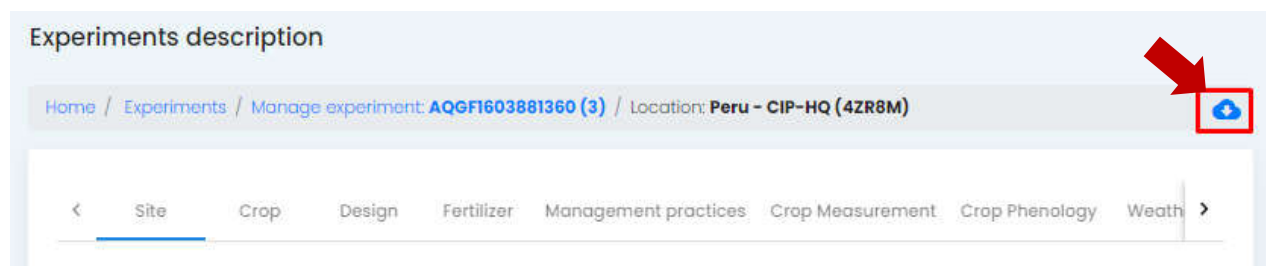
6. Select “Plot” if you want to identify the plots by their number, select "Block/Field Column/Field Row" if you prefer to identify the plots with their Block/Column and Row numbers.

## STEP 3. UPLOADING AN AGROFIMS FIELDBOOK IN KDSMART

### Exporting AgroFIMS fieldbook in a format readable by KDSmart

To upload an AgroFIMS fieldbook in KDSmart, you have to first export the AgroFIMS fieldbook as a .kdx file.

1. Select **Experiments** in the navigation menu and select the experiment of our choice.
2. Go to the **Fieldbooks** tab and open the fieldbook of your choice by clicking on the open icon.
3. Click on the cloud icon at the top right of the window.



4. Click on **Build**.
5. If the fieldbook is correctly built, click on **Save**.
6. Click on **KDSmart App** and a .kdx file will be downloaded to your laptop.

### Sending the file to the mobile device

Once you have created a .kdx file, you have to send it to the device where KDSmart is installed:

- **Via email:** send an email to yourself or the data collector, with the .kdx file attached. Open this email on the mobile device where KDSmart is installed and download the .kdx file.
- **Via a cloud storage service:** On your laptop save the .kdx file on a cloud-based service (OneDrive, Dropbox, Google Drive, etc.). Open the same service on the mobile device and download the .kdx file.
- **Via USB transfer:** Connect the mobile device to your laptop. Save the .kdx file in the folder "Download" of the mobile device.

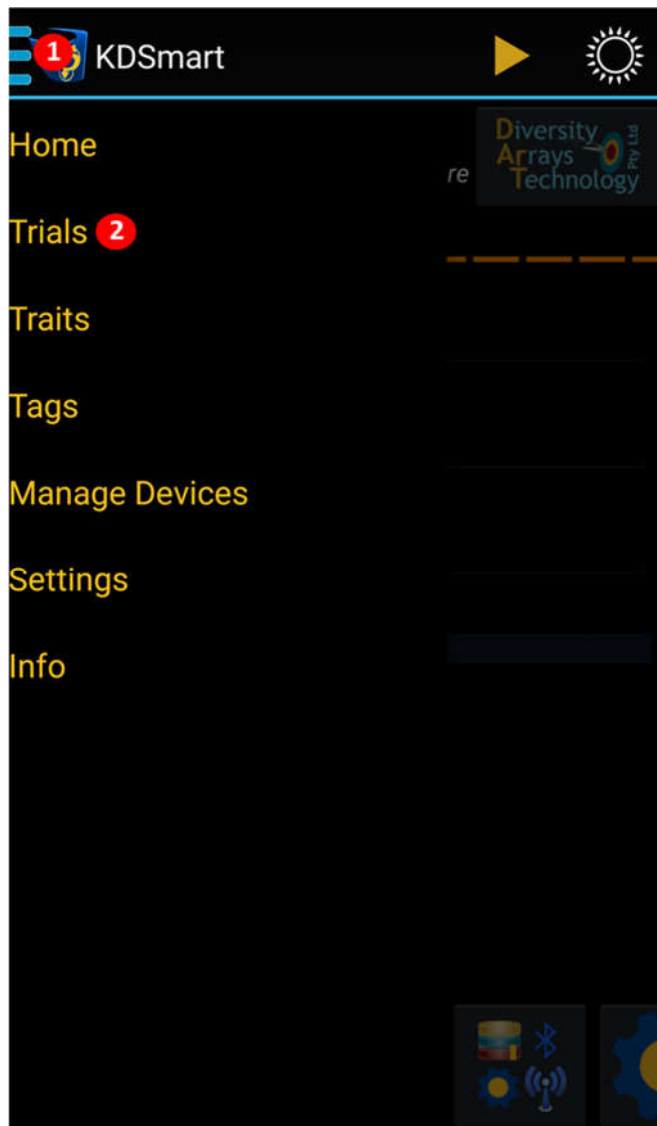
### Opening the file in KDSmart

Once the .kdx file is stored in your mobile device, you can open it in KDSmart following this tutorial: <http://www.kddart.org/help/kdtutorials/html/KDSTutorial.html#step-1-importing-a-scoring-set>

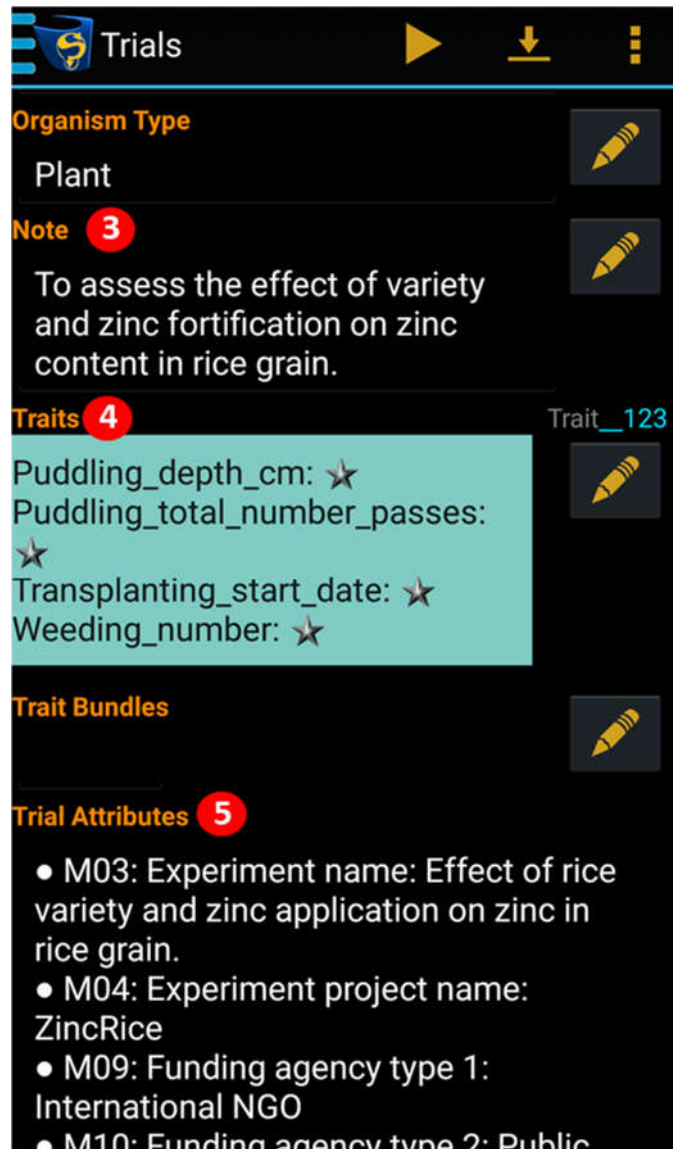
## Finding the information filled in AgroFIMS in KDSmart

Metadata and measurements filled in AgroFIMS are listed in Trail Details section of KDSmart. To find them:

1. Click on the three dots at the top left of KDSmart screen. **1**
2. Select “Trials” **2**



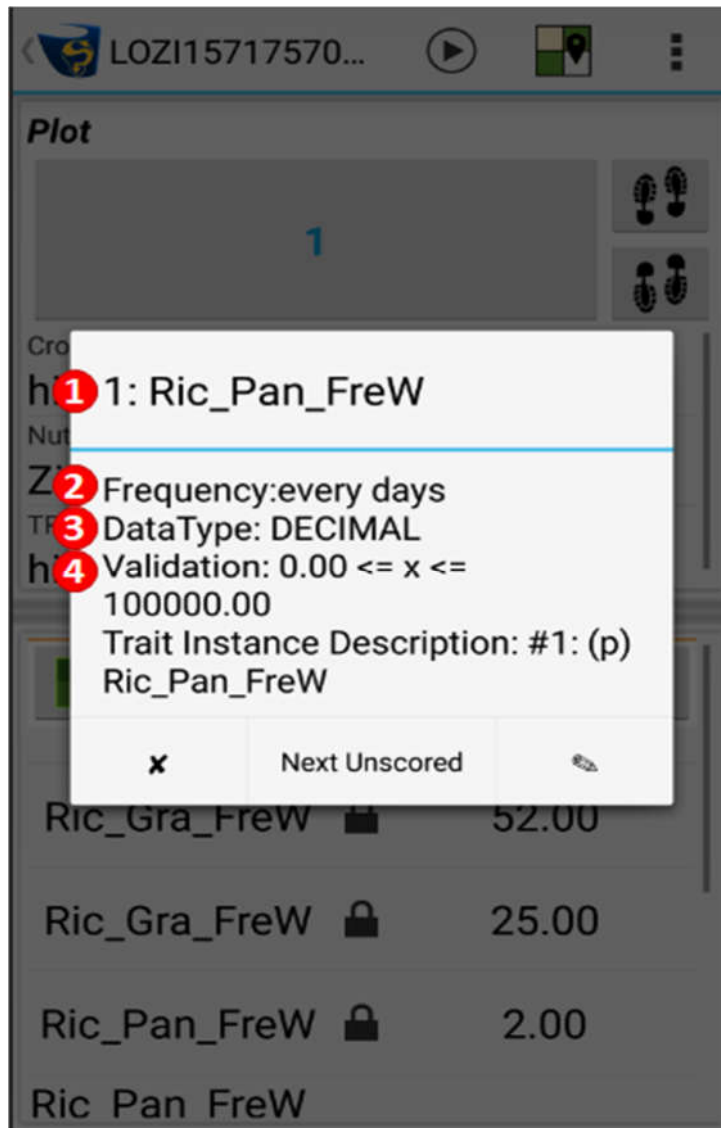
3. Select your trial in the list to open the Trial Details page of your experiment.
4. Experiment objective is noted as Note **3**
5. Measurements (Crop, Phenology, Soil, Management practices to be collected in the field) are listed as "Traits". **4**
6. Experiment, personnel, site, crop and design information are listed under "Trial attributes". They start with a M00. **5**
7. Management practices (Protocol tab of the Excel fieldbook) are listed under "Trial attributes". They start with a P00. **5**



## Understanding the Scoring Panel

In the Scoring Panel of a trait you can find more details about it.

1. Start scoring a trial (cf. KDSmart Tutorial)
2. Click on a Trait to get trait information



- 1 TraitAlias
- 2 Measurement timing
- 3 Type of data
- 4 Trait validation rule





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