PHENOAPPS | Alliance Bioversity & CIAT | CGIAR

Fieldbook: An open-source Android app for collecting phenotypic data

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Faisalabad, November 2023

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#Alliance4Science

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Keep in touch.

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PHENOAPPS

Field Book

Field Book is a simple app for taking phenotypic notes. Collecting data in the field has traditionally been a laborious process requiring writing notes by hand followed by transcription. Field Book was created to replace paper field books and to enable increased collection speed with greater data integrity.
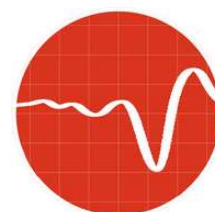
(phenotyping) (data collection)

Coordinate

Coordinate is a highly-customizable data collection app that is based on defining templates and then collecting data in grids created from those templates. Two templates are included by default– Seed Tray and DNA Plate.

(sample management)

Prospector

Prospector is an Android app capable of capturing, storing, visualizing, and exporting data from handheld NIR spectrometers. Prospector provides fast, reliable capture of scans for phenotype prediction with a standardized user interface and data export. Prospector allows breeders to rapidly utilize NIRS for phenotyping.

Intercross

Intercross tracks parental and cross IDs as crosses are made, who makes each cross, and where each cross is made. Cross labels can be printed to Zebra label printers and lists of crosses can be exported to local files.
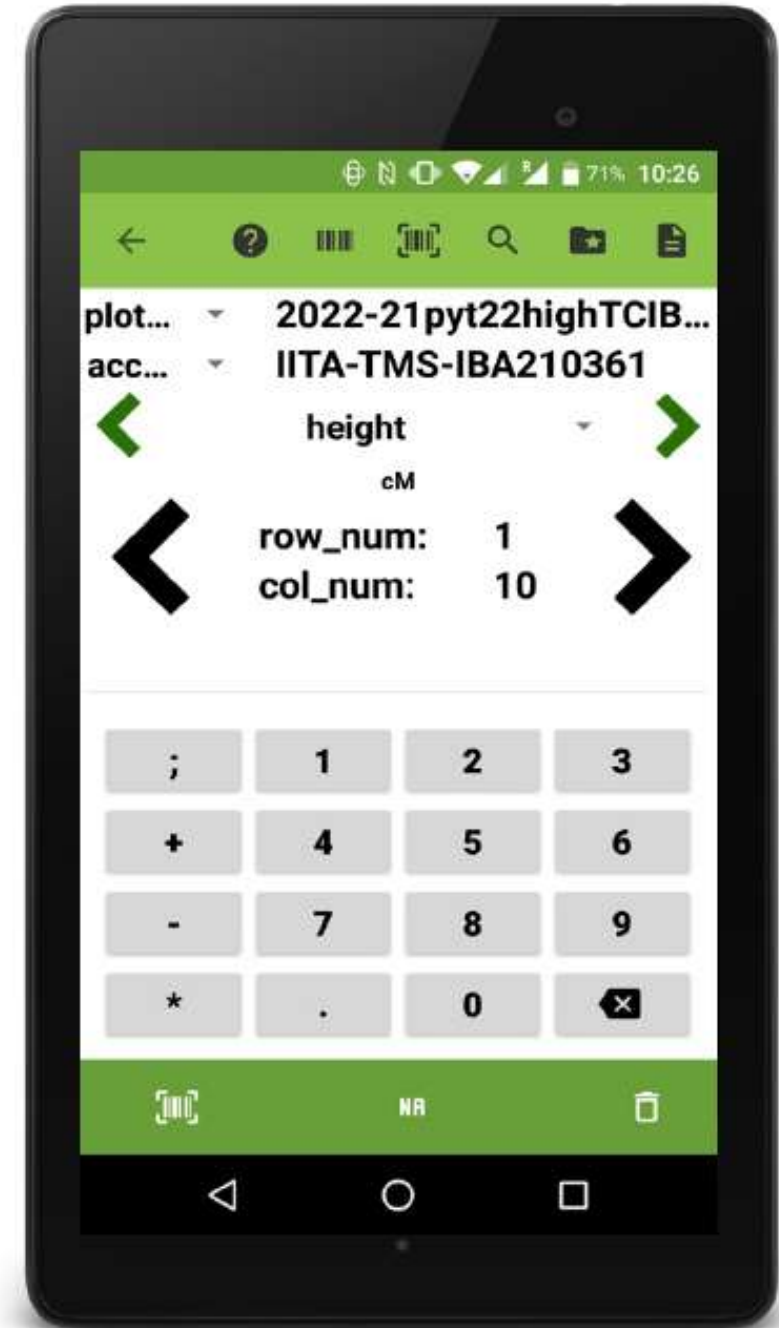
OneKK

OneKK is an app designed to analyze seed lots. Its name comes from the one thousand kernel weight that is commonly used as a selection criteria in plant breeding programs. OneKK extracts seed morphology from images captured by phone and tablet cameras.

Fieldbook

- Phenotypic data collection
- Navigate between plots or traits
- Extra plot information shown
- Manage traits within the app
- 12 custom trait formats/layouts
- Highly customizable
- 10,000 + total installs

How to download the app

- Google play

- Git hub account

Fieldbook Traits

How do I use Field Book?

- Design your layout (preferably using Fielhub)

- Export the layout file

- Transfer file to phone/tablet or cloud

- Import file into Field Book app

- Create or import traits

- Collect data

- Export data

- Upload to Temporary storage or central data base

Layout file (.xls or .csv)

plot_name	accession_name	plot_number	block_number	is_a_control	rep_number	row_number	col_number
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210351_101	IITA-TMS-IBA210351	101	1		1	1	1
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210352_102	IITA-TMS-IBA210352	102	1		1	1	2
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210350_103	IITA-TMS-IBA210350	103	1		1	1	3
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210349_104	IITA-TMS-IBA210349	104	1		1	1	4
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210360_105	IITA-TMS-IBA210360	105	1		1	1	5
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210358_106	IITA-TMS-IBA210358	106	1		1	1	6
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA141092_107	IITA-TMS-IBA141092	107	1	1	1	1	7
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210359_108	IITA-TMS-IBA210359	108	1		1	1	8
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210355_109	IITA-TMS-IBA210355	109	1		1	1	9
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210361_110	IITA-TMS-IBA210361	110	1		1	1	10
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210346_111	IITA-TMS-IBA210346	111	1		1	1	11
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210348_112	IITA-TMS-IBA210348	112	1		1	2	11
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210347_113	IITA-TMS-IBA210347	113	1		1	2	10
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210354_114	IITA-TMS-IBA210354	114	1		1	2	9
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210343_115	IITA-TMS-IBA210343	115	1		1	2	8
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA070337_116	IITA-TMS-IBA070337	116	1	1	1	2	7
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210345_117	IITA-TMS-IBA210345	117	1		1	2	6
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210356_118	IITA-TMS-IBA210356	118	1		1	2	5
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210357_119	IITA-TMS-IBA210357	119	1		1	2	4
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210344_120	IITA-TMS-IBA210344	120	1		1	2	3
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210353_121	IITA-TMS-IBA210353	121	1		1	2	2
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA070593_122	IITA-TMS-IBA070593	122	1	1	1	2	1
2022-21pyt22highTCIB-rep2-IITA-TMS-IBA210360_201	IITA-TMS-IBA210360	201	2		2	3	1
2022-21pyt22highTCIB-rep2-IITA-TMS-IBA210354_202	IITA-TMS-IBA210354	202	2		2	3	2
2022-21pyt22highTCIB-rep2-IITA-TMS-IBA210359_203	IITA-TMS-IBA210359	203	2		2	3	3
2022-21pyt22highTCIB-rep2-IITA-TMS-IBA141092_204	IITA-TMS-IBA141092	204	2	1	2	3	4
2022-21pyt22highTCIB-rep2-IITA-TMS-IBA210344_205	IITA-TMS-IBA210344	205	2		2	3	5
2022-21pyt22highTCIB-rep2-IITA-TMS-IBA210356_206	IITA-TMS-IBA210356	206	2		2	3	6
2022-21pyt22highTCIB-rep2-IITA-TMS-IBA210348_207	IITA-TMS-IBA210348	207	2		2	3	7

Standardize plot name – unique identifier
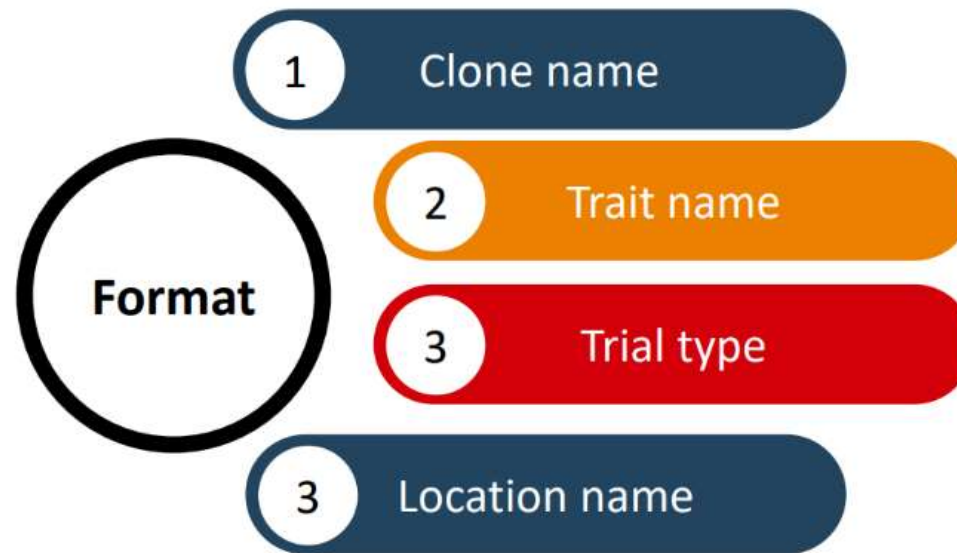
202010DMCOB__cere__rep1__SM2775-4__57

Year + trial number + pipeline + trial type __ location __ rep __ clone name __ plot number
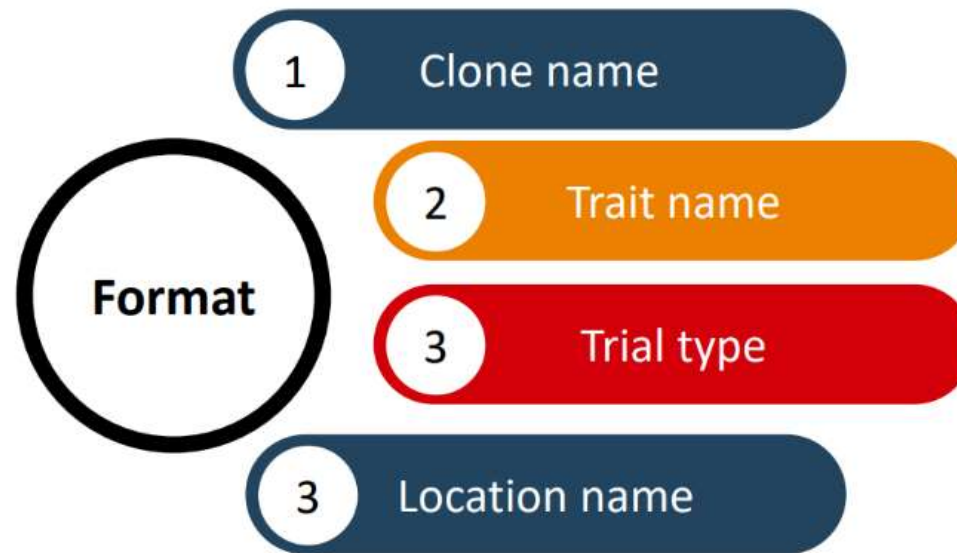
Trait name

Pipelines

	Code	Purpose
1	AD	General adaptation
2	AF	Africa
3	AS	Asia
4	SA	South (Latin) America
5	S1	Self-pollination 1st generation
6	S2	Self-pollination 2nd generation
7	S3	Self-pollination 3rd generation
8	S4	Self-pollination 4th generation
9	S5	Self-pollination 5th generation
10	SE	Super elongation
11	FS	Frogskin disease
12	Z1	Low tropical adaptation with dry season
13	Z2	Savannah acid soils adaptation
14	Z3	Tropical humid forest adaptation
15	Z4	Inter-Andean valleys adaptation
16	Z5	Highland adaptation
17	Z6	Subtropics adaptation
18	Z7	Semi-arid adaptation
19	WL	Wild species
20	TP	Trips
21	MT	Mites
22	BB	Cassava bacterial blight
23	PT	Protein
24	PD	Post-harvest deterioration
25	SQ	Starch quality
26	BC	Beta-carotene
27	CQ	Cooking quality
28	HC	Hydrocyanic acid
29	SG	Small granule
30	DM	Dry matter
32	MD	Mosaic disease
33	MD_WF	Mosaic disease + Whitefly
34	WF	Whitefly
35	BS	Brown streak
36	DV	diversity trial, mixed traits
37	DT	drought tolerance

Trial types

TIPO	NOMBRE	SIGLA	Cassava Base	Team
1	POLICRUZA, polycross, half-sib	PLY	Complete block	breeding
2	paired cross, full-sib	PAR		breeding
3	F1 trial ---- F1 seedlings, 1 plant per plot, 1 rep	F1T	Seedling Nursery	breeding
4	F1C1 ---- 2-6 plants per plot, 1 rep	F1C	Clonal Evaluations	breeding
5	Clone evaluation trial ---- 6-8 plants per plot, 1 rep	COB	Clonal Evaluations	breeding
6	Preliminary yield trial ---- 10 plants per plot, 2-3 reps	EPR	Preliminar Yield Trial	breeding
7	Advanced yield trial ---- 20 plants per plot, 2-3 reps	EAR	Advanced Yield Trial	breeding
8	Uniform yield trial ---- 20 plants per plot, 2-3 reps	PRC	Uniform Yield Trial	breeding
9	Regional yield trial ---- 25 plants per plot, 3 reps	PEA	Variety Release trial	breeding
10	**progenitor trial ---- 10 plants per plot, 2-3 reps**	PRG	Preliminar Yield Trial	breeding
11	MULTIPLICACION	MUL	Seed Multiplication	breeding
12	**ENSAYOS DE GENETICA, GS training population**	GST		breeding
13	quality lab 1	QU1	Specialy trial	quality lab
14	quality lab 2	QU2	Specialy trial	quality lab
15	quality lab 3	QU3	Specialy trial	quality lab
16	genetics study team 1	GN1	Specialy trial	genetic study
17	genetics study team 2	GN2	Specialy trial	genetic study
18	genetics study team 3	GN3	Specialy trial	genetic study

Standardize plot name – unique identifier

202010DMCOB__cere__rep1__SM2775-4__57

Year + trial number + pipeline+ trial type __ location __ rep __ clone name __ plot number

Trait name

Load data to Field Book

plot_name	accession_name	plot_number
2022112CQQU1_ciat_rep1_COL1516_1	COL1516	1
2022112CQQU1_ciat_rep1_COL1505_2	COL1505	2
2022112CQQU1_ciat_rep1_IND135_3	IND135	3
2022112CQQU1_ciat_rep1_PER183_4	PER183	4
2022112CQQU1_ciat_rep1_SM1127-8_5	SM1127-8	5
2022112CQQU1_ciat_rep1_COL2215_6	COL2215	6
2022112CQQU1_ciat_rep1_CR63_7	CR63	7

Transferring files
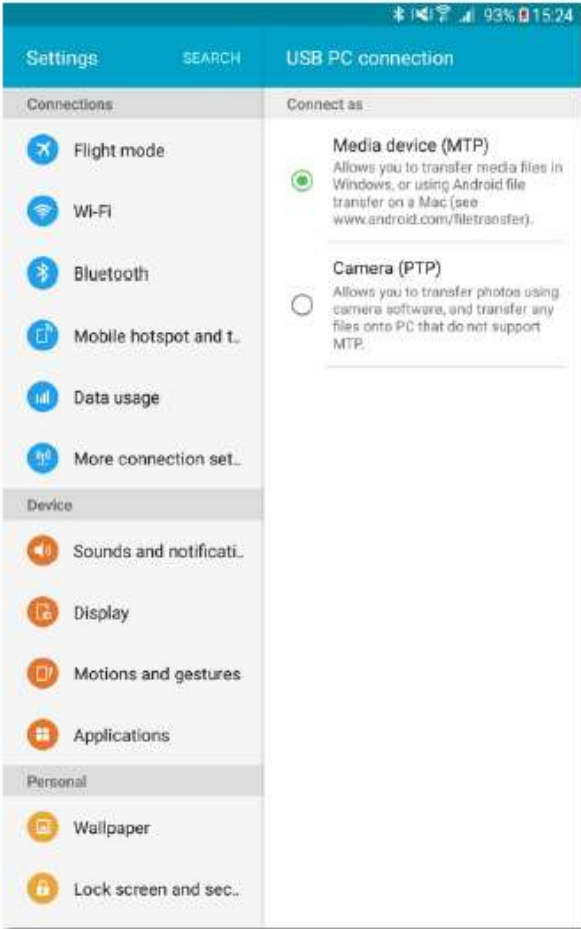
File storage

Once Field Book is installed and launched, it will create several folders in your device's memory:

- **plot_data**: audio and photo data associated with plots are organized and stored in this folded.

- **trait**: this folder contains backed up trait files and the disease rating custom scale.

- **field_import**: Field Book will look for files to import in this folder.

- **field_export**: exported files are stored in this folder.

- **resources**: this folder can hold pictures and files that are accessible from the main data collection screen.

- **database**: this folder contains the files that are exported from the database.

- **updates**: this folder contains updates information of the application.

- **archive**: this folder contains helpful output to debug different errors that may occur.
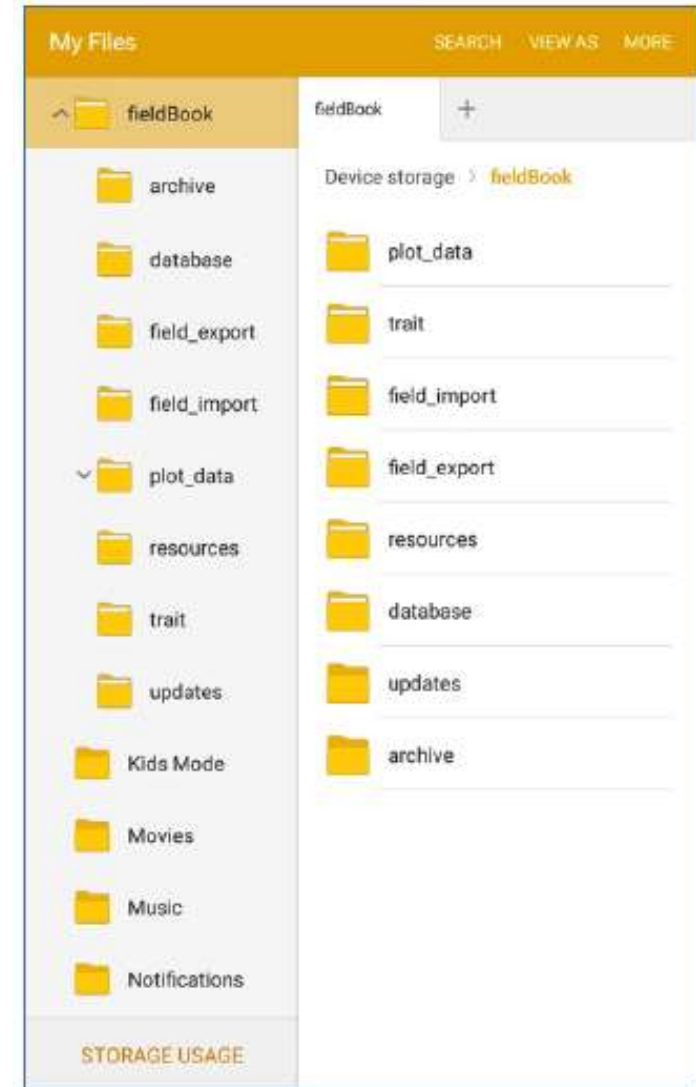
Importing files using Local Storage & Cloud Storage
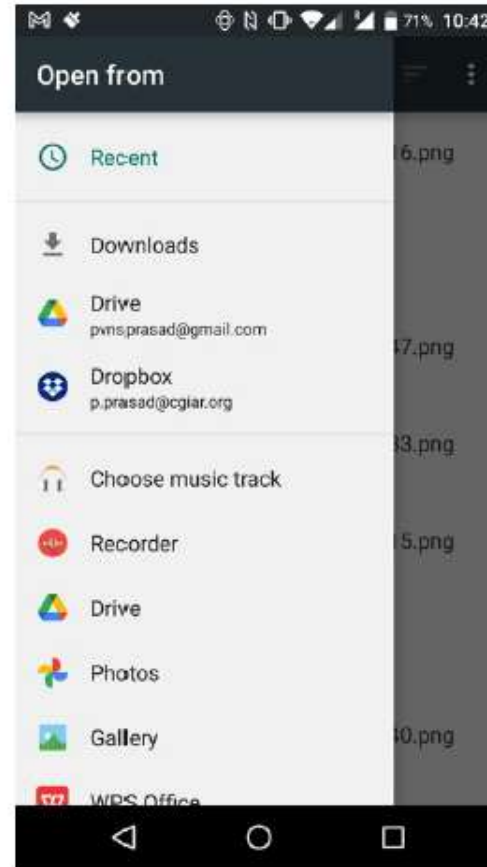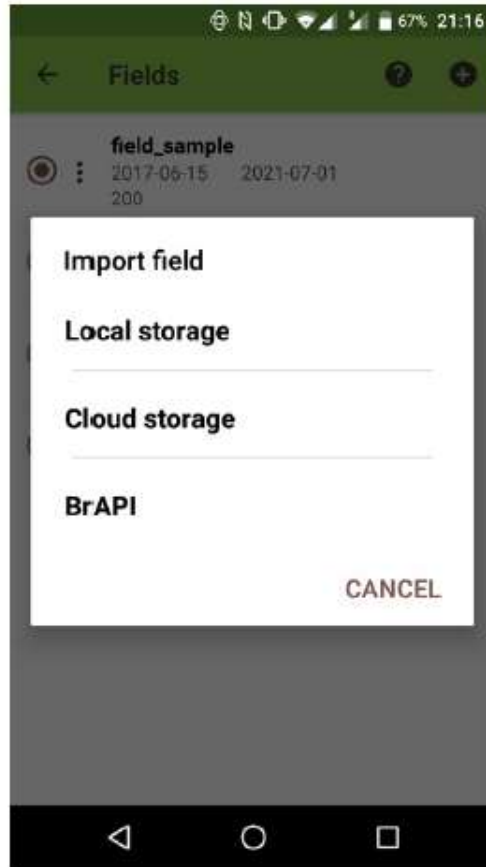
Cloud storage - oneDrive or Dropbox
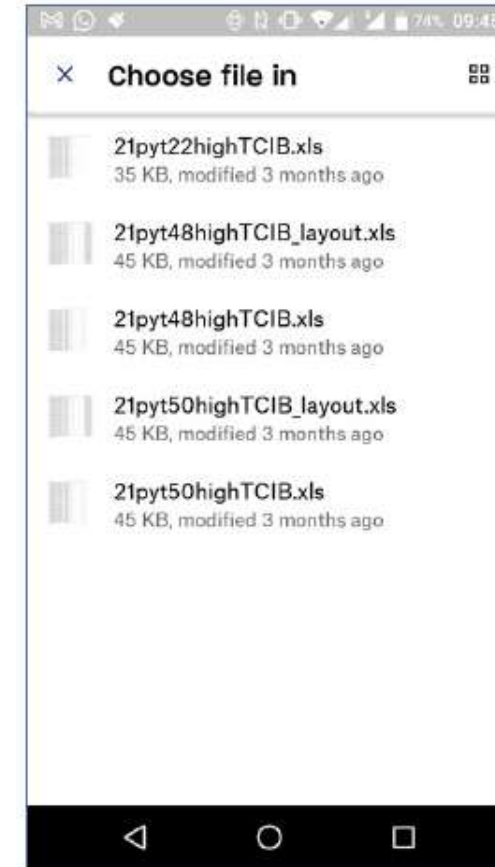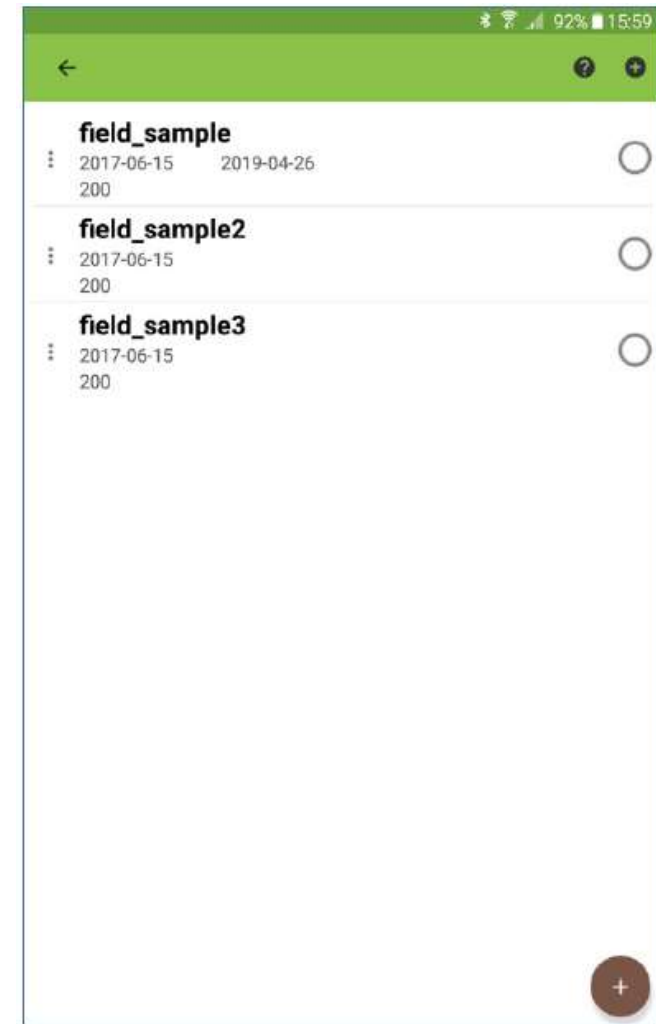

Importing Layout file from Dropbox

Managing Fields

Fields selectable from list

• Import all of the fields you need for the season

Each row shows:

• Date imported

• Date edited

• Date exported

• Number of entries

Creating Traits

- Import/Export existing trait files

- Use the + button to add a new trait

- Choose the trait format

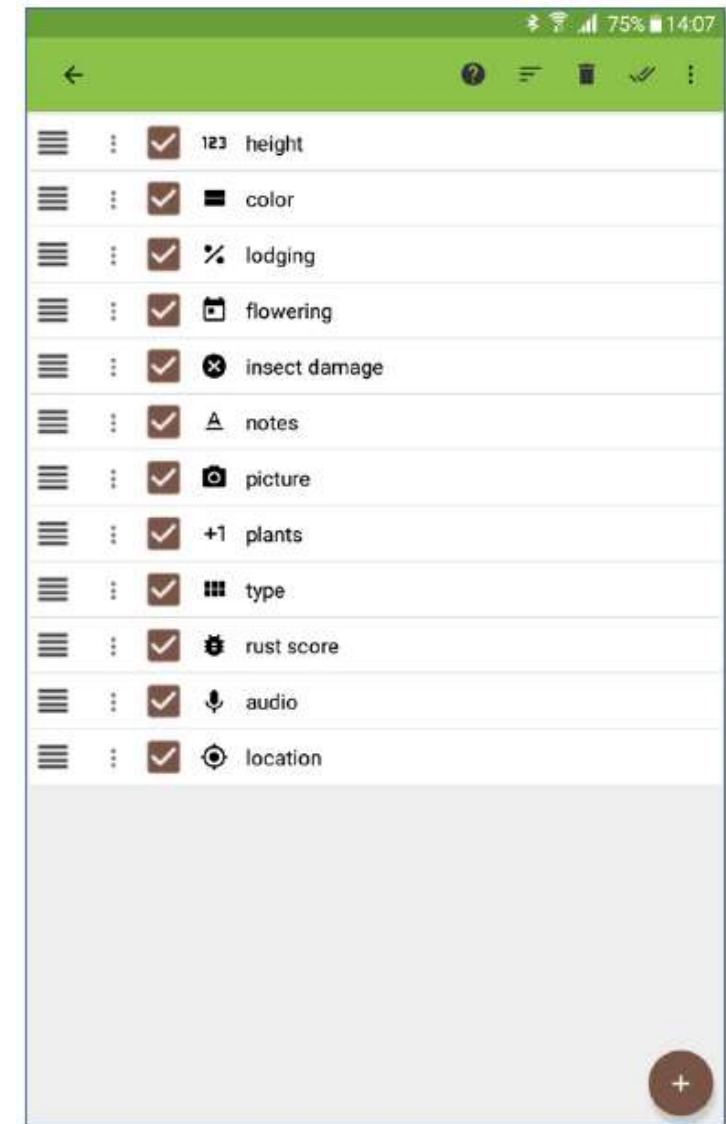- Enter in trait name and other info if required

Managing Traits

Traits can be:

- Reordered via drag and drop.
- Hidden from main screen by toggling checkbox.
- Copied, edited, deleted via each trait's.

Menu button:

- Sort traits by:
- Name
- Visibility
- Format

Field Book

Exporting data

- Exports to CSV
- Two formats : database, table
- Choose what gets exportd
  - All field columns vs. Unique ID
  - All traits vs. Active traits
- Overwrite previous export
- Send file option after export

Export

Format
☐ Database
☐ Table

Field columns   **Traits**
○ Only unique identifier   ○ Only active traits
○ All imported columns   ○ All traits

Filename
2019-04-27-11-25-59_field_sample

☑ Overwrite previously exported file

OK   Close

Exporting data

plot_name	accession_name	plot_number	block_number	is_a_control	rep_number	height	color	lodging
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210351_101	IITA-TMS-IBA210351	101	1		1	25	Orange	26
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210352_102	IITA-TMS-IBA210352	102	1		1	23	Yellow	52
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210350_103	IITA-TMS-IBA210350	103	1		1	48	Yellow	51
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210349_104	IITA-TMS-IBA210349	104	1		1	29	Yellow	56
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210360_105	IITA-TMS-IBA210360	105	1		1	36	Orange	19
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210358_106	IITA-TMS-IBA210358	106	1		1	25	Red	14
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA141092_107	IITA-TMS-IBA141092	107	1	1	1	40	Orange	5

Table Format

plot_name	accession_name	plot_number	block_number	is_a_control	rep_number	trait	value	timestamp	person
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210351_101	IITA-TMS-IBA210351	101	1		1	height	25	2021-07-08 10:14:21.133+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210352_102	IITA-TMS-IBA210352	102	1		1	height	23	2021-07-08 10:14:28.852+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210350_103	IITA-TMS-IBA210350	103	1		1	height	48	2021-07-08 10:14:31.481+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210361_110	IITA-TMS-IBA210361	110	1		1	color	Orange	2021-07-08 10:14:57.870+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210355_109	IITA-TMS-IBA210355	109	1		1	color	Yellow	2021-07-08 10:15:00.486+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210359_108	IITA-TMS-IBA210359	108	1		1	color	Yellow	2021-07-08 10:15:02.343+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210351_101	IITA-TMS-IBA210351	101	1		1	lodging	26	2021-07-08 10:15:33.596+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210352_102	IITA-TMS-IBA210352	102	1		1	lodging	52	2021-07-08 10:15:35.805+01:00	Prasad
2022-21pyt22highTCIB-rep1-IITA-TMS-IBA210350_103	IITA-TMS-IBA210350	103	1		1	lodging	51	2021-07-08 10:15:37.861+01:00	Prasad

Database Format

Collecting data Demo

1. Install Field Book: https://github.com/PhenoApps/Field-Book/releases/download/5.5.24/Field-Book-v5.5.apk

2. Connect phone to the computer.

3. Go to internal_storage/android/fieldbook/fieldbook_import directory

4. Save the demo data (**data_4_field_book.csv**) in previous directory

5. In the app, go to Fields, Local storage, select the correct file.

6. Set the unique identifier, primary identifier and secondary identifier

7. Add traits to be taken.

8. Collect data.

9. Export data.

Thank you.