School of Agriculture, Policy and Development

University of Reading

DIGITAL DATA CAPTURE IN COCOA BREEDING

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MMSP

- Mebang Megakarya Selection Programme
- A large-scale cocoa breeding programme developing high performance planting materials
- ~ 100,000 trees!

MMSP

- Data management system required:
  - Reduce errors
  - Improve speed
- Considerations:
  - Location
  - Power
  - Internet access
  - Consumables
  - Simple to use!

MOBILE COMPUTER /BARCODE SCANNER

- Simple data capture in the field

MANAGING NURSERY STOCK

- Large number of plants budded each year
- Want to know:
  - Number available
  - Locations
- Trace material in the field to parent trees

RECORDING THE MOTHER TREE WHEN COLLECTING BUD STICKS

LABEL ADDED TO BUDWOOD

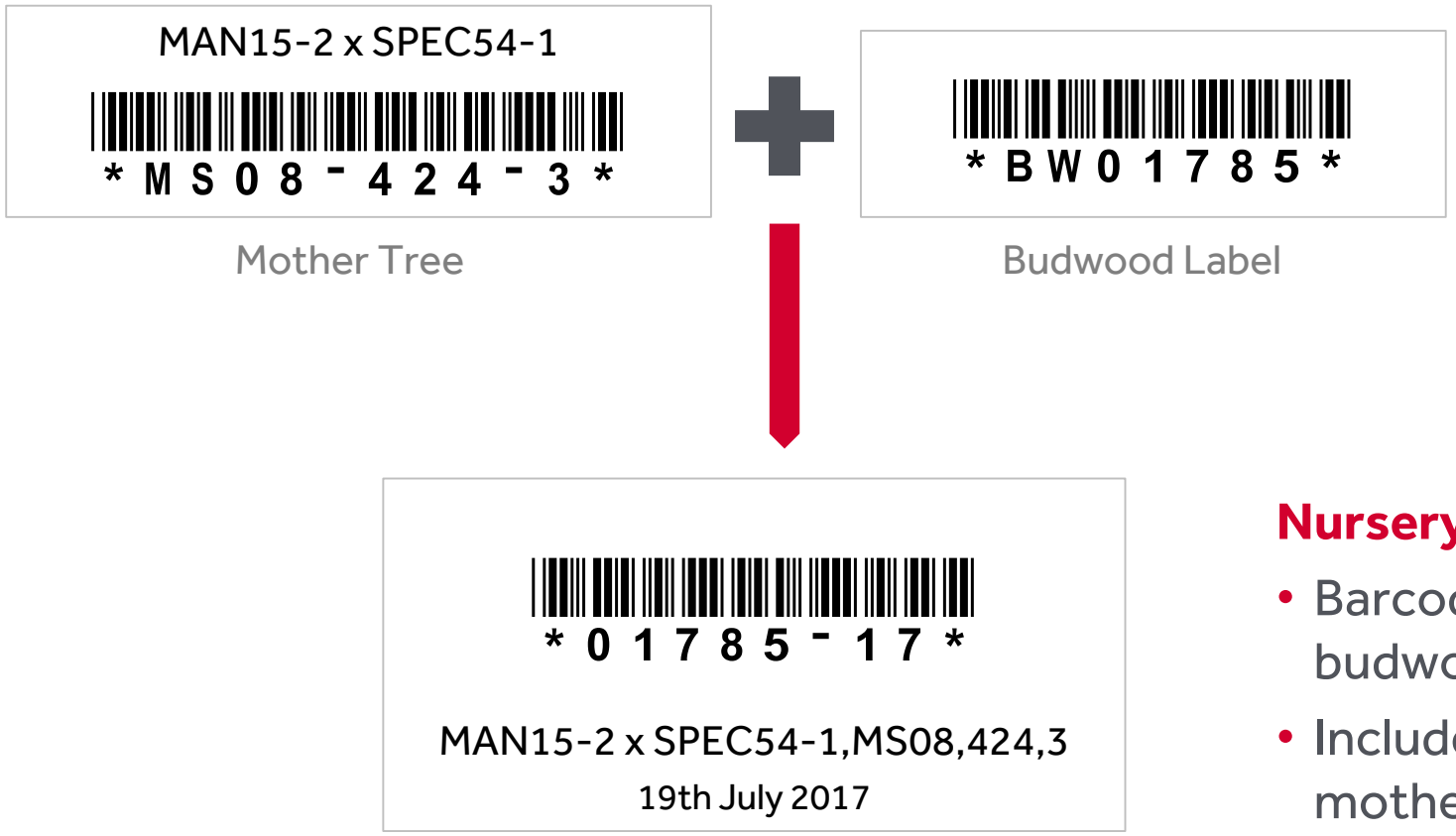
- Unique identifier
  - Only used once in a season
- New labels for every collection:
  - Different tree
  - Different time
- Use in any order

BUDWOOD LABEL

- Stays with plants until they move to the nursery

NURSERY LABELS

- Generated after budding
  - Stays with plants in the nursery
- Scanned when plants moved to nursery
- Scanned when taking inventory



Nursery Labels

- Barcode based on budwood label
- Includes details of mother plant

NURSERY LABELS

NURSERY LOCATION

- Barcode label in each nursery bay
- Scanned when material moved to the nursery
- Only scanned again if material moved

NURSERY INVENTORY

- Scan the barcode on the nursery label
- Type in the number of healthy plants
- Date and time recorded automatically

- Generate plant labels before planting in the field
- Number generated based on inventory
- Based on nursery label
- Position in field recorded during first girth measurements

INDIVIDUAL PLANT LABELS

FIELD DATA

- Similar system for collecting data in the field
- Based on the traits already being recorded at MMSP
  - Match recording sheets

Recording girth data

Reporting a dead or missing tree

FEEDBACK & FIELD TRIALS

- First version of girth included ‘Stem Num’ and ‘Plant Label’
  - Rarely required
  - Needs user input to skip
- Reporting a dead tree required a different menu
- Staff took longer in the field

New girth menu

‘9999’ entered to report dead or missing tree

FEEDBACK & FIELD TRIALS

- New version just has ‘Girth’ option
  - Original renamed
- No additional navigation needed to report a dead tree
- Much faster!

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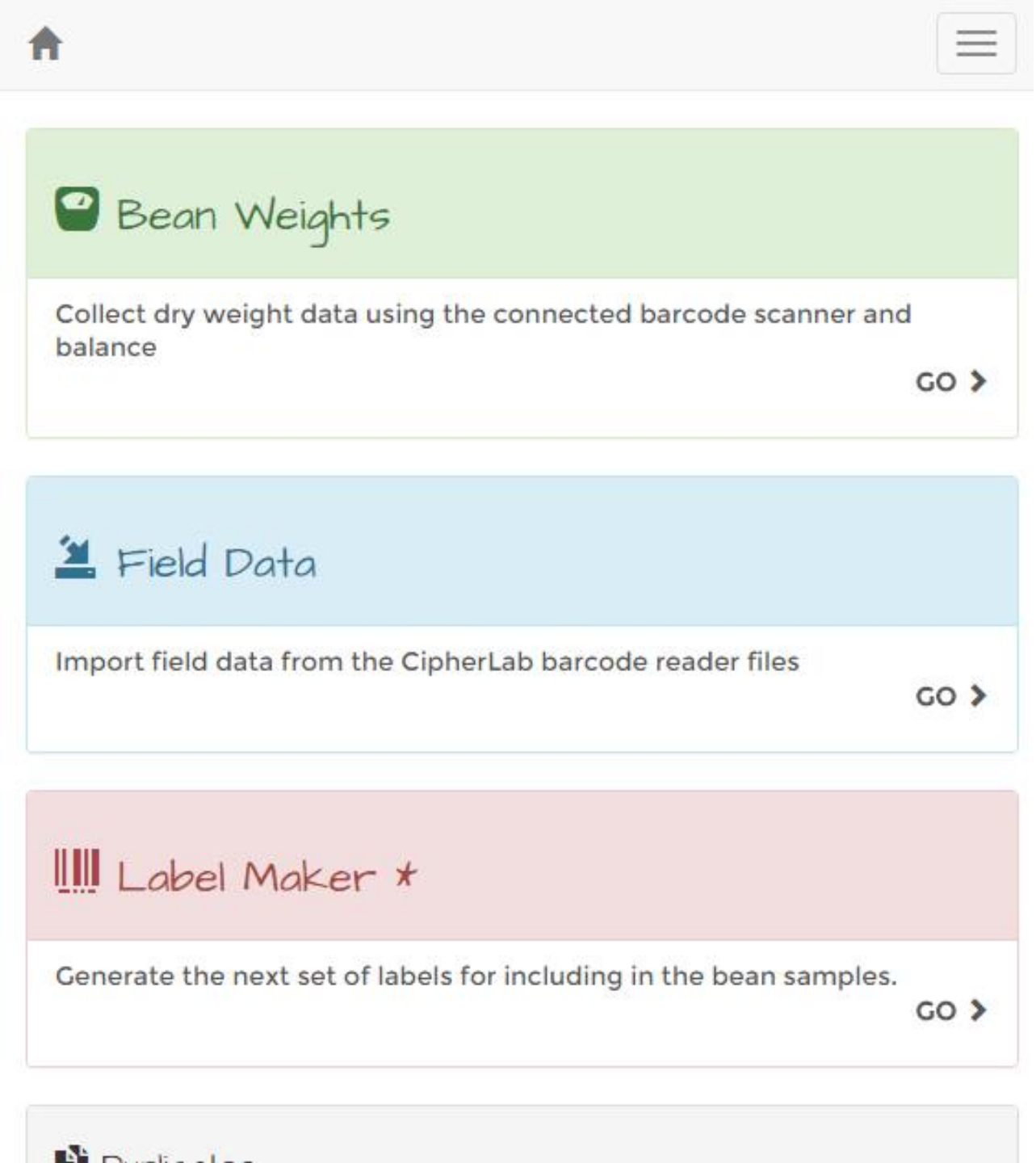
MOBILE COMPUTER OUTPUT



MANAGING MMSP DATA

- Local database to generate labels and input data
  - Based on website for familiarity
  - Future-proof
- User access is controlled

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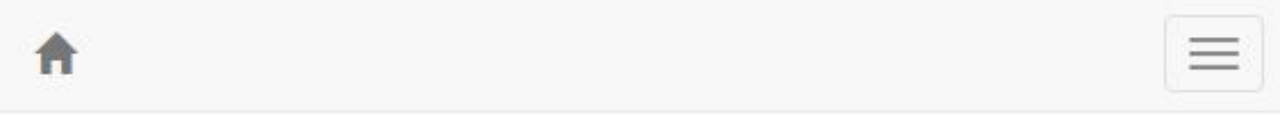
DATA IMPORT

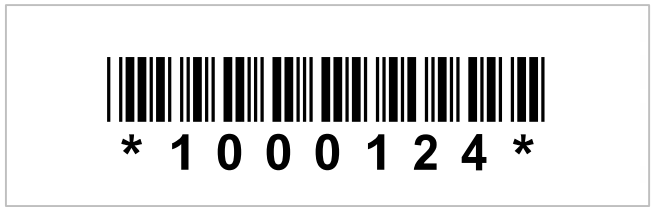
- The text file generated by the mobile computer is imported directly into the database
  - Original file remains unchanged



Record Dry Weights: Step 1

Scan the label

Scan Label



BEAN SAMPLES

- Bean dry weights are entered directly into the database
- Barcode labels identify the beans collected in the field

Record Dry Weights: Step 3

Weigh 100 beans and press 'Print' on the balance

Label ID	1000355
Sample Wgt	685.25 g

Weigh 100 beans

BEAN SAMPLES

- Beans are weighed using a balance connected to the PC
  - Values do not need typing in
- A text file of the data is also created

Germplasm ID: P210

SCA6 x NA427

Trial: **MS02**

Plot 145 [MS02]

FUT	AUT	Bad	% Bad	Samples	Conversion	Pod Value (kg)	Bean We
1817	1696	121	6.66	14	35.18	41.72	0.985

Hide

	Pod Number			Wet Wgt (kg)		Dry Wgt (g)	
Date	Total	Discarded	Useable	Plot	Sample	Sample	100 Bea
17/02/15	8	1	7	0.45	-	-	-
05/01/15	12	3	9	0.45	-	-	-
10/12/14	93	6	87	5.10	2.00	732.00	77.72
18/11/14	237	3	234	15.50	2.00	745.90	97.81

DATA SUMMARY

- Data can be analysed as required
  - From trial to individual tree
  - Export to Excel
- Data checks
  - Duplicates
  - Missed trees
- Tools
  - Inventory

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KEY COMPONENTS

- Simplified labelling system
  - Less emphasis on name
  - Generated in logical sequence
- Introducing barcodes to labels
  - Quick and reduces errors
  - Human readable text still included
  - Font-based ‘Code 39’

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KEY COMPONENTS

- Direct data capture
  - Removes need for further transcription
  - Time-stamped records
  - Real-time data checks

- Managing data in a database
  - Better storage option than Excel
  - Data checking and summary reports
  - Create labels in standard format
  - Names are consistent

NEXT STEPS

- Continue testing in the field
  - Refine protocols
- Label individual trees
- Develop more robust in-field data checking

ACKNOWLEDGEMENTS

- Ghana Cocoa Board
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- CRUK Ltd.
- Mars Inc.
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…and the staff at MMSP!