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

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

Mother Tree

Budwood Label

MAN15-2 x SPEC54-1

*MS08-424-3*

MAN15-2 x SPEC54-1, MS08, 424, 3
19th July 2017

*BW01785*

*01785-17*

*BW01785*
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
INDIVIDUAL PLANT LABELS

- 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

MAN15-2 x SPEC54-1, MS08, 424, 3

* 01785 - 17 - 1 *

* 01785 - 17 - 2 *

* 01785 - 17 - 3 *
FIELD DATA

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

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

New girth menu

‘9999’ entered to report dead or missing tree
Field Data, Plot Harvest, MS01-117, 185, 5, 180, 19.0, 2, 1002198, 2017-10-25, 10:58:26
Field Data, Plot Harvest, MS01-102, 62, 1, 61, 5.5, 2, 1002199, 2017-10-25, 10:59:36
Field Data, Plot Harvest, MS01-132, 115, 3, 112, 13.25, 2, 1002200, 2017-10-25, 11:09:12
Field Data, Plot Harvest, MS01-148, 164, 2, 162, 18.2, 2, 1002201, 2017-10-25, 11:11:50
Field Data, Plot Harvest, MS01-101, 88, 5, 83, 8.2, 2, 1002202, 2017-10-25, 11:15:00
Field Data, Plot Harvest, MS01-147, 7, 0, 7, 0.8, 2, 1002203, 2017-10-25, 11:16:25
Field Data, Plot Harvest, MS01-131, 22, 0, 22, 2.05, 2, 1002204, 2017-10-25, 11:17:49
Field Data, Plot Harvest, MS01-161, 26, 0, 26, 3.1, 2, 1002205, 2017-10-25, 11:19:12
Field Data, Plot Harvest, MS01-116, 62, 4, 58, 6.1, 2, 1002206, 2017-10-25, 11:21:30
Field Data, Plot Harvest, MS01-146, 103, 3, 100, 9.9, 2, 1002207, 2017-10-25, 11:24:24
Field Data, Plot Harvest, MS01-163, 90, 5, 85, 10.4, 2, 1002208, 2017-10-25, 11:28:56
Field Data, Plot Harvest, MS01-150, 14, 0, 14, 1.85, 1.85, 1002209, 2017-10-25, 11:30:08
Field Data, Plot Harvest, MS01-135, 12, 0, 12, 1.5, 1.5, 1002210, 2017-10-25, 11:30:59
Field Data, Plot Harvest, MS01-151, 23, 1, 22, 2.8, 2, 1002211, 2017-10-25, 11:31:51
Field Data, Plot Harvest, MSF1-136, 21, 0, 21, 2.3, 2, 1002212, 2017-10-25, 11:32:56
MANAGING MMSP DATA

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

**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
DATA SUMMARY

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