Wye, February 2017

# What is OMP and how can it contribute to improved plantation performance?


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## 1. Introduction

The main focus of Tropical Crop Consultants (TCCL) work is yield intensification in oil palm plantations and smallholdings. Such work is only possible, however, if the client has reliable and well-organized agronomic data, collected as raw data and stored and analyzed in a properly designed computer database system (Fairhurst and Griffiths, 2014).

Dr. Thomas Fairhurst, Director of TCCL, assisted Agrisoft Systems, a software development company, with the systems analysis and development of OMP, a customized database system for storing and analyzing agronomic data from oil palm production systems (Fairhurst et al., 2003) (Figure 1).

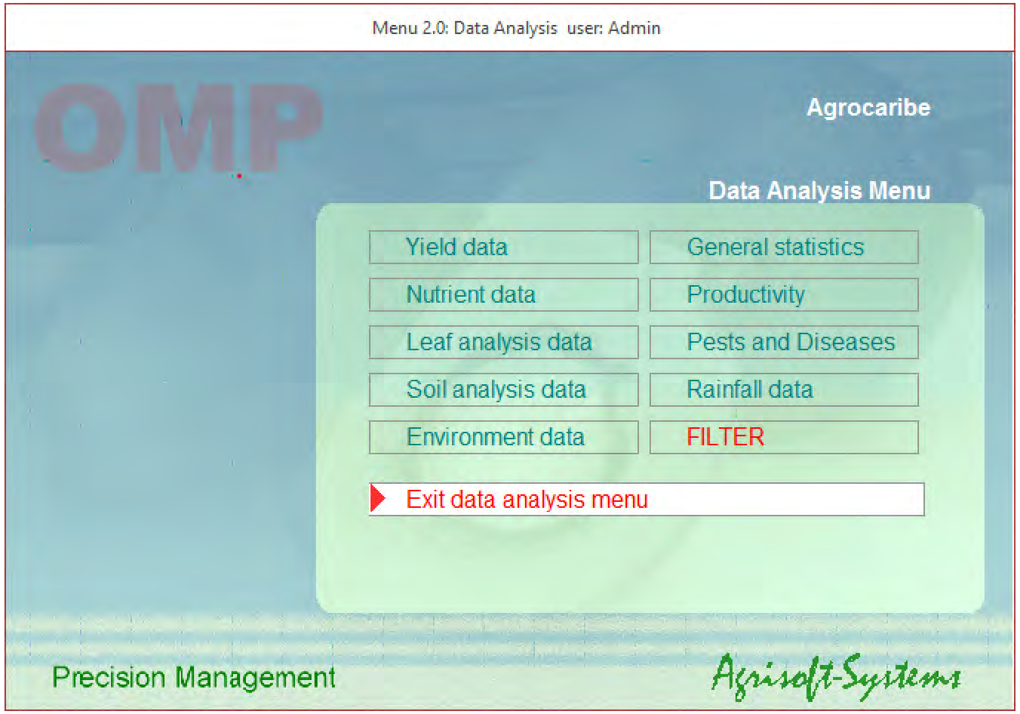



*Figure 1.* *OMP main menu provides access to all the software's tools.*

The original software was first developed and implemented in Indonesia in 1990 and has been continuously extended and updated to cover all major aspects of oil palm agronomy.

OMP is now used in leading companies in >10 countries (total area >0.5 M ha). Whilst many accounting systems incorporate some agronomic data, OMP is the only comprehensive oil palm agronomic database software on the market.


*Figure 2.* *Field inspections are a key part of all approaches to yield improvement. But they are of limited value unless all key agronomic performance information is available to all personnel involved. OMP provides the means to close this 'information gap'.*

TCCL recommends OMP as a 'one stop shop' for the storage and analysis of agronomic data in oil plantations. TCCL has been collaborating with Agrisoft Systems for the past eight years to develop improvements and new features to the software.

OMP has become such an integral part of TCCL's field work that it is difficult to envisage serious yield intensification work being done without first setting up OMP (Figure 2).

## 2. Why is a database system required?

More than 500 'raw data' values are collected and recorded for each block each calendar year. Thus, a 10,000 ha plantation accumulates >1,500,000 unprocessed agronomic data values over each ten year period.

In a typical oil palm plantation without a centralized agronomy database, many personnel are involved in collecting and collating agronomic data in computer spreadsheets. This creates many problems familiar to experienced field staff:

- **Fragmentation of data** (different personnel manage different data sets (e.g., production, leaf analysis, field audit results)).

- **Difficult or even impossible to identify data errors** (incorrect data entry, incorrect calculation formulae).
- **Lack of consistent data recording and analysis standards** amongst personnel.
- **Data lost** due to failure of PC equipment/staff departures.
- **Difficult/impossible to carry out complex data analysis of data** from multiple years because spreadsheets are only suitable for analysing data in two dimensions (Figure 3).
- **Dispersed agronomic data prevents the investigation** of relationships between different agronomic factors (e.g., yield and crop nutritional status).
- **Spreadsheet pivot tables only add uncontrolled and non-standard data analysis on partial data sets.**

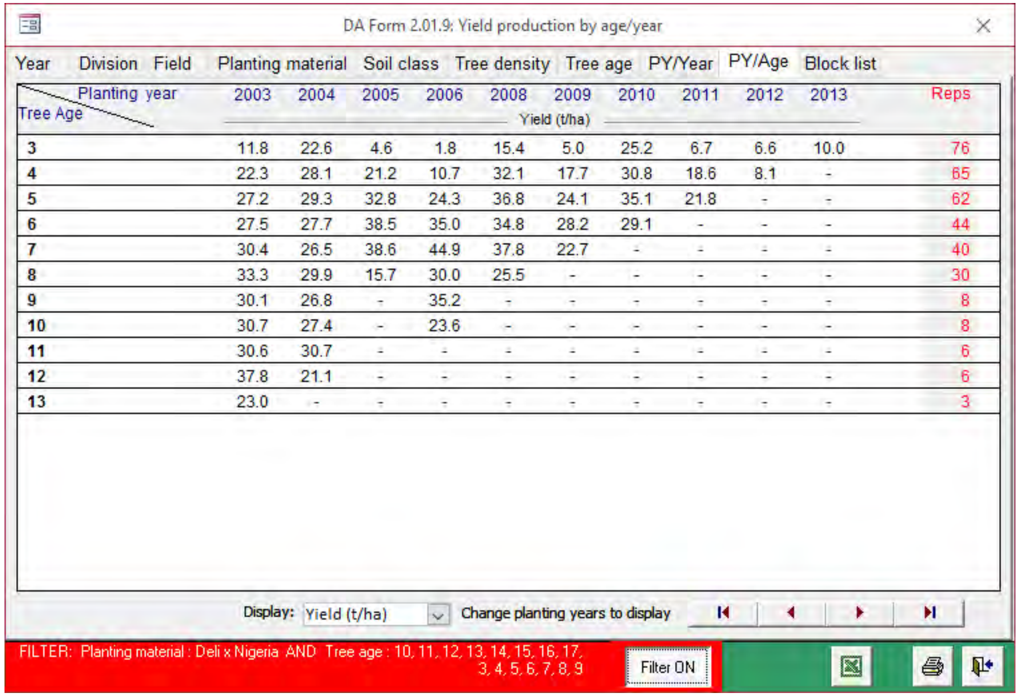
Besides helping to solve the general data management issues listed above, OMP, a software designed specifically for oil palm plantations, has further benefits:

- A full set of consistently formatted **data collection forms** can be printed from OMP.
- OMP contains a comprehensive **data verification** system.
- OMP provides a proven set of **predefined data analysis and reporting tools and reports** covering the most important agronomic aspects.
- **OMP provides powerful tools for specific tasks (e.g. fertilizer cost optimization) which are impossible to build with spreadsheets.**
- **Data can be entered by hand or imported from spreadsheets.**
- **Data can be shared or linked between OMP and other computer software that use standard database protocols (e.g., enterprise resource planning (ERP) software).**
- All **data can be filtered and then exported to an Excel® spreadsheet.**
- **All management staff use one standard set of data: one '*data source*' but multiple '*data users*'.**
- Plantation agronomy '*intellectual property*' is safe and secure over the long term.

## 3. Analysis of plantation 'physicals' or 'financials'?

Most companies place major emphasis on close analysis of the financial performance of their oil palm plantations (e.g., \$/ha, \$/t). This is partly because of the difficulty of carrying out close and consistent analysis on the agronomic data that is actually the basis for calculating financial performance. Financial data is simply agronomic data (t/ md, t/ha, md/ha) that has been converted into financial data using prices (\$/t, \$/md).

Field management staff are always '*price takers*' but they have full authority to control the use of physical inputs (md labour, kg materials, hours machine time) as '*physical performance makers*'. Thus, physical performance criteria (e.g., t/ha, kg/bunch, md/ha, kg/ha, hrs/km) are the best means to assess the efficiency of field management (Figure 3). If physical outputs have been achieved but financial performance is below standard, the cause is likely high prices not poor field management!




| Tree Age \ Planting year | 2003 | 2004 | 2005 | 2006 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | Reps |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yield (t/ha) | | | | | | | | | | |
| 3 | 11.8 | 22.6 | 4.6 | 1.8 | 15.4 | 5.0 | 25.2 | 6.7 | 6.6 | 10.0 | 76 |
| 4 | 22.3 | 28.1 | 21.2 | 10.7 | 32.1 | 17.7 | 30.8 | 18.6 | 8.1 | - | 65 |
| 5 | 27.2 | 29.3 | 32.8 | 24.3 | 36.8 | 24.1 | 35.1 | 21.8 | - | - | 62 |
| 6 | 27.5 | 27.7 | 38.5 | 35.0 | 34.8 | 28.2 | 29.1 | - | - | - | 44 |
| 7 | 30.4 | 26.5 | 38.6 | 44.9 | 37.8 | 22.7 | - | - | - | - | 40 |
| 8 | 33.3 | 29.9 | 15.7 | 30.0 | 25.5 | - | - | - | - | - | 30 |
| 9 | 30.1 | 26.8 | - | 35.2 | - | - | - | - | - | - | 8 |
| 10 | 30.7 | 27.4 | - | 23.6 | - | - | - | - | - | - | 8 |
| 11 | 30.6 | 30.7 | - | - | - | - | - | - | - | - | 6 |
| 12 | 37.8 | 21.1 | - | - | - | - | - | - | - | - | 6 |
| 13 | 23.0 | - | - | - | - | - | - | - | - | - | 3 |

*Figure 3. Yield by year of planting and tree age for one planting material. Such calculations are instantaneous in OMP but very cumbersome if not impossible when using spreadsheets.*

As prices of items such as labour, fertilizers and CPO are typically outside the direct control of plantation managers, analysing and optimizing the physical inputs is the best way to drive profitability in a sustainable manner. This can only be achieved when a dedicated agronomy software application is used to collect and analyze agronomic data Enterprise planning (ERP) applications often contain some agronomic data but focus mainly on financial reporting.

OMP is a one stop shop that provides the means to store, analyse and map all agronomic data generated in a typical oil palm plantation and has been built specifically with the aim of helping to close yield gaps and optimize input use.

Some OMP users have now accumulated >20 years of data for their plantations so that they can analyse agronomic performance over the long-term. Thus, over time, OMP data becomes a key part of the company's intellectual property.

## 4. How does the programme work?

OMP is a database software based on MS Access (Agrisoft Systems is presently preparing a version that uses SQL server):

- OMP allows for **four levels of administrative unit** (i.e., **block** (smallest unit of recording – 20–30 ha), **field** (group of blocks), **division** (group of fields), **estate** (group of divisions).
- The software provides the **means to record all agronomic data** collected in an oil palm plantation (Table 1).
- All **'raw data' is captured at the block level** (Table 1), the lowest level of data administration, **and aggregated automatically**. This ensures consistency at all reporting levels (block, field, division and estate).
- **Analysis of all agronomic data can be carried out at block, field, division and estate level over a single year or multiple years**:
  - A **filter tool** provides the means to select records for a sub-set of blocks (e.g., 'all blocks planted on sandy soil with Lonsum seed in 2009').
  - **Built-in queries** provide the means for detailed data analysis (e.g., leaf analysis trends) for a sub-set of blocks (e.g., a combination of planting year and soil type) selected using the filter tool.
  - All data analysis that can be displayed on screen can be printed as reports or pdfs or exported as an Excel® spreadsheet.
- Nearly all data stored in OMP can be portrayed in the form of thematic block maps that use colours to differentiate agronomic performance standards (e.g., yield, leaf P content) (Figure 13) and graphs (Figure 4).

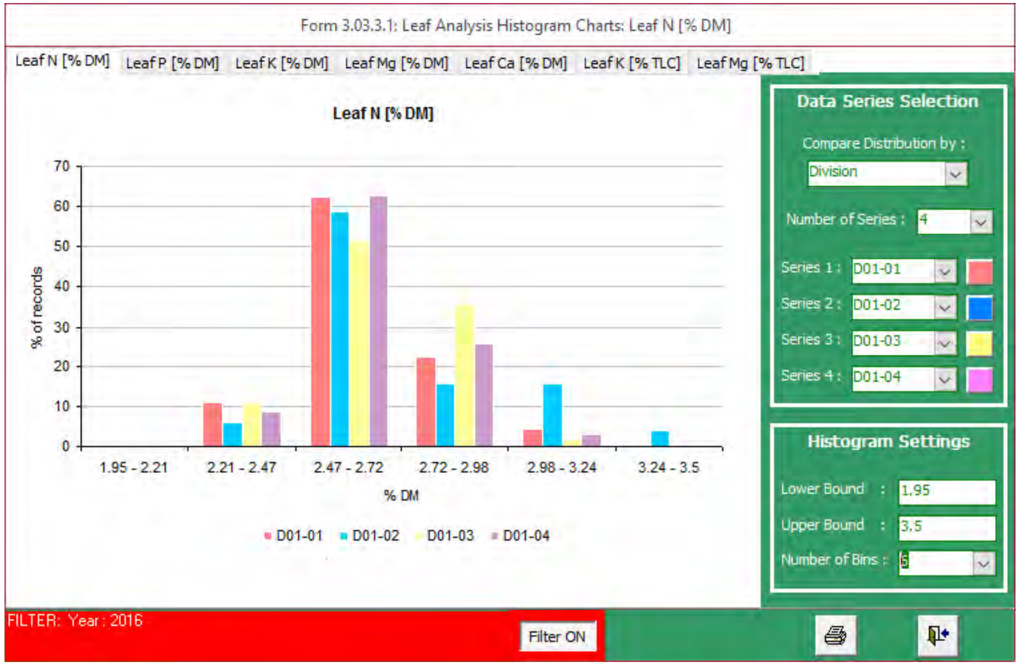



*Figure 4. Histogram showing values for leaf N concentration grouped into six 'bins' for four plantation divisions. The leaf N concentrations is <2.5% N in about 10% of all blocks.*

Crucially, the OMP software captures raw data (i.e., uncalculated values) wherever possible so that aggregated and calculated data are a true and accurate reflection of the raw data upon which values are based. In many cases, parameters from one data segment (e.g., palm census) are used to calculate values in other segments (e.g., yield). Thus, there are huge advantages in managing all agronomic data in one software application. All calculations performed in OMP have been thoroughly tested over time. The software provides the means for data cross checking so that incorrect raw data values can be identified and corrected.

One or two workers are sufficient to operate the OMP software in a plantation of 10,000 ha. Thus, field staff are free to focus on field supervision and, crucially, can be provided with up-to-date and accurate summarized data to use during field inspections and to assess performance (Figure 11, Figure 10).

A single OMP estate license does not limit the number of computers on which

OMP can be installed. Therefore, field managers and/or agronomists are free to run a copy of the software on their own desktop or laptop computer to carry out detailed analysis - they become '*information users*' not '*data managers*'.

## 5. How does OMP contribute to improved plantation performance?

Some examples of how OMP can contribute to improved business performance are illustrated below.

### 5.1. Crop budgeting

OMP includes a crop budget module where the crop budget is built up based on an estimate of the yield and crop distribution for each block.

- OMP operator enters the crop budget for each block (t/ha/month fruit bunches, crop distribution).
- Based on this data, reports at block, field, division and estate level provide reliably calculated performance data on production and yield (t/ha/month, t/ha to date, comparison with budget, potential and 12 month rolling average yield).
- Easy to identify blocks, fields and divisions where yields are lagging.

### 5.2. Crop forecasting

Forward sales of crude palm oil provide opportunities to achieve additional profits. Forward sales should always be underpinned by reliable information from a crop forecast based on black bunch counts.

Black bunch counts have been used in the oil palm industry for many years. The reliability of crop forecasts is often poor, however, where the process is poorly controlled in the field, calculations are not reliable, and there is insufficient retrospective analysis of the accuracy of past completed crop forecast periods. OMP provides the means for controlled crop forecasting data:

- Field staff group all blocks into subsets of five blocks. Sampling is carried out on every 20th row (5% palms) in one block in each subset (20% blocks) to give an overall sampling rate of 1%.
- The OMP operator enters the number of palms sampled and the number of black bunches counted.
- Based on this data, reports at block, field, division and estate level provide reliably calculated performance data:
    - Crop forecast (t) for the four-month period.
    - Retrospective analysis of the most recently completed four-month period (actual versus forecast).

### 5.3. Yield monitoring

Oil palm is a '*volume crop*' and, provided proper management procedures are followed, large yields are usually translated into large profits. Continuous monitoring is required to assess yield gaps and identify individual blocks where yields are less than expected.

- Daily fruit bunch (kg/block and bunches/block) can be entered or imported directly from weighbridge records. Alternatively, the OMP operator can enter or import the production variables on a monthly basis.

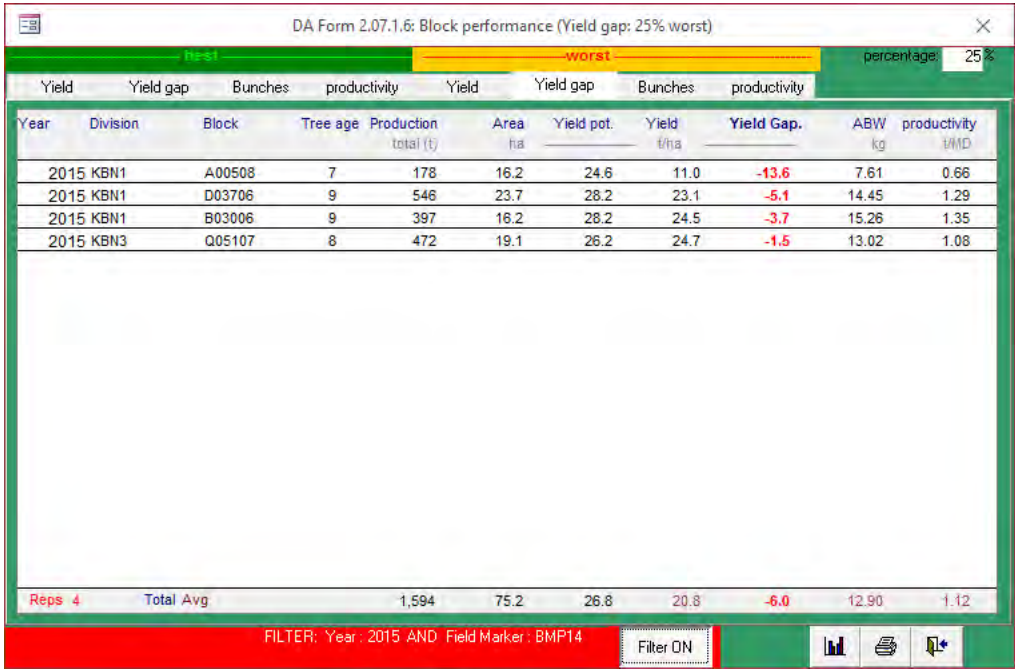



*Figure 5. Yield gap analysis (difference between potential and actual yield) provides the means to identify blocks where there are opportunities for yield improvement.*

- Based on this data, reports at block, field, division and estate level provide reliably calculated performance data:
    - Detailed yield analysis at block level (t/ha, kg/bunch, kg/productive palm, difference to previous years).

- Yield analysis at field, division and company level in terms of the gap between budget and/or potential and actual yield (Figure 5).
- Strategic analysis at company level (t/ha by year of planting and calendar year).

## 5.4. Harvest control

Harvest interval control is the key to avoiding crop losses. A monthly review of statistics is required to assess standards and identify areas requiring improvement.

- The OMP operator sets up the annual budget based on yield (t/ha/year/block) and crop distribution (% annual crop in each month).

DA Form 2.07.2.1: Block with harvesting rounds > 13 days

Number and percentage of blocks with harvesting rounds > 13 days

Harvesting rounds > 13 days | Harvesting round is empty | Block list (in yield) | Block list (all)

| Year | Division | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | In yield |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | No. of blocks in yield with harvesting rounds > 13 days | | | | | | | | | | | | |
| 2016 | D01-01 | No. | - | - | 16 | - | - | - | - | - | 2 | - | - | - | 47 |
| | | % | - | - | 34 | - | - | - | - | - | 4 | - | - | - | |
| 2016 | D01-02 | No. | 8 | - | 18 | 17 | 2 | - | 8 | - | - | - | - | - | 51 |
| | | % | 16 | - | 35 | 33 | 4 | - | 16 | - | - | - | - | - | |
| 2016 | D01-03 | No. | 2 | 14 | 17 | 5 | 2 | 8 | 33 | 1 | 14 | - | - | - | 63 |
| | | % | 3 | 22 | 27 | 8 | 3 | 13 | 52 | 2 | 22 | - | - | - | |
| 2016 | D01-04 | No. | 1 | 1 | 10 | 2 | 5 | 7 | - | 1 | 23 | - | - | - | 35 |
| | | % | 3 | 3 | 29 | 6 | 14 | 20 | - | 3 | 66 | - | - | - | |
| 2016 | D02-01 | No. | 3 | - | 17 | 1 | 2 | 1 | - | 5 | 4 | - | - | - | 43 |
| | | % | 7 | - | 40 | 2 | 5 | 2 | - | 12 | 9 | - | - | - | |
| 2016 | D02-02 | No. | 13 | 13 | 39 | 1 | 10 | - | 7 | 41 | 51 | - | - | - | 60 |
| | | % | 22 | 22 | 65 | 2 | 17 | - | 12 | 68 | 85 | - | - | - | |
| 2016 | D02-03 | No. | 14 | 3 | 9 | - | 8 | 2 | 18 | 9 | 18 | - | - | - | 26 |
| | | % | 54 | 12 | 35 | - | 31 | 8 | 69 | 35 | 69 | - | - | - | |
| Total | | No. | 380 | 396 | 489 | 889 | 600 | 407 | 372 | 403 | 652 | 494 | 226 | 93 | 4,272 |
| Reps | 117 | % | 9 | 9 | 11 | 21 | 14 | 10 | 9 | 9 | 15 | 12 | 5 | 2 | |

Filter OFF

*Figure 6. Summary of number and percentage of blocks with harvest intervals >13 days in length.*

- The OMP operator enters raw monthly data for t/block, md/block, round length (days), harvests per month.
- Harvest round lengths and harvests per month can also be calculated automatically by the program based on the daily production data (Figure 6).
- Based on this data, reports at block, field, division and estate level provide reliably calculated performance data:
  - Round/harvest cycle lengths including non-compliance with minimum standards. Reports can be printed and circulated and maps printed to show where round/harvest cycle control is poor (Figure 6).
  - Harvester performance (t/md, t/md).
  - Block maps showing harvesting intervals by category (e.g., <7 days, 7–14 days, 14-21 days, >21 days).
  - Actual production and yield compared with budget for the month and year to date.

## 5.5. Field upkeep monitoring

Top management needs to have a clear picture of field standards (field upkeep, harvesting, pest and disease management).

OMP provides the means to store scores for at least 24 parameters assessed during field audits.

- Field team carry out field audits and records a score for each parameter (e.g., circle weeding up to standard = score 3, below standard = score 2, urgently needs improvement = score 1).
- OMP operator records scores in OMP (or imports them from a hand phone app used for data collection or an Excel® spreadsheet).
- Based on this data, reports at block, field, division and estate level provide reliably calculated performance data:
  - Changes and/or variation in field standards over time and space.
  - Summary scores for harvest, field upkeep and fertilizer management.
  - Data can be used as part of staff appraisal.

The next version of OMP will include a field survey data collection app (Android and iOS) called OMP-FS that can be used to record data on all relevant field upkeep and agronomy parameters, pest and disease data and nutritional status data (Figure 7). This will contribute to even more accurate field data by eliminating data transcription errors and providing the means to verify that data was really collected at the correct locations.

The OMP app will provide the user with the means to:

- Record any data by block, palm point, palm row and number.

- Record and analyze data on specific traits (e.g., incidence of noxious weeds) that may not yet be available in OMP.
- Define expressions to calculate summary scores.

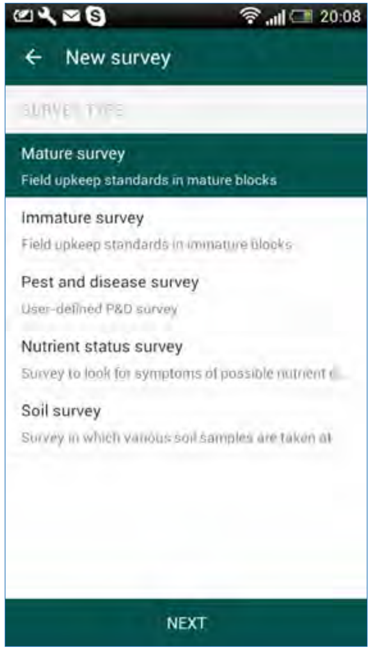



*Figure 7.* *Screen shot of the new OMP-FS app for Android and iOS, presently under development. The app will provide users with the means to capture data in the field and upload data to OMP.*

Significantly, the app provides management to verify whether or not surveyors have actually visited the locations from which data was collected.

## 5.6. Fertilizer use

Fertilizer is the single largest cost item in oil palm management. It therefore is essential to have up-to-date and accurate information on implementation of the fertilizer programme, based on properly aggregated raw data.

- The OMP operator enters the fertilizer programme (kg/palm/block for each fertilizer) at the beginning of the year (5.8).
- OMP calculates total fertilizer requirement based on palm census data and recommended rates.
- The OMP operator enters the amounts of fertilizer applied each month (kg/block for each fertilizer).
- Based on this data, reports at block, field, division and estate level provide reliably calculated performance data:
  - Comparison of recommendation versus actual application at block, division and estate level (Figure 8).
  - Progress with fertilizer programme implementation.
- Considerable fertilizer savings can be achieved by calculating fertilizer requirements based on the latest number of productive palms rather than the planted area.

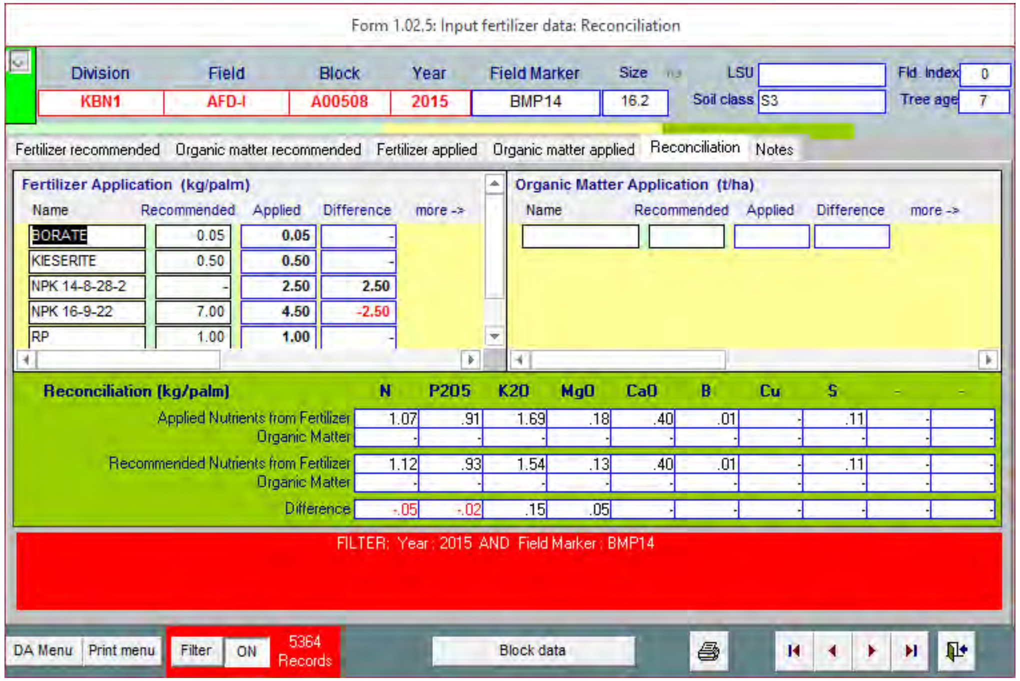



*Figure 8.* *OMP provides the means to reconcile recommended versus actual fertilizer application rates.*

## 5.7. Environmental parameters

Nowadays,it is important to collect data on environmental (e.g., erosion control, soil conservation) and agronomic (e.g., pruning, crop recovery) parameters as part of assessments of plantation sustainability and efficiency.

- Field staff assess key sustainability and agronomic parameters during leaf sampling exercises.

- The OMP operator enters the data and produces, reports at block, field, division and estate level provide reliably calculated performance data:
  - Analysis of the percentage of blocks for each sustainability parameter (e.g., soil erosion) that fall under each category (e.g., none, sheet erosion, rills, gulleys).
  - Analysis of the percentage of blocks for each sustainability parameter (e.g., pruning) that fall under each category (e.g., correctly pruned, under pruned, over pruned, neglected).
  - Investigate the relationship between different parameters (e.g., pruning assessment and fruit bunch yield).

Data on environmental parameters collected with the OMP app will be available for data analysis and reporting in OMP.

DA Form 2.03.2.3: Block leaf data with low K

N low | P low | K low | Mg low | All low | Low TLC

Replications 353

| Year | Division | Block | N% Leaf | N% Rach | P% Leaf | P% Rach | Crit | TLC | Low K% Leaf | Low K% Rach | Low K% %TLC | Mg Leaf | Mg %TLC | Ca % | Cl | S | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2016 | KBN1 | A00108 | 2.54 | | 0.154 | 0.085 | - | 70 | 0.79 | 1.25 | 29 | 0.24 | 28 | 0.61 | | | | |
| 2016 | KBN1 | A00208 | 2.54 | | 0.154 | 0.085 | - | 70 | 0.79 | 1.25 | 29 | 0.24 | 28 | 0.61 | | | | |
| 2016 | KBN1 | B01510 | 2.77 | | 0.158 | 0.051 | - | 65 | 0.83 | 1.11 | 33 | 0.22 | 28 | 0.52 | | | | |
| 2016 | KBN1 | B02011 | 2.78 | | 0.141 | 0.086 | - | 67 | 0.83 | 1.75 | 32 | 0.27 | 33 | 0.47 | | | | |
| 2016 | KBN1 | B02411 | 2.77 | | 0.177 | 0.093 | - | 60 | 0.79 | 1.31 | 34 | 0.25 | 34 | 0.39 | | | | |
| 2016 | KBN1 | B02614 | 2.71 | | 0.174 | 0.053 | - | 72 | 0.90 | 1.35 | 32 | 0.26 | 30 | 0.56 | | | | |
| 2016 | KBN1 | B02912 | 2.59 | | 0.181 | 0.118 | - | 61 | 0.86 | 1.60 | 36 | 0.21 | 28 | 0.43 | | | | |
| 2016 | KBN1 | B03012 | 2.59 | | 0.181 | 0.118 | - | 61 | 0.86 | 1.60 | 36 | 0.21 | 28 | 0.43 | | | | |
| 2016 | KBN1 | C01508 | 2.38 | | 0.148 | 0.078 | - | 76 | 0.81 | 1.59 | 27 | 0.36 | 39 | 0.52 | | | | |
| 2016 | KBN1 | F01908 | 2.60 | | 0.169 | 0.081 | - | 69 | 0.87 | 1.22 | 32 | 0.29 | 35 | 0.45 | | | | |
| 2016 | KBN1 | G03408 | 2.60 | | 0.169 | 0.081 | - | 69 | 0.87 | 1.22 | 32 | 0.29 | 35 | 0.45 | | | | |
| 2016 | KBN2 | D05412 | 3.03 | | 0.164 | 0.093 | - | 68 | 0.83 | 1.75 | 31 | 0.28 | 34 | 0.48 | | | | |
| 2016 | KBN2 | D05512 | 2.75 | | 0.150 | 0.046 | - | 75 | 0.81 | 1.07 | 28 | 0.26 | 29 | 0.65 | | | | |
| 2016 | KBN2 | E05112 | 2.75 | | 0.150 | 0.046 | - | 75 | 0.81 | 1.07 | 28 | 0.26 | 29 | 0.65 | | | | |
| 2016 | KBN2 | E05612 | 3.03 | | 0.164 | 0.093 | - | 68 | 0.83 | 1.75 | 31 | 0.28 | 34 | 0.48 | | | | |
| 2016 | KBN2 | E05712 | 3.03 | | 0.164 | 0.093 | - | 68 | 0.83 | 1.75 | 31 | 0.28 | 34 | 0.48 | | | | |
| 2016 | KBN2 | E05812 | 2.75 | | 0.150 | 0.046 | - | 75 | 0.81 | 1.07 | 28 | 0.26 | 29 | 0.65 | | | | |
| 2016 | KBN2 | E05912 | 2.75 | | 0.150 | 0.046 | - | 75 | 0.81 | 1.07 | 28 | 0.26 | 29 | 0.65 | | | | |

Filter OFF

*Figure 9. All blocks with K deficiency based on leaf analysis results can be identified as a first step in deciding upon follow up action.*

## 5.8. Crop nutritional status

Proper fertilizer programmes can only be developed when there is adequate leaf and soil analysis information as well as information on block characteristics (soil type, planting material, age of palms).

Many plantations place excessive confidence in recommendations provided by external consultants. The OMP FP provides a tool for estimating fertilizer requirements based on rules and assumptions set by management in a system that is completely transparent in terms of calculations.

- The OMP operator enters annual leaf and soil analysis data and maintains up-to-date information on block characteristics (Figure 9).
- The OMP Fertilizer Planner (OMP-FP), a decision support tool, can be used to interrogate agronomic data at the block level. Rules can be set up by the user, so that maintenance and corrective fertilizer applications are recommended according to block nutritional status.
- The OMP FP can calculate the least costly combination of fertilizers (kg/palm fertilizer) to implement the recommended application rates (kg/palm nutrient) based on fertilizer process and nutrient content in available fertilizer materials.

It is very easy to share the recommendations and assumptions with agronomists as part of due diligence on the fertilizer recommendation process.

## 6. Concise data available during field visits

Regular field inspections are vital but not very productive if data is not available. Typically, one member of the team is burdened with carrying a rucksack full of reports on harvest intervals, yields, fertilizer programmes, crop forecasts and so on, in case the data is needed in the field.

Growth Marker BMP14 BMP: BMP14 Division KBN1 Field AFD-II Block B03006
Soil: S2 Topography Rolling YOP: 2006 mYOP: 1 YAP: 10 DFH: 01/01/201 MFH: 48
Previous crop Land clearing Full Mech Density 136 P. material: FLD Area 16.2 ha

| Yield data: Yr | YA | Pot | Act | Gap | BW | BN | Fertilizer inputs (kg/palm): N A | N R | P2O A | P2O R | K2O A | K2O R | Mg A | Mg R | B A | B R | Leaf analysis (% dry matter): N L | N D | P L | K L | K Rc | K D | Mg L | Mg D | B L | B D | PCS cm2 | PH m | SPH p/ha |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 10 | 28 | 17 | 11.2 | 19 | 7 | ).64 | 1.0 | 0.4 | 0.6 | 0.88 | 1.4 | 0.11 | 0.1 | - | ).011 | 2.6 | - | 0.18 | 1.1 | 1.4 | - | 0.24 | - | 14 | - | 36 | 4 | 130 |
| 15 | 9 | 28 | 24 | 3.7 | 15 | 13 | 1.06 | 1.1 | 0.6 | 0.6 | 1.68 | 1.5 | 0.18 | 0.1 | ).006 | ).006 | 3.0 | - | 0.20 | 1.3 | 1.3 | 1 | 0.23 | - | 11 | - | 32 | 3 | 130 |
| 14 | 8 | 28 | 27 | 1.5 | 14 | 15 | 1.14 | 0.9 | 1.9 | 1.7 | 2.27 | 1.8 | 0.16 | 0.1 | ).032 | ).006 | 3.0 | | 0.19 | 1.1 | 1.1 | | 0.22 | | 12 | | 30 | 5 | 124 |
| 13 | 7 | 27 | 19 | 7.8 | 9 | 19 | 1.01 | 1.1 | 0.8 | 0.8 | 2.02 | 2.1 | 0.15 | 0.2 | ).037 | ).038 | 2.9 | | 0.17 | 1.3 | 1.3 | | 0.28 | | 11 | | 45 | 4 | 113 |

Manager's comments

*Figure 10. Example of a summary report containing historical data on yield, fertilizer use and leaf analysis results for a single block.*

Nowadays, the rucksack is obsolete because all the necessary reports can be stored on a tablet. Nevertheless, the required information that is of interestmay be spread over multiple reports, making it difficult to get a clear picture about a particular block quickly. Moreover agronomic issues may be overlooked, because the required information is hidden within one of many reports.

With OMP the user will have a few well-structured reports designed for the specific needs of a field walk. These reports summarize the data needed in a compact format of a pocket book, which you can either print out, or carry as pdf file on a tablet computer or smartphone (Figure 11, Figure 10).

Field management staff can then triangulate between what they see, what has been recorded and what the field management team's perceptions are concerning field agronomy.

**Field walks are more effective when management relies on reliable data processed into useful information and not just opinions!**

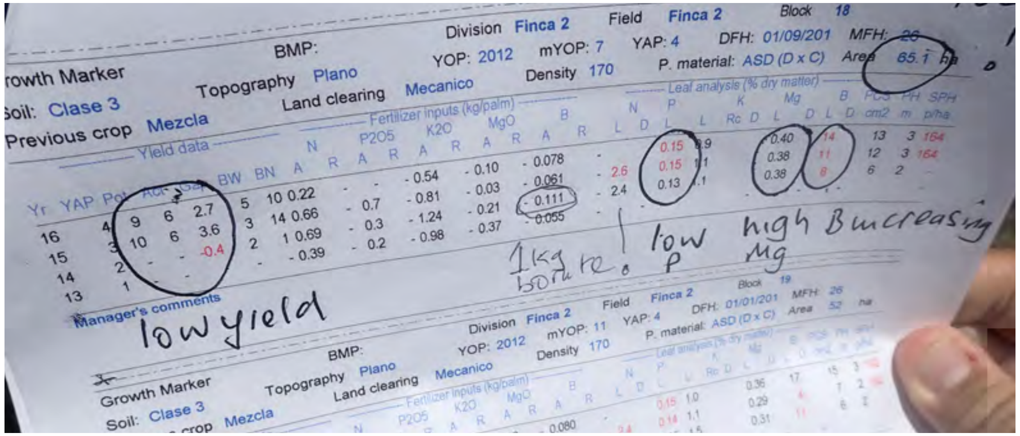



*Figure 11. In the field and armed with historical information on each blocks agronomic performance. Such reports can also be carried in a smartphone.*

## 7. What does OMP cost?

You can obtain a quotation from Agrisoft Systems.

The software is very cost competitive and usually works out on an annual basis equivalent to:

- 2–3 fruit bunches per ha; or
- 15–20 kg fruit bunches per ha; or
- <8 kg/ha fertilizer; or
- <0.2% of field upkeep costs.

A very small cost to take full control of agronomic data in the plantation?

## 8. References


Fairhurst, T. and Griffiths, W. (2014) Best management practice in oil palm. A practical guide to yield intensification in mature oil palm plantings. IPNI, Penang, Malaysia.

Fairhurst, T.H., Rankine, I.R., Gfroerer-Kerstan, A., McAleer, V., Taylor, C., Griffiths, W. and Hardter, R. (2003) A conceptual framework for precision agriculture in oil palm plantations. In: The oil palm - management for large and sustainable yields. Potash & Phosphate Institute/Potash & Phosphate Institute of Canada (PPI/PPIC) and International Potash Institute (IPI), Singapore, pp. 321-332.



*Figure 12. The manager and his assistant review field conditions in relation to verified and summarized performance data.*

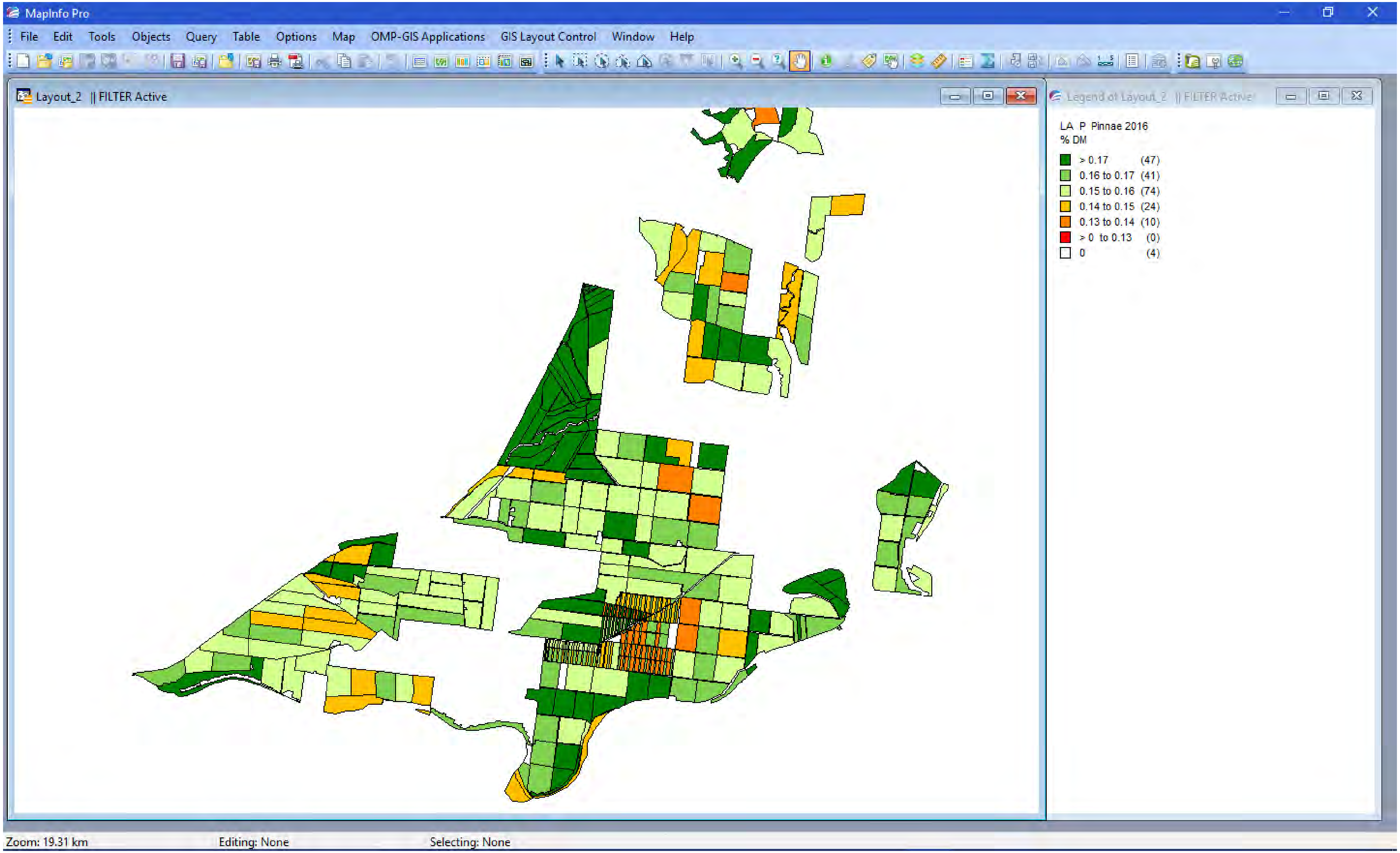



*Figure 13. Screen shot showing a thematic map that categorizes each planted block according to leaf P content.*

*Table 1.* Summary of data recording and analysis in OMP

| Recording | Data entered/recorded | Data analysis |
|---|---|---|
| Crop production | t/block, bunches/block | Yield analysis (t/ha, kg/bunch, bunch/palm, kg/productive palm) at all administrative levels and over time (day, week, fortnight, month, year) . |
| Harvest labour use | md/block/month | Harvester performance (t/md, ha/md). |
| Harvest events | Round/cycle length and harvest events per month (or automatic calculation) | Harvest cycle control (cycle/round length per block, harvest intervals by division and estate). |
| Crop budget per block | t/ha/block, crop distribution (% crop/month | Crop production (t/month, t/ha for the month, to date and by comparison with 12 month rolling yield and potential by block and management unit). |
| Black bunch count | Number of black bunch count palms, black bunches counted | Monthly four-month crop forecast based on black bunch counts.<br>Retrospective analysis of each completed crop forecast period of four months. |
| Palm census | Number of new planted/supply, immature, mature, dead, abnormal and unplantable palms | Calculation of stand per ha (SPH).<br>Calculate fertilizer requirements based on productive palms.<br>Calculate kg and bunches/productive palm. |
| Field audit scores | Score for each parameter assessed | Analyze quantitative scores for field conditions (e.g., pruning, harvesting, road maintenance) by block and over time |
| Vegetative growth | PCS, palm height, LAI parameters | Leaf area index.<br>Replanting requirements based on palm height. |
| Environment and field upkeep | Category for erosion, soil conservation, ground cover, drainage, pruning, crop recovery. | Percentage blocks in each category by year. |
| Leaf analysis | Leaf analysis results<br>Deficiency scores | Identification of blocks with nutrient deficiencies |
| Soil analysis | Soil analysis results | Characterization of blocks and administrative areas in terms of soil fertility constraints. |
| Fertilizer planner | Rules for fertilizer recommendation (maintenance and corrective application rates, rules for applying fertilizer) | Estimation of least costly sources of fertilizer nutrients.<br>Fertilizer plan and costs. |
| Pest and diseases | Results of monthly census | Pest and disease management reports and maps. |
| Pesticide use | Amount of pesticide used (l, kg/block) | Toxicity, amount of active ingredient used (l or kg/ha actual versus recommendation). |
| Climate data | Rainfall, raindays, irrigation, solar radiation, temperature | Water deficits.<br>Monthly and annual weather statistics. |