



# eCognition

## OIL PALM APPLICATION

### MORE SUSTAINABLE OIL PALM PLANTATION MANAGEMENT

Using a UAS to collect images of your complete plantation gets you an overview of every single tree from above. Such precise and accurate knowledge is the basis for better decisions that are essential to a successful plantation management. Automating the detection, counting and assessment of individual palm trees will enable you to efficiently perform this task right from your office desk.

With the Trimble® eCognition® software Oil Palm application, oil palm plantation operators can generate information based on every individual tree which is essential for understanding the current on-ground situation and derive appropriate actions like the application of fertilizers to maximize production yields.

#### Automatic Palm Tree Detection

The essential function in this application is the possibility to automatically detect every single palm tree in a block or on the complete plantation. The software uses the typical leaf structure to identify individual trees. This allows generating maps on a per-tree basis with minimum effort and is the basis for further analysis.

#### Automatic Crown Diameter & Anomaly Analysis

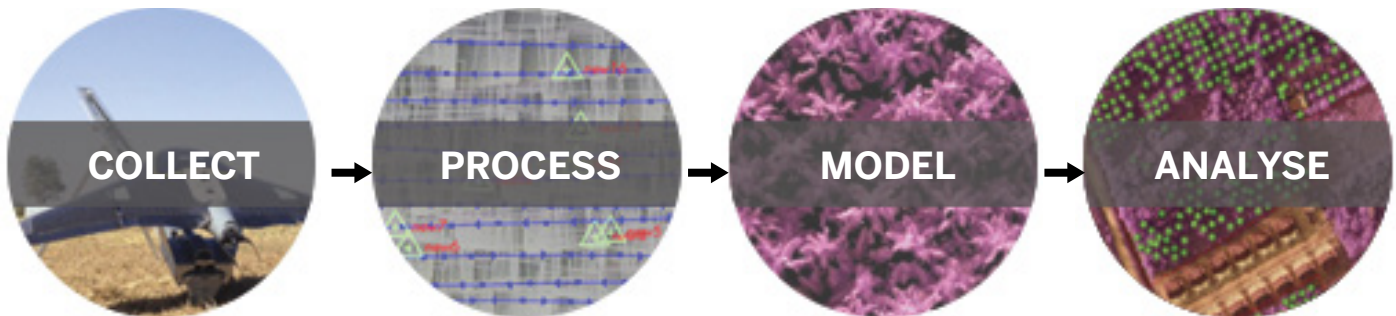
In addition to the oil palm identification the application analyses the detected palm trees automatically. The analysis divides the individual palm trees into three crown size categories – large, medium & small – and classifies trees that deviate in color (anomalies) corresponding to health status. Furthermore, it is possible to visualize the tree densities over a complete block, so that operators can identify areas potentially suitable for new trees or detect areas where the block has to be thinned out. Having a complete understanding of location, size and health-status of trees lets plantation managers to estimate current yields and derive actions to increase production for a given plantation size. It further identifies areas for future tree planting activities that drive a sustainable plantation operation without the need to extend the plantation into natural forests.

#### Quality Control & GIS-Export

The workflow is complemented with a set of interactive tools to correct misdeteected or misclassified oil palm trees by adding, removing, or reclassifying (crown diameter/ health status) individual palm trees. All derived data can be exported into a GIS for further utilization by generating printed or digital maps that can be used by the people in the field to efficiently execute the identified activities.

### Key Features

- ▶ Oil palm tree identification and anomaly detection that drives better decision making and sustainable plantation operations
- ▶ Guided and automated workflow for efficient oil palm mapping
- ▶ Low ramp-up time with little pre-knowledge that lets you generate convincing & actionable results












i.e. UX5 HP

i.e. TBC Base

i.e. UASMaster or TBC APM

eCognition Oil Palm Application

## TECHNICAL SPECIFICATIONS

Feature	Details
Import Multiple Data 	Use RGB or CIR imagery and elevation data from i.e. Trimble UX5 UAS: orthomosaic and DSM (optionally DTM) Supported image data types: TIFF, IMG, JP2 Required GSD <10 cm for imagery; <30 cm for DSM/DTM
Easy Project Preparation 	Define project setup for analysis: <ul style="list-style-type: none"> <li>– used camera type (RGB/CIR)</li> <li>– used spatial unit (meter/feet)</li> </ul>
Flexible Block Definition 	Define land parcels (polygons) for analysis and data reports by either drawing manually or by GIS layer import
Visualize Input Data and Analysis Results 	Navigate through the input data (pan/zoom), utilize predefined useful layer mixing and vector overlay options, and visualize tree density per block
Automatic Oil Palm Detection 	Automatically detect oil palm trees with the typical leaf structure and (optionally) small trees based on the DSM and DTM data
Automatic Crown Diameter Analysis 	Divide detected oil palm trees into three crown size categories: large, medium and small
Automatic Anomaly Analysis 	Classify oil palm trees that deviate in color (anomalies) corresponding to health status
Manual Quality Control 	Optional manual editing (add, remove, edit) of oil palm stands, crown diameters and/or health status
Export Results 	Generate GIS-ready information through export of results into an ESRI typical

## BENEFITS

- ▶ Get a precise and accurate overview of the current state of your plantation
- ▶ Create actionable information out of UAS datasets for your oil palm plantation
- ▶ Make faster and better decisions on a per-tree basis that increase production yields and drive a sustainable plantation operation

## DELIVERABLES

- ▶ **Tree Positions:** Point Shapefile that contains the center points of the detected palm trees and according attributes (including palm tree size, height, crown diameter, anomaly status, block ID)
- ▶ **Tree Crowns:** Polygon Shapefile that represents the crowns as well as all attributes from the tree centers shapefile
- ▶ **Blocks:** Polygon Shapefile that contains the defined analysis area (blocks) and all attributes that were evaluated during analysis (including number of palm trees per block, area, statistical summary of individual tree attributes from tree centers shapefile)

## SYSTEM REQUIREMENTS

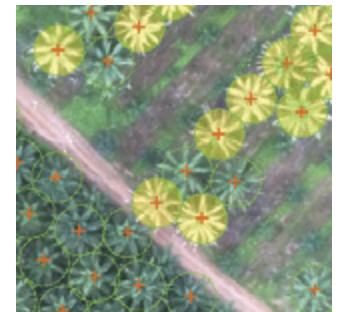
Trimble eCognition Oil Palm Application requires an Intel x86\_64 hardware platform (64 bit).

The recommended hardware requirements are:

- ▶ Intel Dual Core
- ▶ 8 GB RAM
- ▶ 200 GB available hard disk space
- ▶ 1920 x 1080 display

The recommended hardware requirements are:

- ▶ Microsoft® Windows® 7 (64-bit)
- ▶ Microsoft® Windows® 8.1 (64-bit)
- ▶ Microsoft® Windows® 10 (64-bit)



Automatic Palm Tree Detection and Analysis Results (unhealthy trees in yellow)

Contact your local Trimble Authorized Distribution Partner for more information

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