PHOENIX RESEARCH STATION

WAGENINGEN UNIVERSITY & RESEARCH

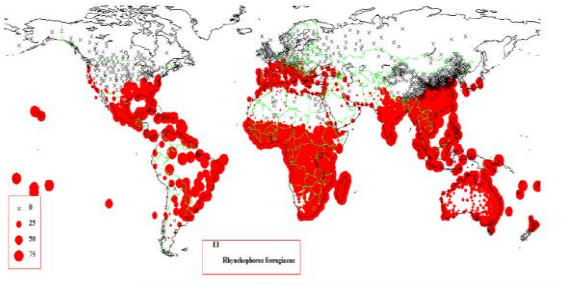
vito remote sensing

# PALMWATCH

## Red palm weevil infection detection with remote sensing

belspo

# BACKGROUND

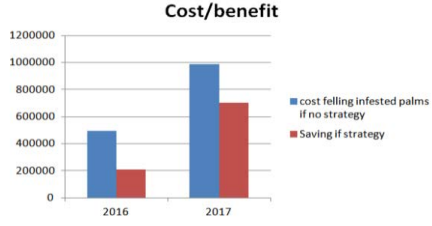



- Date palm production is an **important commodity crop** with a fairly large economic value:
  - US$ 2000 per ton for prime quality.
  - Yields: 11-17 tonnes/ha.

- The **red palm weevil (RPW)** is spreading fast across palm producing countries and causes palm trees to collapse.
  - Production losses & delay.
  - Slow plantation re-establishment.

- Extremely important crop from **cultural** point of view: gardens and public parks

- Frequent **inspection** and **trapping poorly implemented** although efficient if palms owners and gardeners were mobilized and trained




*These are compelling reasons for defining a solution to the problem of red palm weevil infestation.*

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# BACKGROUND

The RPW is spread by:

- **Flying** of adult beetles
- **Trade** of infested plants

The RPW causes:

- A **decrease in photosynthetic rate**
- A decrease in **water use** efficiency
- **Water loss**
- **Yellowing**
- Higher canopy **temperatures**
- Lower **stomatal conductance**
- **Structural** damage (e.g., chewing)

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# STUDY AREA

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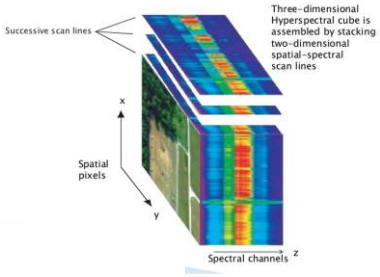
remotesensing.vito.be

# PALMWATCH - KEY QUESTIONS

- Can we detect RPW using available RS techniques?
- At what stage will we be able to detect RPW?

# PALMWATCH - OBJECTIVES

**RQ1: Can leaf biochemical changes be assessed?**

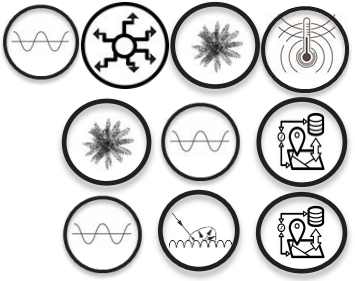


spectral

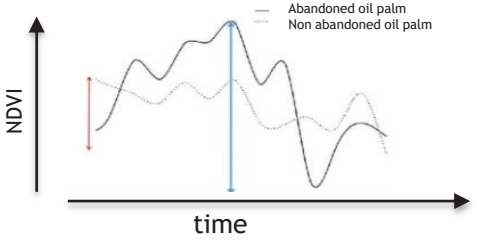
thermal

# PALMWATCH - OBJECTIVES

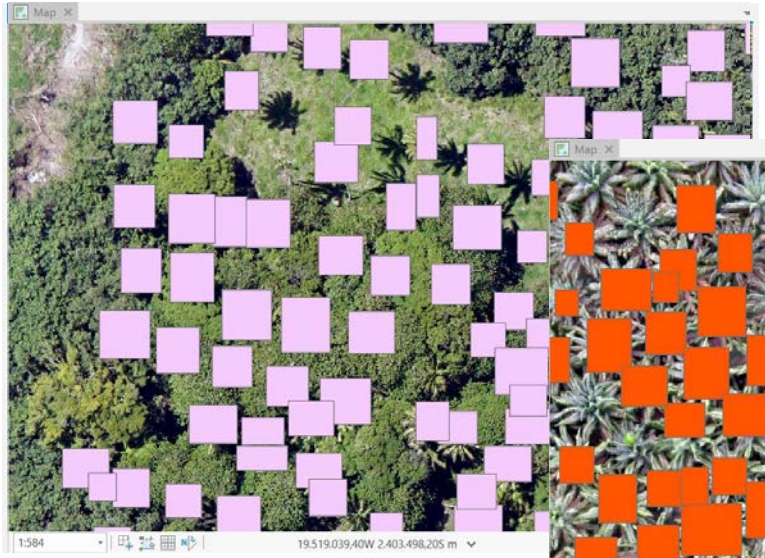
**RQ2: Can tree vitality parameters be used to detect RPW?**



| Platform | Resolution | Spatial | Spectral | Temporal |
|---|---|---|---|---|
| | | Very high | Very high | Low |
| | | High | Very low | High |
| | | Low | Low | Very High |



# LOCAL MAPPING WITH OBJECT DETECTION




Coconut palm detection model applied to oil palm

Coconut palm detection model

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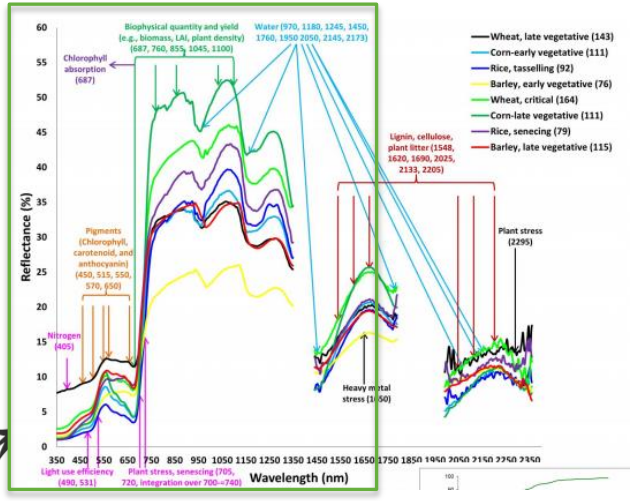
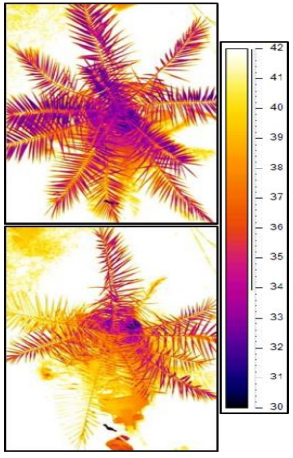
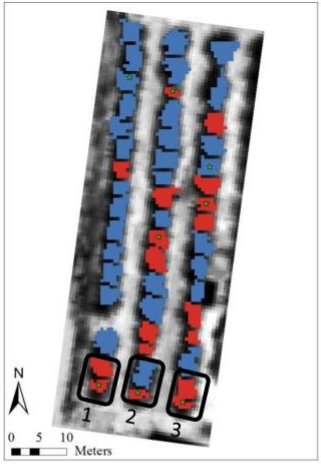
# LOCAL MAPPING

- ✓ Understanding the **physiological** response of the trees to RPW infection and **link to RS**
- ✓ Set-up an **innovative RS monitoring system** for a non-destructive effective local detection of RPW



# REGIONAL MAPPING

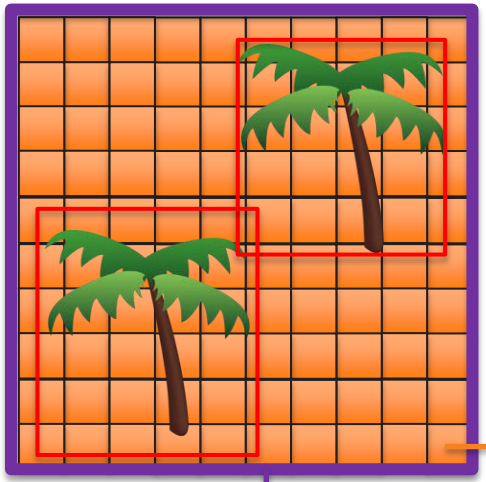
Regional palm tree maps

Temporal tracking

Targeted risk area mapping

# CREATING GROUND TRUTH FOR S1 AND S2

**Main concept: use high resolution maps to generate low resolution training data**



> 50% of S2 covered: palm tree pixel
< 50% of S2 covered: background pixel

In case of palm tree pixel:
density = amount of objects

Pleiades pixel

S1/S2 pixel

- While the Pleiades-based maps will serve as training data generation
- Additional manual 1m training data will be generated for independent validation

# THANK YOU