PHOENIX RESEARCH STATION

WAGENINGEN UNIVERSITY & RESEARCH

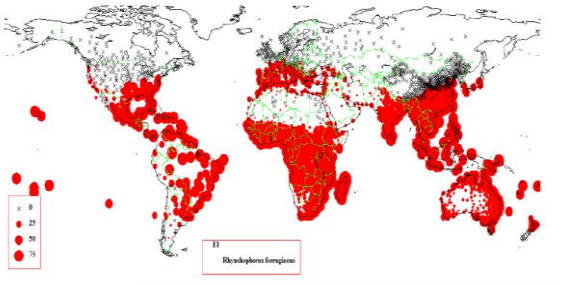
vito remote sensing

PALMWATCH

Red palm weevil infection detection with remote sensing

belspo

BACKGROUND

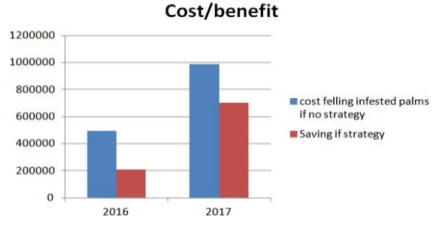


- Date palm production is an **important commodity crop** with a fairly large economic value:
  - US$ 2000 per ton for prime quality.
  - Yields: 11-17 tonnes/ha.

- 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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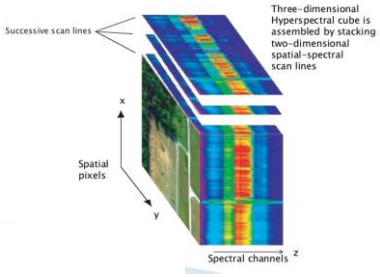
PALMWATCH - KEY QUESTIONS

- 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?

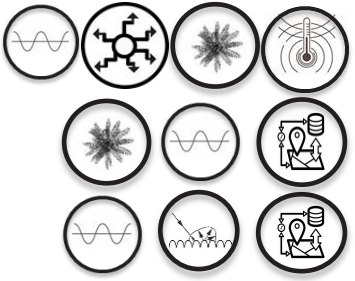


spectral

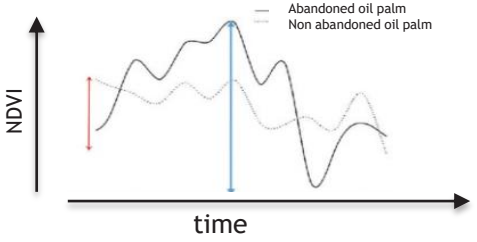
thermal

PALMWATCH - OBJECTIVES

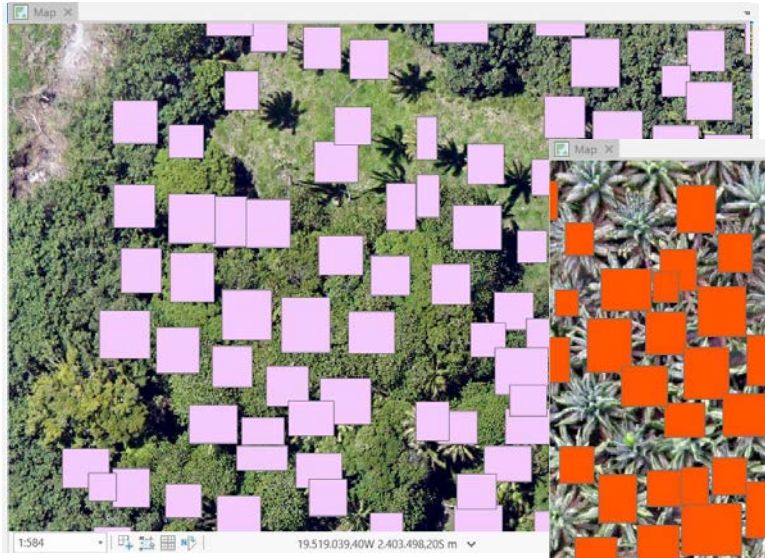
RQ2: Can tree vitality parameters be used to detect RPW?



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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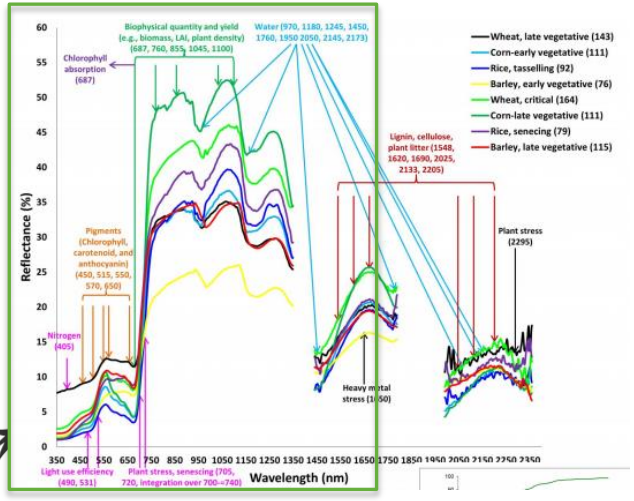
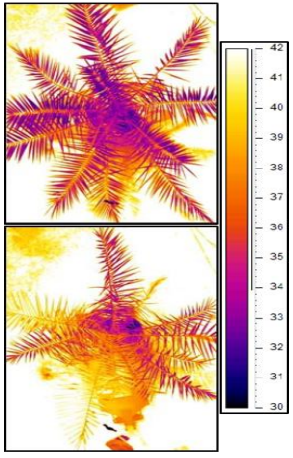
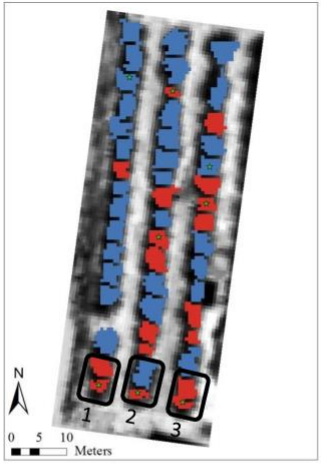
LOCAL MAPPING

- ✓ 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

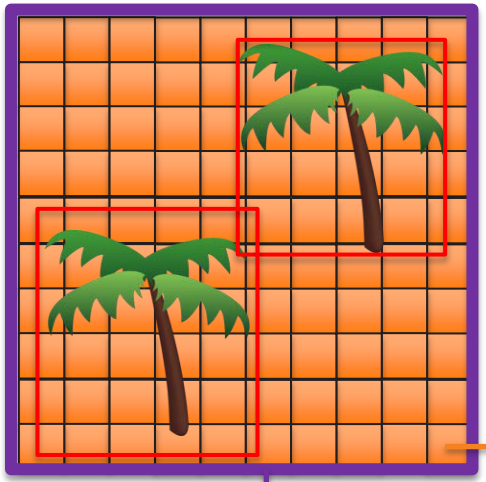
Regional palm tree maps

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