Vegetation Biophysical parameters

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What Does it mean… ???

Why I need to study it… ???

- Powerful parameters which can be used in Precision Agriculture
- Helps in finding Biomass,
- Related to Photosynthesis Activity
- Identification of stages of crops

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Biophysical parameters

Name	Meaning	Value	Interest
fCover (fractional cover of green vegetation)	% of surface of the ground occupied by the plant, seen from above	0 to 1, 1 corresponding to a situation where the ground is completely covered by vegetation	Mixed with other indicators, gives access to biomass assessment
FAPAR (Fraction of Absorbed Photosynthetically Active Radiation)	% of sunlight absorbed by the plant in the domain of photosynthesis	0 to 1, 1 corresponding to a photosynthesis fully active	Directly related to photosynthesis activity, mixed with other indicators, gives access to biomass assessment and production
LAI (Leaf Area Index)	Number of square meters of leaves present in one square meter of ground	Up to 5 to 7 for most crops (canopy closure is reached for 3-4)	Mixed with other indicators, gives access to biomass assessment

Biophysical parameters

Name	Meaning	Value	Interest
Chlorophyll content	Content of Chlorophyll A and B per unit area of leaves	Typical range 20 to 80 µg / cm^2	Mixed with biomass, allows assessing nitrogen concentration and deriving nitrogen inputs recommendations
fNPV (fractional cover of non photosynthetic – brown – vegetation)	% of surface of the ground occupied by brown leaves, seen from above	It ranges from 0 to 1, 1 corresponding to a situation where the ground would be completely covered by brown vegetation	May indicate stress or a certain degree of senescence / maturity in the crop. Can be used to issue recommendations for harvest or irrigation

Source: intelligence-airbusds

How to get these Parameters ???

1. Destructive method
2. Remotely sensed data (Satellite, Airplanes, UAVs)
3. Inversion of PROSPECT and PROSAIL Model
4. Direct measurement by ground Instruments

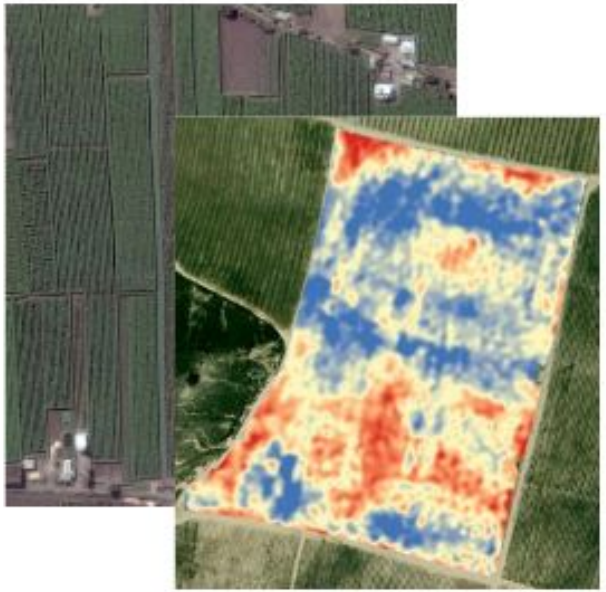
Importance of these parameters in Precision Agriculture

Precision Agriculture

Objective of PA: Intervention at

Right Place	Right Time	Right Amount

- On farm, evidence based decision making
- Optimize the use of crop inputs



Source: J. Bellvert et al., "Mapping crop water stress index ", 2014

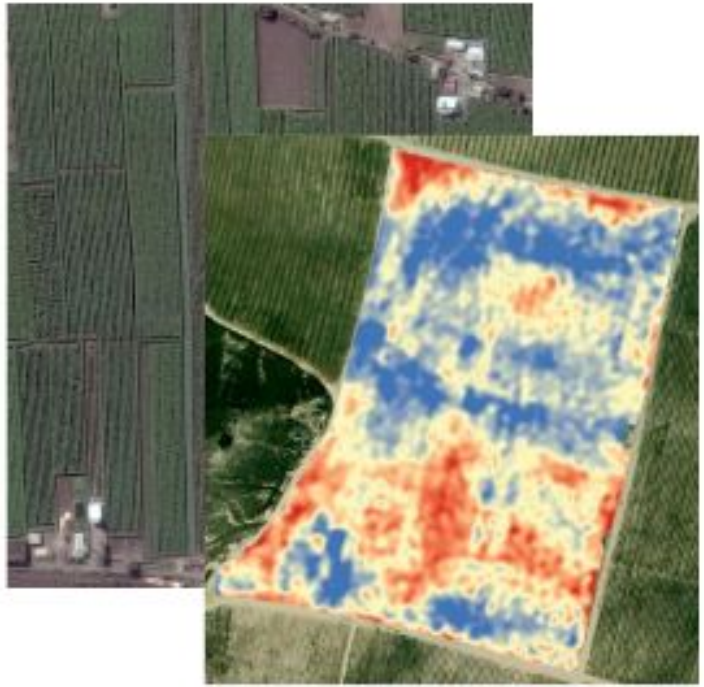
Precision Agriculture

Crop Variability:

Crop density; crop height; crop nutrient stress for N, P, K, Ca, Mg, C, Fe, Mn, Zn, and Cu; crop water stress; **crop biophysical properties** — leaf area index (LAI), intercepted photo-synthetically active radiation, and biomass; crop leaf chlorophyll content

or

Some kind of damage, infection or weed



Source: J. Bellvert et al. 2014

Ref: Naiqian Zhang et al., "Precision agriculture—a worldwide overview" 2002

Case Study

Evaluation of UAV based high resolution and satellite based medium resolution citrus canopy images with ground based LAI