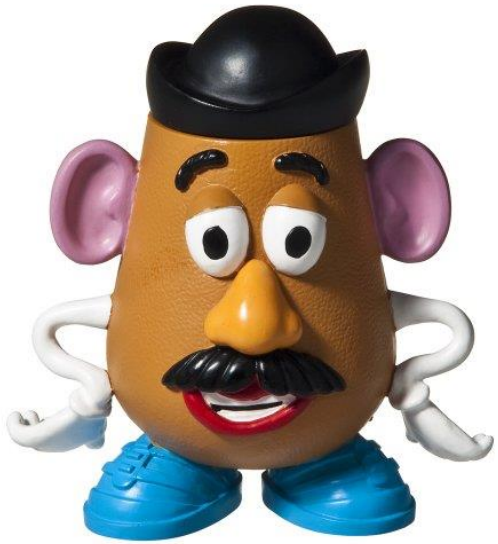
Google

iPOT ?????



"Industrial Potato monitoring for the Belgian potato sector"

iPOT

R. Cools, N. Cattoor (BELGAPOM)
I. Piccard, A. Gobin (VITO)
V. Planchon, Y. Curnel, J.P. Goffart (CRA-W)
B. Tychon, J. Wellens(Ulg)

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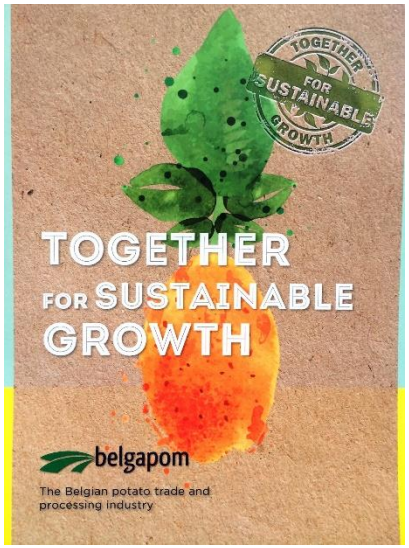

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Belgapom: the Belgian potato trade & processing industry

Processors : frozen & chilled potato products, chips, flakes & granulates

Traders : merchants, packers, seed potatoes, exporters

iPot project

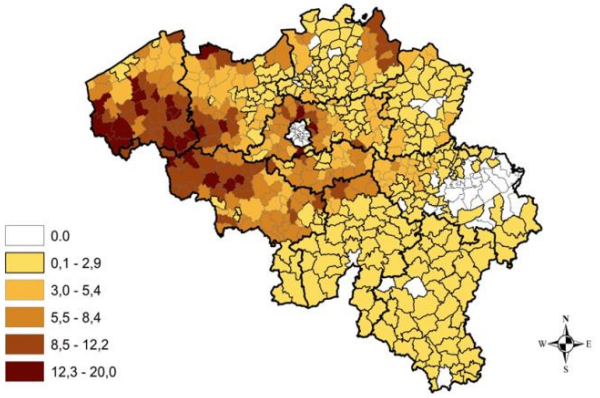
Background

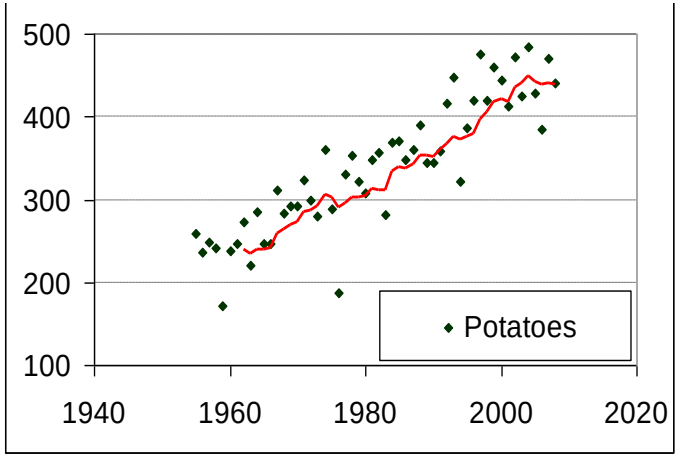
iPot project

Background

Belgian potato sector

- Fast growing sector of the Belgian food industry (the world largest exporter of potato products & largest importer of potatoes)
- More & more contracts with farmers (processors & trade)
- Crop consulting between processors & trade – growers
- Necessity to realise **higher yields** in a sustainable way to compete

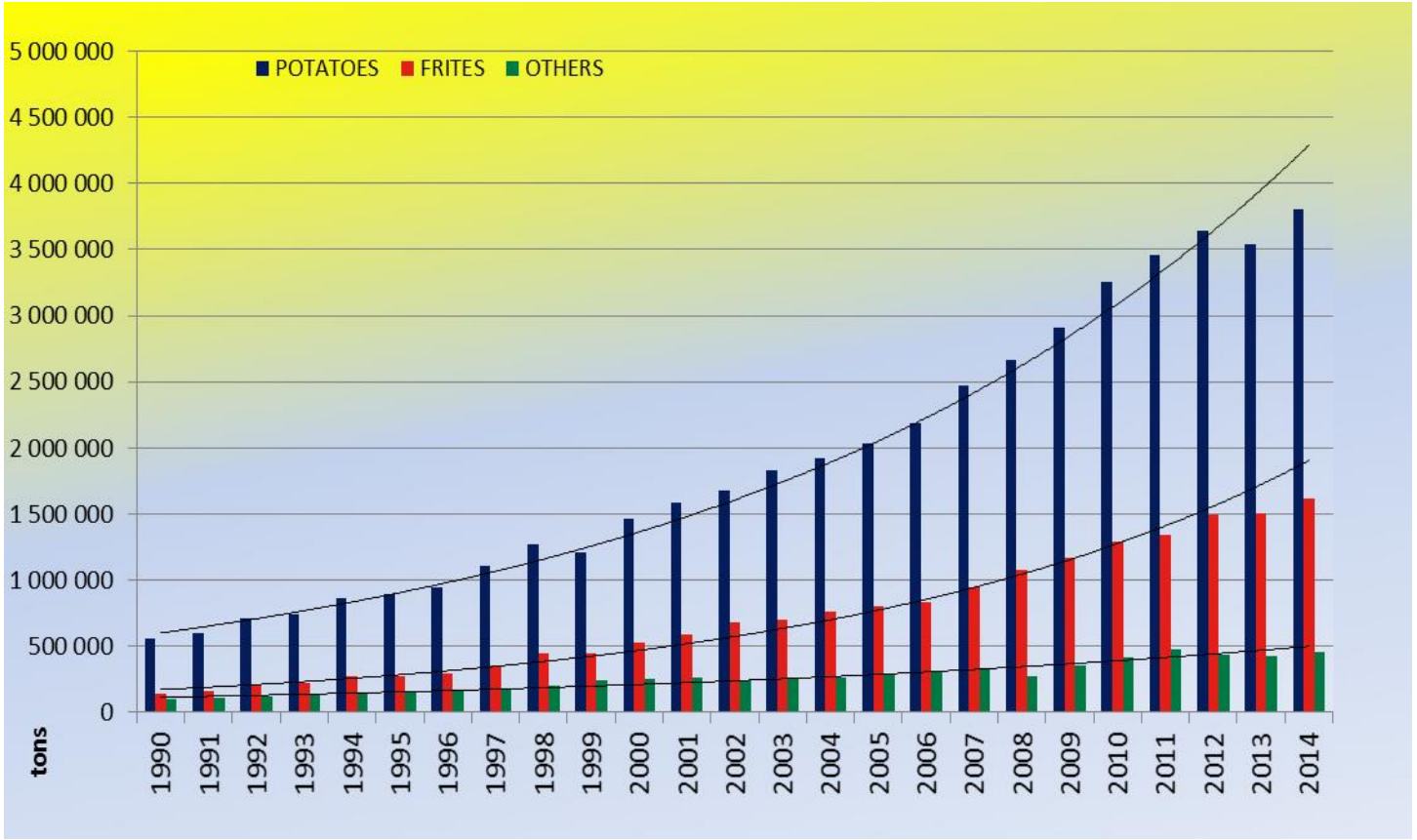




iPot : create a web based tool for an on line follow up of the potato parcels in order to control and improve potato quality and volume

iPot project

Background



90 % exported

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General objective

Potatoes : contracts + free market (volatility)

- contracted : December – February

- planted : March – May

- harvested : August – October
(volume & quality : yields – unstable)

Potato products :

- contracted : July – September (volume & price of potatoes ???) (high risks)

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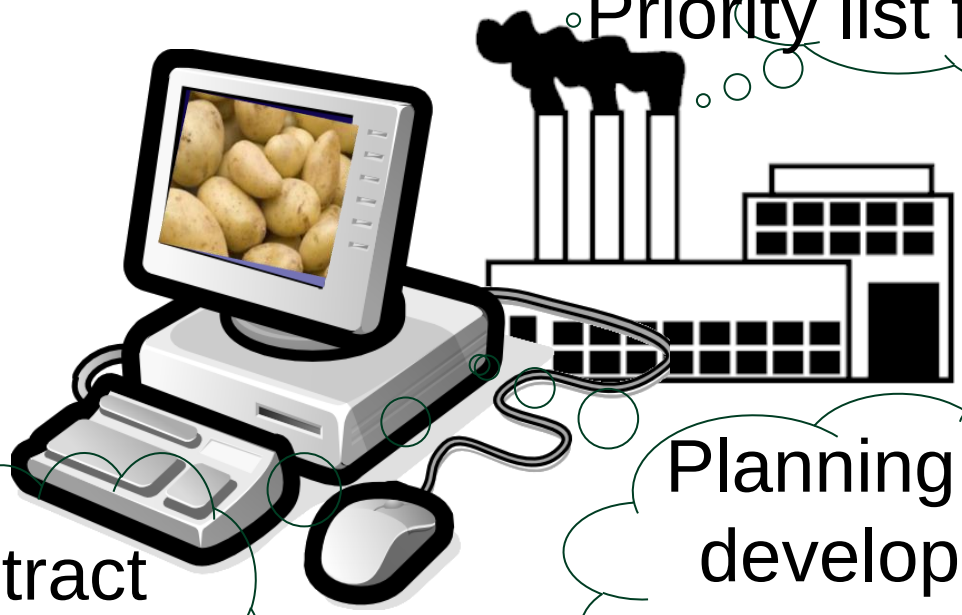
User needs

Risk of yield or quality losses?

Problems? Where? Priority list for field visits?



Planning! Crop development stage?

Contract negociations! Expected yield?

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User needs

The following monitoring techniques are considered as essential information to contribute to a better quality and quantity management of the production :

- Potato yield and quality information (tuber size and under water weight) to decide on haulm killing and/or harvesting;
- Real-time information on potato growth and development as physical follow up / sampling by industry experts is difficult given the increase in acreage and larger parcels with large within field variability;
- Information on crop and soil moisture, temperature and solar radiation to allow crop risk assessment for diseases or deformations

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Objectives

To provide information on potato growth and development at field level and yield estimates and forecasts to the Belgian potato sector by means of a

web-based geo-information platform

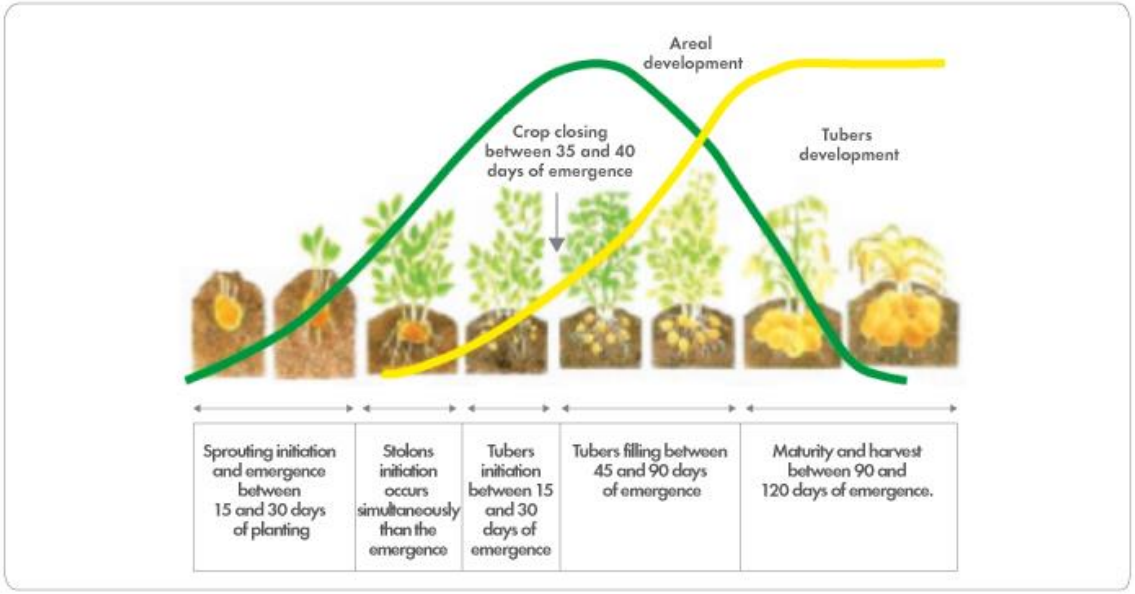
This intuitive web based geo-information platform will be developed for both the Belgian potato processing industry and research centres, focussing on the cultivation of the potato crop as an answer to specific challenges and information needs.

Continuous yield estimates and crop growth monitoring are on the top of the industry's priority list.

iPot project

Objectives

To develop - in close collaboration with the users - information products for potato crop growth monitoring based on the integration of field observations, close range sensing measurements, satellite images and crop growth models



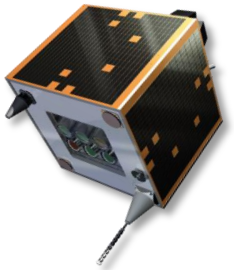
Methodology / expected results

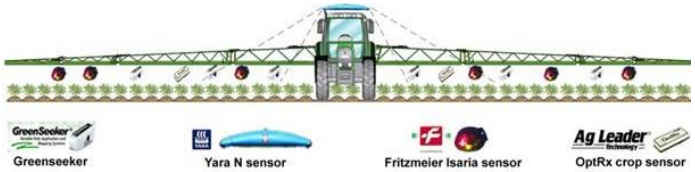
A combination of earth observation and modelling techniques will be used to investigate these issues and to develop practical solutions in the form of geo-referenced maps and graphs accessible via a web based interface

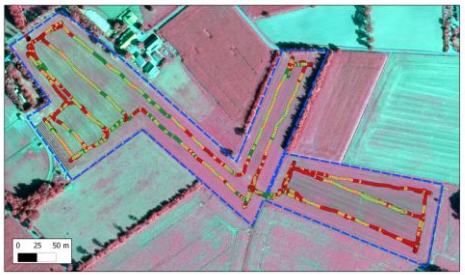
Multi-scale approach for potato monitoring and yield estimation, integrating field observations and close range sensing measurements with UAV and satellite images taken at regular intervals during the growing season (for crop monitoring) and with crop growth models (for yield assessment)

iPot project

Methodology







- Remote sensing data
- Field data collected / provided by the industry, potato research centers, government, research partners

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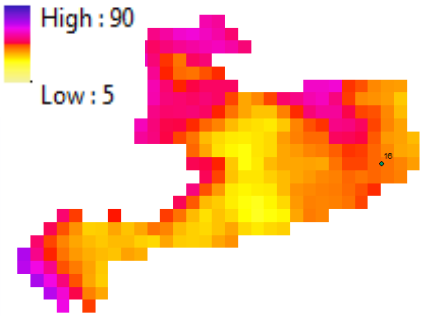
Field condition monitoring

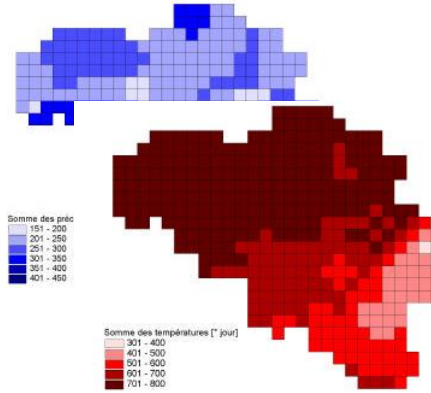
Monitoring field and crop condition to assess risk of yield or quality losses

- fAPAR from HR satellite sensors to estimate the crop's photosynthetic activity
- Vegetation moisture via NDWI, GVMI,…
- Soil moisture via Soil Moisture Index from B-CGMS (water balance module)
- Temperature and solar radiation from weather stations (interpolated to 10x10km grid) and from MSG (5km)



fAPAR variations within a potato field

Meteo station network in Belgium



10-km Meteo Grid Data Examples: sum of rainfall & temperature sum

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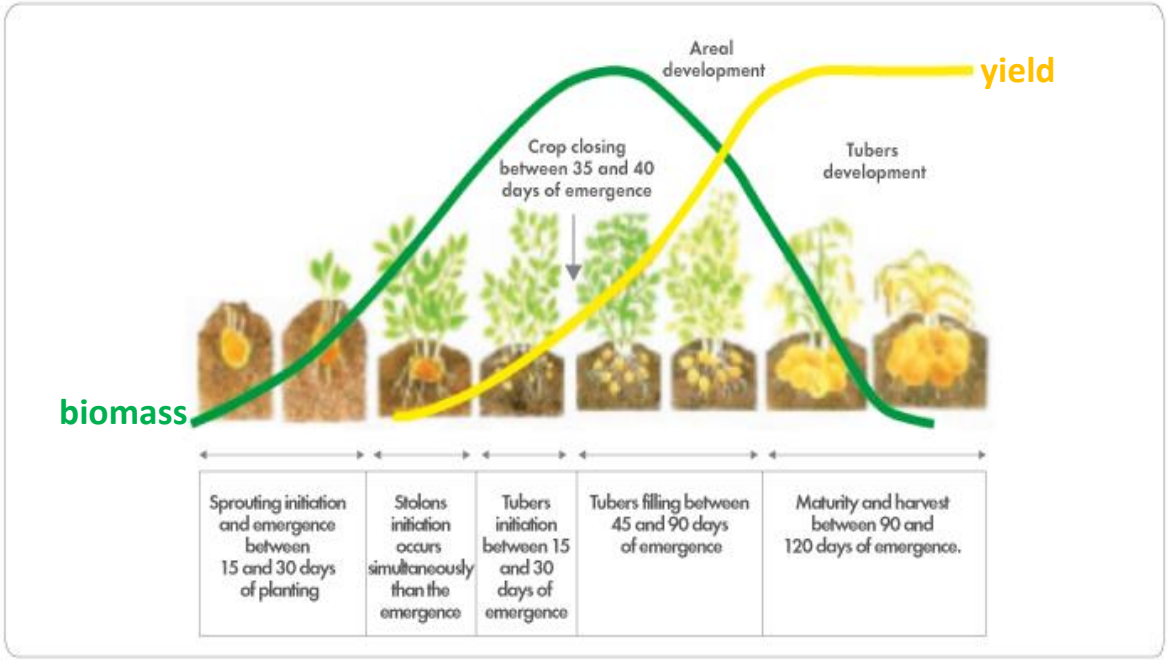
Crop growth / phenology monitoring

Objective:

- Parcel management & control, planning & logistics
- Input for crop yield modelling
- Maps can be derived on a regular basis with for each pixel the actual development stage of the potato crop



Development stage observed on the field will be linked with HR satellite index profile metrics

Methods:
(Gobin, 2012)

Growth Stage Timing = f(temperature, soil type, moisture, cultivar, …)
Dynamic coupling between weather, farm management and crop growth

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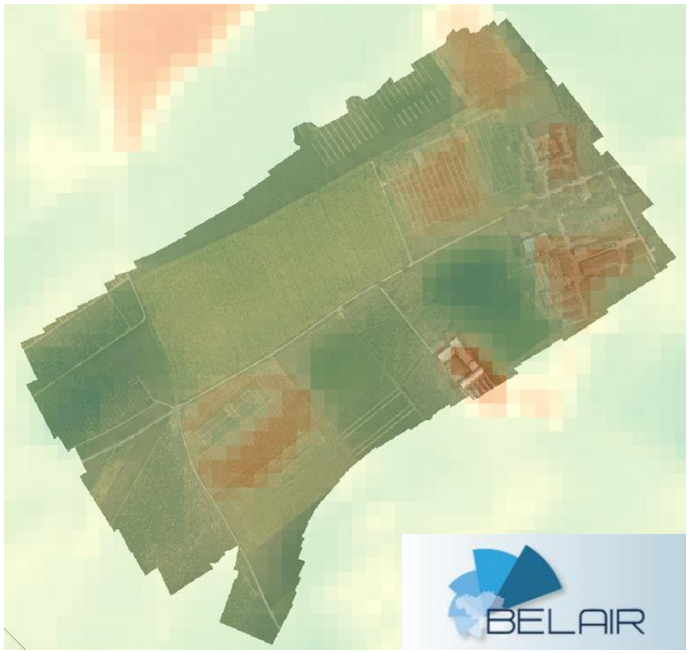
Crop growth / phenology monitoring

- Emergence and canopy closure
- Senescence

"Scaled approach":

- Field observations:
  - counting seedling emergency & field assessment of crop closure
  - Measurements of chlorophyll content with handheld sensors to estimate vegetation / haulm condition
- Estimation of these parameters from UAV imagery
- Extrapolation to (V)HR satellite images



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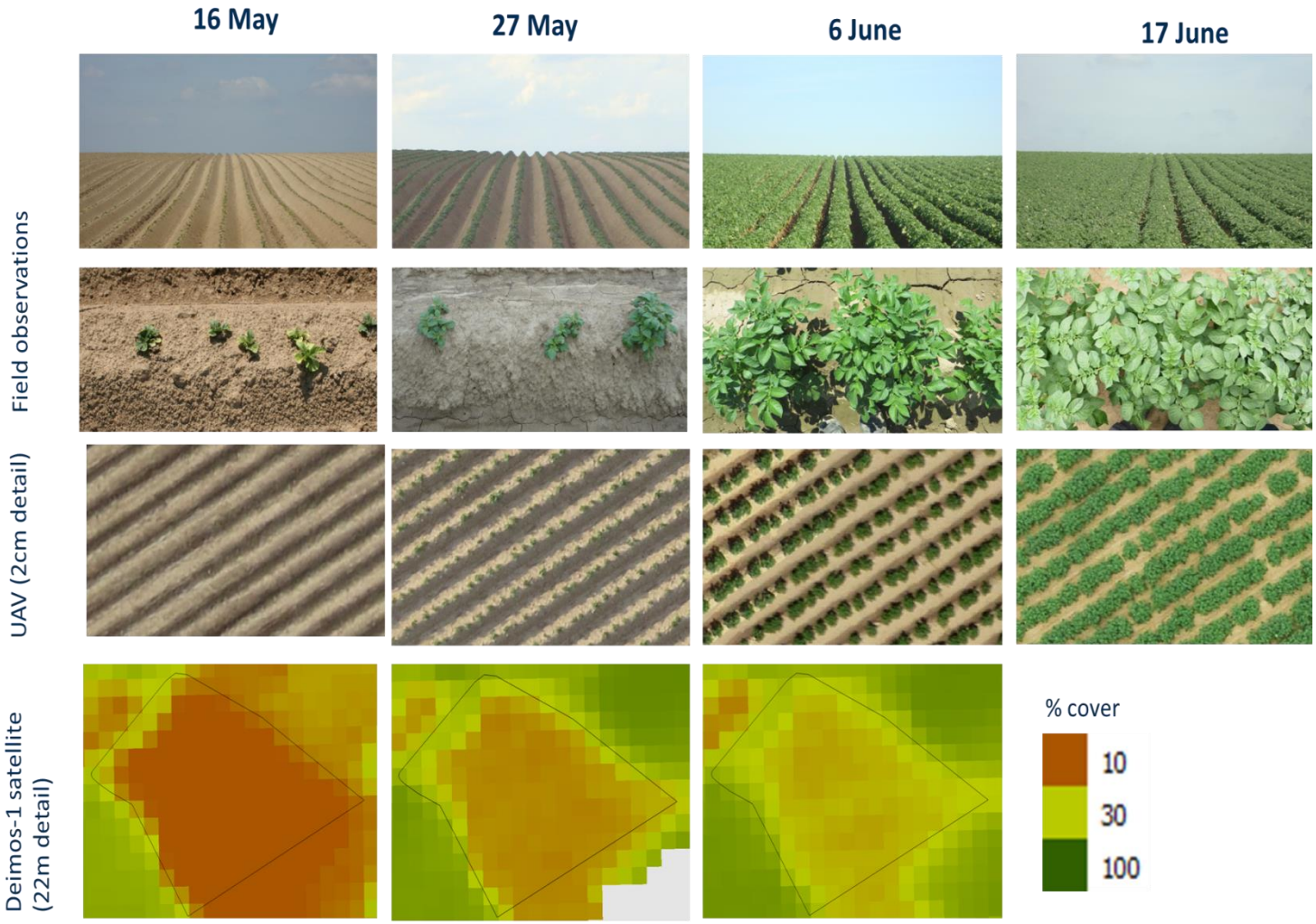
Crop growth / phenology monitoring



Crop growth / phenology monitoring

Expected outcome:

- Regular maps with, for each pixel, the actual development stage of the potato crop
- Crop emergence maps illustrating the time (date) and degree of crop emergence and crop closure (in terms of % cover)
- Crop senescence maps reflecting the % cover of non-photosynthetic active vegetation

based on (V)HR satellite images

Methodology / expected results

Yield estimation :

- **crop emergence and phenology data** incorporated into the model
- **yield data** collected at the parcel level
- observed **weather characteristics** will be derived from the B-CGMS historical meteorological dataset, based on a model inter-comparison and testing, the best performing, most suitable and easiest to implement model will be included in the web-tool to simulate potato yields

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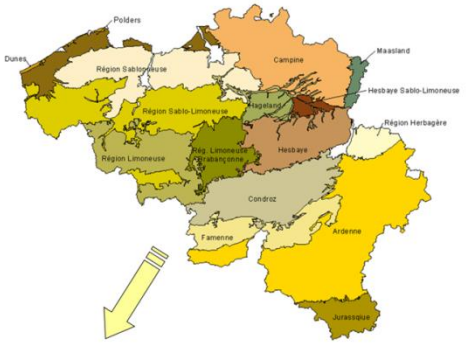
Yield estimation and prediction

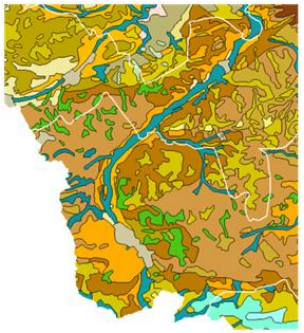
Expected outcome (at parcel level):

- Crop yield estimates
- Early crop yield prediction (i.e. at harvest) including uncertainty range

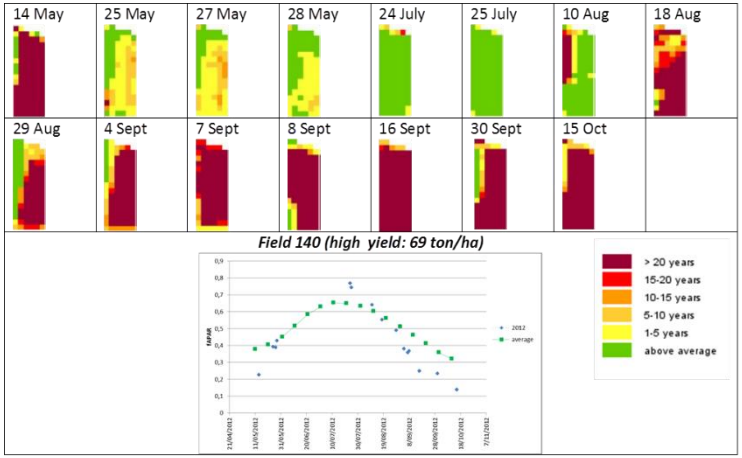
iPot project
Variability mapping

- Intra-field & inter-field variability
- Expected outcome:
  - "**Status maps**": actual field condition, crop status (incl. development stage) and yield
  - "**Anomaly maps**": comparison of actual vs. average status
  - Soil type from soil association map





Regional soil association map

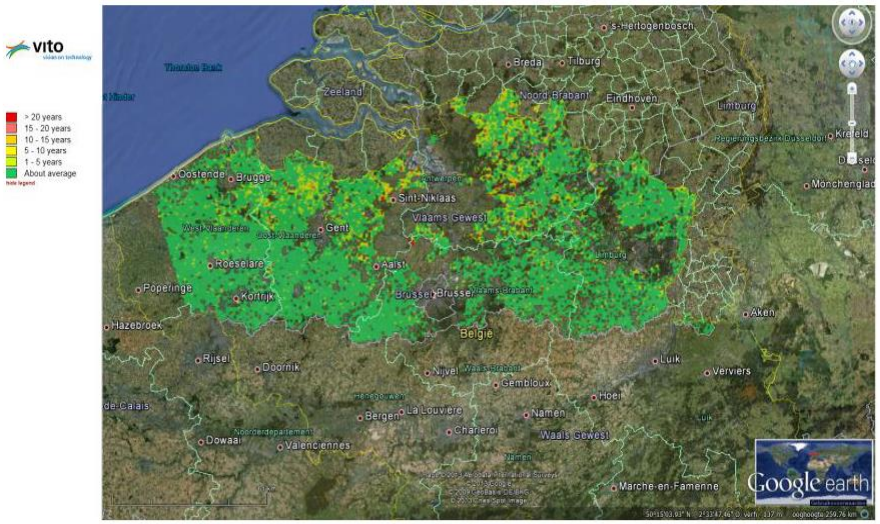


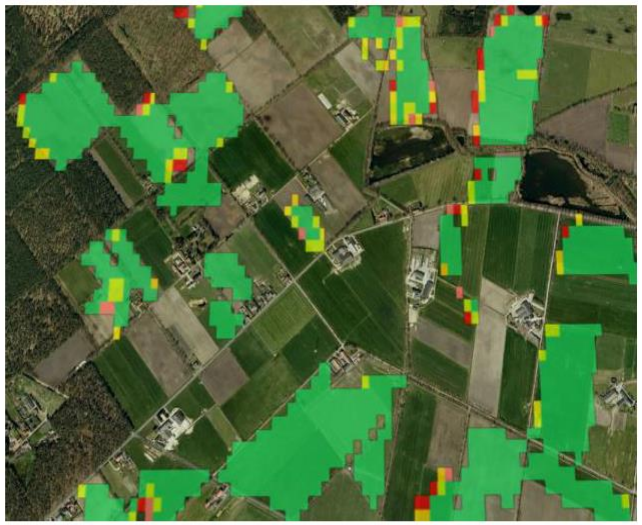
"intra-field variability"
Anomaly maps: fAPAR return period May-October 20

"inter-field variability"
fAPAR variations between potato fields (same date)

iPot project
Geo-spatial web platform

- By opting for web based interface in combination with a lean development approach, maximal relevance, usability and user-friendliness is pursued
- Data and model complexity is hidden from the end user
- End products will be readily available without needs to install tools and will have a desktop like intuitive interface





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Conclusion

- The iPot project aims to bridge the gap between the latest research efforts regarding crop growth monitoring and the industry
- Earth observation can be a sustainable tool in the future of the Belgian potato industry
- Through the involvement of Belgapom (as project coordinator) and its members the applicability and future use of the developed products will be ensured

Thank you for your attention!

CONTACTS

Romain COOLS, romain.cools@fvphouse.be
Nele CATTOOR, nele.cattoor@fvpouse.be

Flemish Institute for Technological Research - Remote Sensing Unit

Isabelle PICCARD, isabelle.piccard@vito.be

Walloon Agricultural Research Center
Viviane PLANCHON, v.planchon@cra.wallonie.be

Jean-Pierre GOFFART, j.goffart@cra.wallonie.be

Liège University
Sciences and Environment Department

Bernard TYCHON, bernard.tychon@ulg.ac.be
Joost WELLENS, joost.wellens@ulg.ac.be