watchITgrow
An innovative platform for a sustainable growth of the Belgian potato production

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watchITgrow platform is an output of iPot project

“Industrial potato monitoring for the Belgian potato sector”

- Funded by the BELgian Science Policy Office (BELSPO)
- iPot:
  - 36 months (06.2014 - 05.2017)
  - Application project
  - Crop: Potato

- Partners:
Potato and Belgium...A love story

Belgium is the 17th biggest potato producer of the world.

Belgium is at the 4th rank when considering the potato production per inhabitant (395.5 tons per 1000 inhabitants) (WES report, 2013).

Industrial potatoes represent around 80% of the total potato cropped area in Belgium.
Potato and Belgium...A love story

- Up to 100.000 ha expected in 2017!
- Potatoes have evolved from a ‘side crop’ to a ‘main crop’ for arable farmers: need for professionalization and R&D.
- Potatoes are a part of ‘crop rotation’: need for arable land and efficient land use
Potato and Belgium...A love story

The potato sector is growing fast.

In order to ensure / fasten this development, the sector is looking for new developments/new tools (such as WatchItGrow)

Risk of yield or quality losses?

Contract negotiations! Expected yields?

Problems? Where? Priority list for field visits?

Planning! Crop development stage
WatchITgrow® for the future of the Belgian potato chain

Monitoring potatoes from space!

– Crop development
– Field heterogeneity
– Risks at production and quality losses
– Yield forecasts

For all actors in the potato chain:
- Get access to satellite images/products, weather data, yield forecasts
- Store your own field data (e.g. treatments, yield samples,...)
Weather data

- Country wide weather info on a weekly basis:
  - Average temperature
  - Precipitation sum
  “deviation with average”

→ risk at production or quality losses?
Satellite images

- **Sentinel-2:**
  - 10m pixels
  - Since August 2015
  - Every 10 and soon every 5 days

- **DMC/Deimos:**
  - 22m pixels
  - Since 2009
  - Every 2 days

→ monitor & compare fields
Monitor your fields throughout the season

Emergence ➔
1 May 2016
8 May 2016
28 May 2016
6 June 2016
10 July 2016
20 July 2016
9 Aug 2016

Senescence ➔
26 Aug 2016
5 Sept 2016
8 Sept 2016
15 Sept 2016
25 Sept 2016
28 Sept 2016
5 Oct 2016

Greenness index

Monitor your fields throughout the season.
Check your fields for anomaly

Heavy rainfall in June 2016 (a record): waterlogging...

<table>
<thead>
<tr>
<th>June (Uccle)</th>
<th>rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>174.6</td>
</tr>
<tr>
<td>1839</td>
<td>173.7</td>
</tr>
<tr>
<td>1963</td>
<td>153.7</td>
</tr>
<tr>
<td>1966</td>
<td>140.5</td>
</tr>
<tr>
<td>1859</td>
<td>137.4</td>
</tr>
<tr>
<td>Normal</td>
<td>71.8</td>
</tr>
</tbody>
</table>

Sentinel-2 of 20 July 2016 (10m)  

UAV image of 18 July 2016 (RGB, 3 cm)  

UAV image of 18 July 2016 (NDVI, 8 cm)

Greenness index < 50%: crop lost or severely damaged
Check your fields for heterogeneity

Sentinel-2 of 20 Aug 2016

Reference data from soil scans (source: CRA-W)

useful for field selection (historical data)

improved sampling (per zone)

evolution towards precision agriculture: variable rate application of fertilizers, irrigation, haulm killing,...
Compare your fields

Early varieties (in blue) vs. late varieties (in red)

Sentinel-2 of 22 Aug 2016

More advanced senescence
Still green

Senescence started?
Haulm killing applied?

→ optimize field visits
→ input for planning / logistics (harvest)
Yields forecast

- Based on combination of yield models
- For 3 varieties: Fontane, Bintje, Nicola
- Per field, municipality, province, region
- From August onwards
Field data

2 intensive field campaigns have been organised (2015, 2016)
~75 parcels per year

3 varieties: Fontane, Bintje et Nicola
Field data

• **Field location:**
  • geographic coordinates
  • Field area
  • …

• **Management data:**
  • Variety
  • Planting / haulm killing / harvest dates
  • Planting density
  • Fertilisation & irrigation
  • …

• **Tubers samplings**
  – Tubers sampling every 2 weeks from the begin of July (Nicola variety) / mid-July (Fontane and Bintje varieties) up to harvest.
  – Sampling over 3 m (4 replications)

• **Phenological stages**
  • BBCH scale (2-digits)
  • Every 2 weeks

• **Specific events**:
  • Waterlogging / flooding
  • Drought
  • …
Field data (Validation of satellite’s VI)

- 3 UAV monitoring campaign (2014-2016) in 3 fields (1 per variety: Fontane, Bintje & Nicola) in Gembloux – equipped with a RGB/Mspec Camera
- Comparison of VI from satellite vs. UAV and ground measurements (DHP)
Field data (Validation of satellite’s VI)

- 3 UAV monitoring campaign (2014-2016) in 3 fields (1 per variety: Fontane, Bintje & Nicola) in Gembloux – equipped with a RGB/Mspec Camera
- Comparison of VI from satellite vs. UAV and ground measurements (DHP)
Field specific monitoring?

• For farmers
• Data can be shared with other actors in the potato chain

Enter your fields…

• from existing parcel layer (IACS crop type declarations)
• your parcel on the map
• a shapefile with your parcel boundaries
Field specific monitoring?

...and start monitoring your fields

<table>
<thead>
<tr>
<th>Field name</th>
<th>Location</th>
<th>Variety</th>
<th>Planting date</th>
<th>Harvested</th>
<th>Yield</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>A01</td>
<td>Turnhout</td>
<td>Fontane</td>
<td>04-05-2016</td>
<td>✓</td>
<td>37.35</td>
<td></td>
</tr>
<tr>
<td>B03</td>
<td>Asemont</td>
<td>Blintje</td>
<td>14-05-2016</td>
<td>✓</td>
<td>41.98</td>
<td></td>
</tr>
<tr>
<td>Bally</td>
<td>Limont</td>
<td>Nicola</td>
<td>11-05-2016</td>
<td>✓</td>
<td>42.72</td>
<td></td>
</tr>
<tr>
<td>Fresnay</td>
<td>Molenbaix</td>
<td>Fontane</td>
<td>18-04-2016</td>
<td>✓</td>
<td>56.62</td>
<td></td>
</tr>
<tr>
<td>Hangar</td>
<td>Sauvenire</td>
<td>Nicola</td>
<td>10-05-2016</td>
<td>✓</td>
<td>37.91</td>
<td></td>
</tr>
<tr>
<td>MO5</td>
<td>Belegem</td>
<td>Fontane</td>
<td>13-05-2016</td>
<td>✓</td>
<td>36.19</td>
<td></td>
</tr>
<tr>
<td>Mouw</td>
<td>Geilien</td>
<td>Fontane</td>
<td>17-04-2016</td>
<td>✓</td>
<td>41.36</td>
<td></td>
</tr>
<tr>
<td>Perceel 6</td>
<td>Westvleeren</td>
<td>Blintje</td>
<td>20-04-2016</td>
<td>✓</td>
<td>44.64</td>
<td></td>
</tr>
<tr>
<td>Waterwal</td>
<td>Kanegem</td>
<td>Fontane</td>
<td>14-05-2016</td>
<td>✓</td>
<td>44.28</td>
<td></td>
</tr>
</tbody>
</table>
Field specific monitoring?

...and start monitoring your fields
All data in one place

View watchITgrow® data and add your own data!

### Fresnoy - 2016

#### General info

<table>
<thead>
<tr>
<th>Field name</th>
<th>Surface</th>
<th>Expected yield</th>
<th>Actual yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresno</td>
<td>20.95 ha</td>
<td>56.62 tons/ha, 1186.33 tons</td>
<td>0 tons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Irrigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>7760 Molenbaix</td>
<td>Yes, No</td>
</tr>
</tbody>
</table>

#### Crop characteristics

<table>
<thead>
<tr>
<th>Variety</th>
<th>Planting date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fontane</td>
<td>18-04-2016</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Haulm killing</th>
<th>Harvest date</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-09-2016</td>
<td>13-10-2016</td>
</tr>
</tbody>
</table>

#### Treatments

#### Damage

#### Warnings
All data in one place

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<table>
<thead>
<tr>
<th>General</th>
<th>Temperature</th>
<th>Rainfall</th>
<th>Greenness</th>
</tr>
</thead>
<tbody>
<tr>
<td>56.62 tons/ha</td>
<td>56.62 tons/ha</td>
<td></td>
<td>39.13 tons/ha</td>
</tr>
<tr>
<td>Fresnoy</td>
<td>Molenbaix</td>
<td></td>
<td>Hainaut</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Samples</th>
<th>Delegate</th>
</tr>
</thead>
<tbody>
<tr>
<td>39.97 tons/ha</td>
<td>Leemstreek / Région limoneuse</td>
</tr>
</tbody>
</table>
### All data in one place

**View watchITgrow® data and add your own data!**

<table>
<thead>
<tr>
<th>Date</th>
<th>no.</th>
<th>Harvest</th>
<th>Plants</th>
<th>Stems per plant</th>
<th>Tubers per plant</th>
<th>Total fresh weight</th>
<th>% dry matter &gt;35 mm</th>
<th>Under water weight &gt;35 mm</th>
<th>% low sorting 35-50 mm</th>
<th>% high sorting &gt;50 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-07-2016</td>
<td>1</td>
<td></td>
<td>7</td>
<td>4.29</td>
<td>16.43</td>
<td>9350 g</td>
<td>18.2 %</td>
<td>329 g</td>
<td>82 %</td>
<td>18 %</td>
</tr>
<tr>
<td>04-08-2016</td>
<td>2</td>
<td></td>
<td>7</td>
<td>4.25</td>
<td>17.71</td>
<td>12350 g</td>
<td>21.2 %</td>
<td>390 g</td>
<td>43 %</td>
<td>57 %</td>
</tr>
<tr>
<td>17-08-2016</td>
<td>3</td>
<td></td>
<td>8</td>
<td>4.88</td>
<td>20.25</td>
<td>15600 g</td>
<td>22.2 %</td>
<td>409 g</td>
<td>42 %</td>
<td>58 %</td>
</tr>
<tr>
<td>21-09-2016</td>
<td>4</td>
<td></td>
<td>7</td>
<td>4.26</td>
<td>15.75</td>
<td>14250 g</td>
<td>22.7 %</td>
<td>420 g</td>
<td>30 %</td>
<td>70 %</td>
</tr>
</tbody>
</table>
Your field from space
Thank you for your attention!
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