Seed potato certification in NL

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Dutch General Inspection Service for Agricultural Seed and Seed Potatoes
Seed potato production

- Moderate climate - appropriate water supply
- Usually low aphid pressure
- Suitable soils (no stones)
- Seed infrastructure (farmers, breeders, trade)
- 37,400 Ha seed (2010)
The start
Case: Groningen
Potato production 2010
No seed on PCN infested land
NAK

- Legal basis in Dutch Seed Act
- Inspection and certification
- Seed potatoes
- Agricultural seeds
  - Grass seed
  - Cereals
  - Flax
  - Field peas and field beans
  - Others (mustard, hemp, sugar beet, clover)
- Management of certification schemes
- Financed by inspection fees
EU regulations are the basis

Phytosanitary directive (2000/29/EC)
- control directives (e.g. Cms, Rs)
- reference to IPPC (ISPM’s) and EPPO

Marketing directive (2002/56/EC)
- for marketing in EU
- only marketing of certified seed allowed
- not for export to third countries
- not for farm saved seed
- official inspection and labelling

+ national requirements
NAK

210 fte permanent staff + 80 fte temporary
87 full-time inspectors + 15 temporary
Structure NAK

Board of Directors

- Technical Committees
  - Seeds
  - Seed Potatoes

Ministry

- NAK Staff
  - Breeders
  - Seed Growers

- Experts
  - Farmers
  - Seed Merchants
Classification scheme

Clonal selection

Minitubers

first year clone (G1)
second year clone (G2)
third year clone (G3)
fourth year clone (G4)
Inspection system

- Application
- Field inspection
- Haulm killing dates
- Post harvest tests
  - virus, Ralst.s, Clavibact.ms
- Lot inspection
Application for inspection (on paper)

- 28,000 field records
- web-based in 2011
Field inspections

- minimum 2; usually 3
- tuber-borne diseases  
  (focus on viruses and blackleg)
- trueness to variety
- varietal purity
- quarantine diseases
## Disease tolerances field inspection (%)

<table>
<thead>
<tr>
<th>Class</th>
<th>S</th>
<th>SE</th>
<th>E</th>
<th>A</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe mosaic/leafroll</td>
<td>0.025</td>
<td>0.05</td>
<td>0.1</td>
<td>0.25</td>
<td>2</td>
</tr>
<tr>
<td>Mild mosaic</td>
<td>0.025</td>
<td>0.05</td>
<td>0.1</td>
<td>2</td>
<td>10</td>
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<tr>
<td>Total max.</td>
<td>0.025</td>
<td>0.05</td>
<td>0.1</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Blackleg (Erwinia spp)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.03</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Crop standards – comparison
example Prebasic seed

<table>
<thead>
<tr>
<th></th>
<th>Tolerances growing crop (%)</th>
<th>EU present (2002/56/EC)</th>
<th>UNECE</th>
<th>EU Proposal</th>
<th>NL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB = Prebasic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>virus</td>
<td>not specified</td>
<td>0,1</td>
<td>0,1</td>
<td>0,1</td>
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<tr>
<td>blackleg</td>
<td>not specified</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>other varieties/</td>
<td>not specified</td>
<td>0,01</td>
<td>0,01</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>off-types</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Roguing before inspection
Varietal mixtures and off-types
Blackleg
Erwinia - new names

Erwinia carotovora subsp. atroseptica (Eca)
  = ‘blackleg’ = Pectobacterium atrosepticum

Erwinia chrysanthemi (Ech)
  = ‘stem softrot’ = Dickeya spp.

Erwinia carotovora subsp. carotovora (Ecc)
  = Pectobacterium carotovorum subsp. carotovorum
Dickeya - Pectobacterium

- **Shift in species**
- **Need for improvements – how?**
  - agronomic measures!
  - number of generations?
  - tolerances?
  - test?
  - varieties?
Potato leafroll virus (PLRV)
Mosaic  (90% PVY)
Y-virus strains

£ PVY

£ PVYc
£ PVYo
£ PVYn

PVYn x PVYo

PVYntn (tuber necrosis)

PVYnW (less visible?)
$Y^n-W$ severe
Yntn  mild
PVY-defects
Aphid monitoring
**Aphids 2010 - web application**

**Actuele bladluissituatie**

Klik op een locatie in de kaart voor de actuele bladluissituatie.

**Dagvangst vrijdag 16 juli 2010**

<table>
<thead>
<tr>
<th>Locatie</th>
<th>Colijnsplaat</th>
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<tbody>
<tr>
<td>Type</td>
<td>Zuijval</td>
</tr>
<tr>
<td>Vectorendruk</td>
<td>3,40</td>
</tr>
<tr>
<td>Geaccumuleerd</td>
<td>45,62</td>
</tr>
</tbody>
</table>

**Graph:**

- **Zuijval Colijnsplaat**

Locaties zijn vangbaken of zuigvallen (Z).
NB = niet bekend
Haulm killing dates, based on:
- aphid pressure
- infection pressure (virus in the field)
- PVY susceptibility of varieties
- crop maturity
<table>
<thead>
<tr>
<th></th>
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<th></th>
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<td>1</td>
<td>EBA</td>
<td>0,30</td>
<td>C</td>
<td>-/C</td>
<td></td>
<td>07-09</td>
<td></td>
<td>oof dood</td>
<td>ontheff.</td>
<td>te bemon</td>
<td>ontheff.</td>
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<td>2</td>
<td>DONALD</td>
<td>0,31</td>
<td>C</td>
<td>-/C</td>
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<td>07-09</td>
<td></td>
<td>oof dood</td>
<td>ontheff.</td>
<td>te bemon</td>
<td>ontheff.</td>
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<tr>
<td>3</td>
<td>FONTANE</td>
<td>0,88</td>
<td>C</td>
<td>-/C</td>
<td></td>
<td>07-09</td>
<td></td>
<td>oof dood</td>
<td>ontheff.</td>
<td>te bemon</td>
<td>ontheff.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>AURORA</td>
<td>1,21</td>
<td>E2</td>
<td>A</td>
<td></td>
<td>07-09</td>
<td></td>
<td>oof dood</td>
<td>te bemon</td>
<td>te bemon</td>
<td>ontheff.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>PLASETTIE</td>
<td>0,60</td>
<td>A</td>
<td>A</td>
<td></td>
<td>07-09</td>
<td></td>
<td>oof dood</td>
<td>te bemon</td>
<td>te bemon</td>
<td>ontheff.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>AURORA</td>
<td>0,65</td>
<td>E2</td>
<td>A</td>
<td></td>
<td>07-09</td>
<td></td>
<td>oof dood</td>
<td>te bemon</td>
<td>te bemon</td>
<td>ontheff.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>AURORA</td>
<td>0,98</td>
<td>E2</td>
<td>A</td>
<td></td>
<td>07-09</td>
<td></td>
<td>oof dood</td>
<td>te bemon</td>
<td>te bemon</td>
<td>ontheff.</td>
<td></td>
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</table>
.......and for trade companies

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
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<th></th>
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<tr>
<td>10152</td>
<td>Fa H. en A. de Vries</td>
<td>Koudehuisterdijk 4</td>
<td>0740 CR</td>
<td>WITMARSUM</td>
<td>6</td>
<td>BARTINA</td>
<td>1,50</td>
<td>E1</td>
<td>E1</td>
<td>16-09</td>
<td>16-09</td>
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<tr>
<td>10208</td>
<td>J. Binnema</td>
<td>Hearewei 25</td>
<td>9047 VA MINNERTSGA</td>
<td>9</td>
<td>BARTINA</td>
<td>1,50</td>
<td>E1</td>
<td>A</td>
<td>15-09</td>
<td>15-09</td>
<td>OK</td>
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<tr>
<td>10264</td>
<td>G.H. Boomsma</td>
<td>Miedlame 13</td>
<td>9047 VM MINNERTSGA</td>
<td>10</td>
<td>SPUNTA</td>
<td>1,06</td>
<td>E1</td>
<td>E1</td>
<td>14-09</td>
<td>14-09</td>
<td>OK</td>
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<tr>
<td>10279</td>
<td>Van der Bos Stamselecte BV</td>
<td>Witmonniksweg 1</td>
<td>9151 AC HOLWERD</td>
<td>11</td>
<td>DIAMANT</td>
<td>07-1V</td>
<td>1,34</td>
<td>S</td>
<td>S</td>
<td>08-09</td>
<td>09-09</td>
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<tr>
<td>10404</td>
<td>Mts van Dijk</td>
<td>Holwerda</td>
<td>Skanserwei 10</td>
<td>9133 DV ANJUM</td>
<td>12</td>
<td>SPUNTA</td>
<td>1,06</td>
<td>E1</td>
<td>E1</td>
<td>14-09</td>
<td>14-09</td>
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<tr>
<td>10422</td>
<td>W. Kloppenburg</td>
<td>Marssummerdyk 1</td>
<td>9033 WD DEINUM</td>
<td>13</td>
<td>SPUNTA</td>
<td>1,06</td>
<td>E1</td>
<td>E1</td>
<td>14-09</td>
<td>14-09</td>
<td>OK</td>
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<tr>
<td>10595</td>
<td>U.O. Hiddema</td>
<td>Medwerd 1</td>
<td>9151 AJ HOLWERD</td>
<td>14</td>
<td>FABULA</td>
<td>3,80</td>
<td>E1</td>
<td>E1</td>
<td>09-09</td>
<td>13-09</td>
<td>OK</td>
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<tr>
<td>10645</td>
<td>Mts Hoogland</td>
<td>Hiemstra</td>
<td>Oudebildtdijk 1177</td>
<td>9075 NP WESTHOEK</td>
<td>15</td>
<td>FABULA</td>
<td>0,50</td>
<td>E1</td>
<td>E1</td>
<td>09-09</td>
<td>13-09</td>
</tr>
</tbody>
</table>
Harvest:
- remove rots
Post harvest lab tests

For:

- Viruses (Elisa on Y, PLRV, X/S, A)
- Brownrot (Ralstonia s.) / Ringrot (Clavibacter m.s.)

Methods:

- Virus: ELISA / PCR (multiplex – 4 viruses)
- Brownrot / ringrot: IF + verification tests
- Blackleg (voluntary):
  - PCR (‘Bioplex’ - enrichment)
  - Pectobacterium (pathogenic) + Dickeya spp.
Test ringrot / brownrot

- 200 tubers / lot
  (max. 6 ha)
- EU protocol
Post harvest virus test

- Basic seed: 200 tubers (max. 6 ha)
- Certified seed: 100 tubers (max. 6 ha)
- Combined sampling for virus and Brr/Rs (90%)
Statistics and detection

Probability of detection (%)

<table>
<thead>
<tr>
<th>Sample size</th>
<th>1.0</th>
<th>0.5</th>
<th>0.1</th>
<th>0.05</th>
<th>0.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>63.2</td>
<td>39.3</td>
<td>9.5</td>
<td>4.9</td>
<td>1.0</td>
</tr>
<tr>
<td>200</td>
<td>86.5</td>
<td>68.2</td>
<td>18.1</td>
<td>9.5</td>
<td>2.0</td>
</tr>
<tr>
<td>300</td>
<td>95.0</td>
<td>77.7</td>
<td>25.9</td>
<td>13.3</td>
<td>3.0</td>
</tr>
<tr>
<td>400</td>
<td>98.2</td>
<td>86.5</td>
<td>32.9</td>
<td>18.1</td>
<td>3.9</td>
</tr>
</tbody>
</table>
Chance of approval, tolerance 4%
effect of sample size
Lot (tuber) inspection

- Inspection during grading:
  - NAK standards
  - requirements importing countries
- Sampling adhering soil for PCN
  (only when required for export)
- Certification:
  - NAK-labels
  - Phytosanitary certificate - outside EU
# Lot inspection tolerances

<table>
<thead>
<tr>
<th></th>
<th>NAK</th>
<th>EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet rot</td>
<td>Practically free</td>
<td>1% of weight</td>
</tr>
<tr>
<td>Dry rot</td>
<td>1 or 2 tubers/50 kg</td>
<td>1% of weight</td>
</tr>
<tr>
<td>Phytophthora</td>
<td>1 per 100 kg</td>
<td>1% of weight</td>
</tr>
<tr>
<td>Common scab</td>
<td>max. $\frac{1}{8}$ surface</td>
<td>max. $\frac{1}{3}$ of surface and 5% above</td>
</tr>
<tr>
<td>Rhizoctonia</td>
<td>S/SE max 10% light</td>
<td>not specified</td>
</tr>
<tr>
<td></td>
<td>E/A/B max 25% light</td>
<td>not specified</td>
</tr>
<tr>
<td>External defects</td>
<td>4-12 per 50 kg</td>
<td>3% of weight</td>
</tr>
<tr>
<td>Adhering soil</td>
<td>1% of weight</td>
<td>2% of weight</td>
</tr>
</tbody>
</table>
Nature’s surprises
Inspection
Inspection figures

Visual inspections
- Field inspection: 37,500 ha
- Lot inspection: 915,000 tonnes
- 3rd country insp.: 11,000 lots

Lab tests
- PCN soil tests: 37,500 ha
- Brown-ringrot: 22,000 samples
- Virus: 17,500 samples

- €2,500,000
- €4,400,000
- €500,000
- €7,400,000
- €1,800,000
- €1,700,000
- €2,400,000
- €5,900,000
Inspection fees (2010)

PCN soil test: € 41.00 /ha
Field inspection: € 63.55 /ha
Virus test Elisa: € 103.80 (200 tubers)
Virus test PCR: € 200.00 (100 tubers)
Brown-/ringrot: € 75.00 /sample
Lot inspection: € 3.80 /ton
(labels and documents excluded)
EU-harmonisation discussion

National systems are not fully harmonized, e.g.:
- classes and number of field generations,
- labelling
- production and certification of tissue culture material
- field inspection, sizing requirements, etc
EU-harmonisation will effect national certification schemes

Proposals (tentative):

- Max. 9 generations:
  - max. 4 generations PB
  - basic classes: S, SE, E
  - certified classes: A, B.
- Crop tolerances for off-types and virus
  (current directive has only progeny tolerances)
- Combined tolerance for severe and mild mosaic
- Stricter tolerances for crop and progeny
- Post harvest virus test: based on risk evaluation
- Tolerances included for powdery scab and black scurf
- Standards more in line with UNECE
- Stricter national tolerances possible.
Guaranteed certified

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