Genetic structure of *Alternaria solani* - a new approach

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Outline

- Situation in Sweden 2009 - 2011
  - Inventory of causal agent(s)
  - Strobilurins – useful or not?
- Genetic structure using SSRs

Background

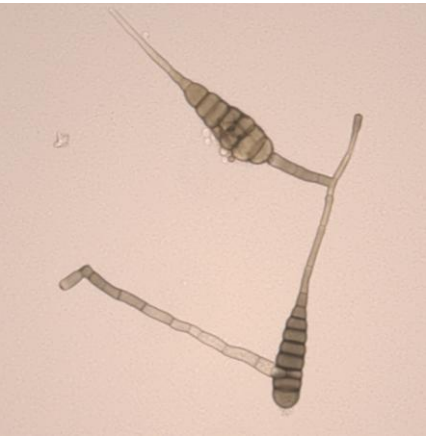
- 3 million ha arable land
  - 7% of total area (45 million ha)
- Potato grown on 1%
- Total harvest 860,000 tonnes
  - Ware potato 560,000 tonnes (19,000 ha)
  - Starch potato 7,300 ha (data from 2010)
- Severe outbreaks of EB in south-eastern Sweden
  - Dry climate and sandy soils

Situation in Sweden 2009-2011

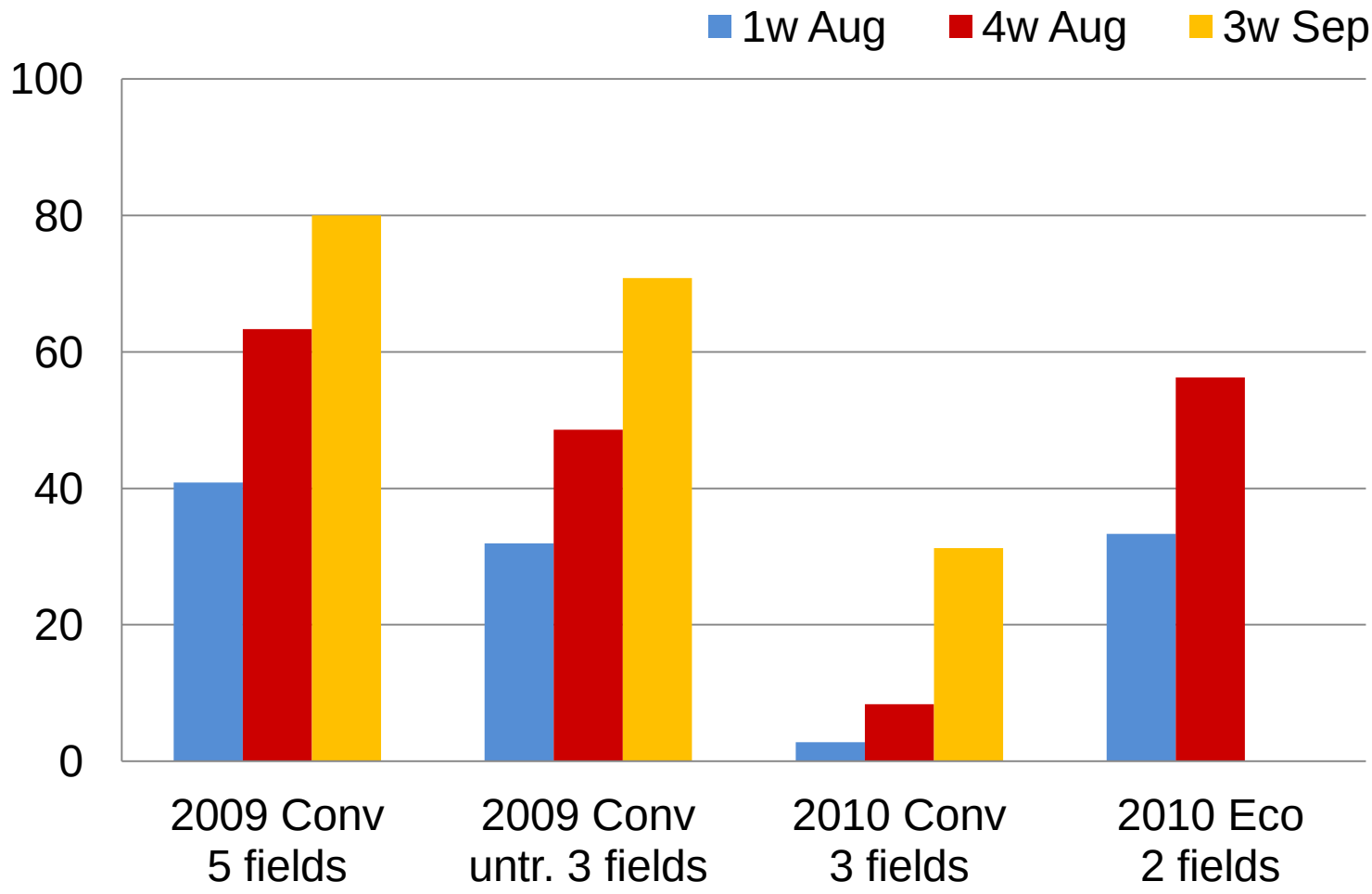
- Inventory of the causal agent(s) in starch potato, 2009-2011
  - Skåne, Listerlandet & Kalmar/Öland
- Organic potato, 2010-2011
  - Skåne, & Kalmar/Öland
- Three collections analysed per year
  - Beginning and end of August + mid September

Identification of *A. solani*

- Species specific PCR primer
  - Also used for sequencing of the cytochrome *b* gene for strobilurin tolerans
  - Own F-primer for PCR-product that includes pos. 129, 137 & 143
  - 143 reverse primer (Rosenzweig *et al.,* 2008)



Positive *A. solani* in 24 samples/coll. (%)



***A. alternata* in only a few lesions – co-occurrence**

Results 2011

- First reports around 20th July in furthest south
- Organic potato:
  - South (Skåne) 3 Aug, common on entire plant
    24 Aug, just some top leaves left
  - Southeast (KLR) 2 Aug, only top leaves left

Results 2011, cont.

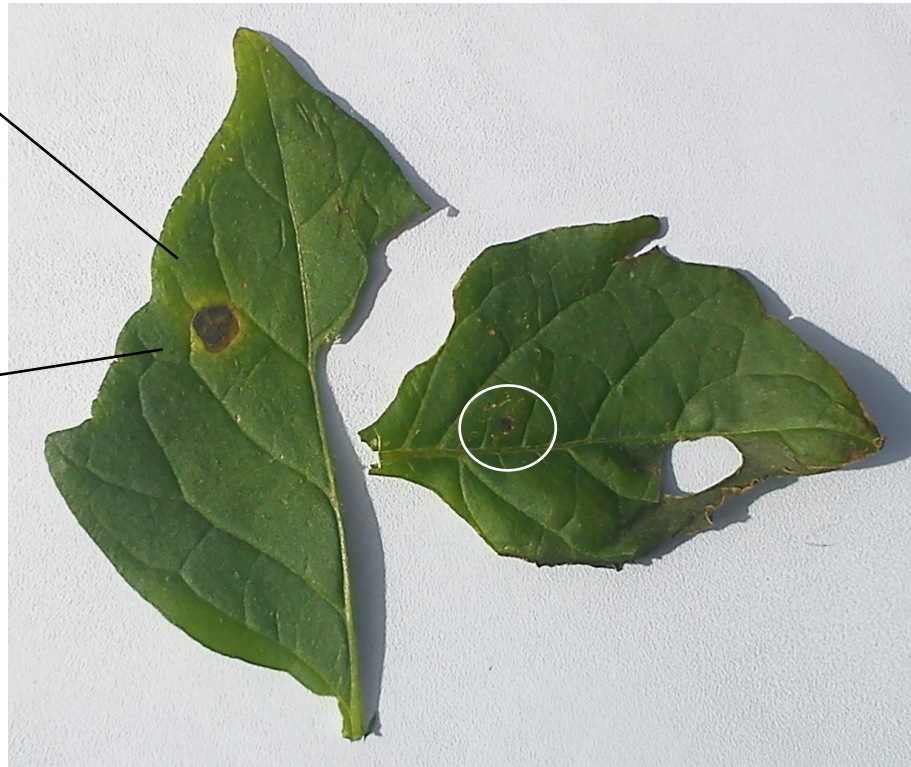
- Starch potato (all treated)
  - South and SE
    - 3 Aug, scattered lesions
    - 24 Aug, scattered, but common on entire plant
    - 14 Sep, common on entire plant

Results from sequencing

- All of the Swedish isolates analysed from 2009-2010 were wild type

Early blight on black nightshade

- Scattered lesions were found on *Solanum nigrum* in mid September
- To be analysed…



Genetic structure of *A. solani*

- 8 SSRs developed for *A. alternata* and *A. dauci* work for *A. solani* as well
  (Tran-Dinh & Hocking, 2006; Benichou *et al*., 2009)
  - Small variation in length in 6 of the SSRs
  - Exceptions: Admic7, 89-233 bp
    Admic8, 176-320 bp
  - Optimisation
- Tested on mycelium isolates and lesion DNA
- Focus on Sweden and Tajikistan

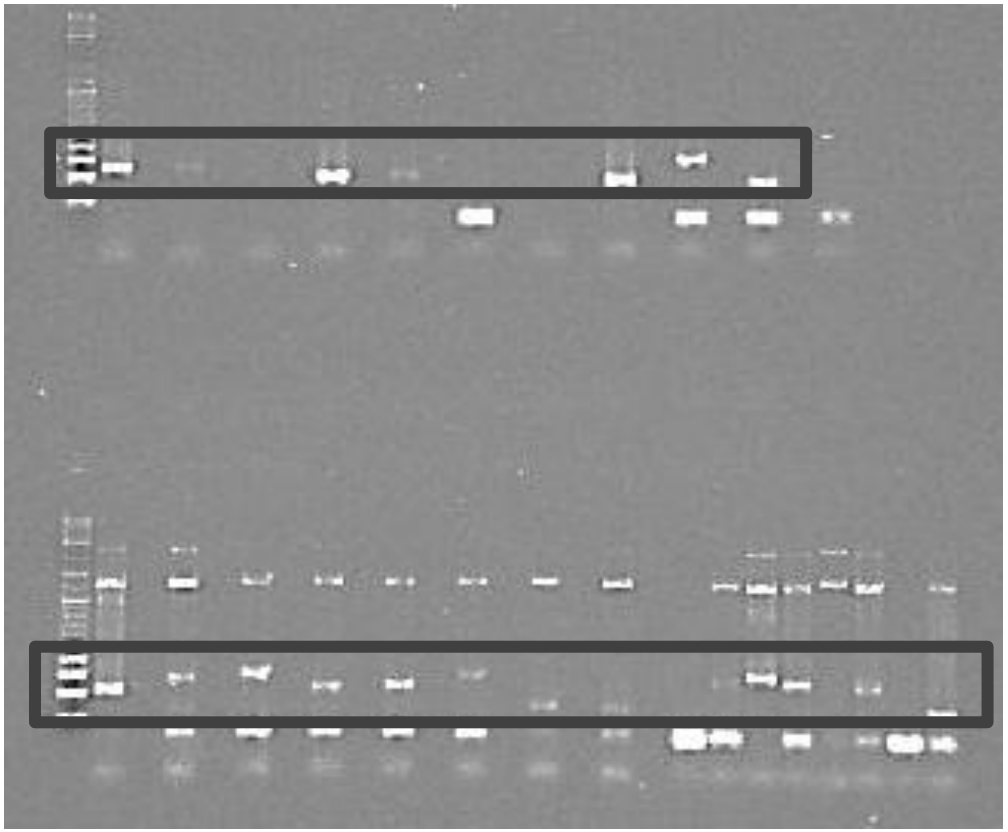
Genetic structure, cont.

- Preliminary results show some diversity

Admic8
176–320bp

Isolates
Diff conc.

Lesion
DNA



Summary of the early blight project

- *Alternaria solani* seems to be the only causal agent to early blight in Southern Sweden
- Infections in late July, lesions Aug
- Strobilurins are still effective
  - Exceptions may occur: timing & abiotic effects?
- Prel. results show some genetic diversity

Any Questions?

Thank You!

Risk of mix-up

1

1. Potassium deficiency

- Dark green younger leaves
- Wrinkled leaves
- Dry rolled leaf edges
- Necrosis between the veins

2

2. Magnesium deficiency

- Chlorosis between veins that becomes necrosis
- Middle of the leaf
- Leaf edges still green

Photos from Faktablad 53J

Risk of mix-up, cont.

3

3. Manganese deficiency
   - Lower leaves
   - Brown spots mainly along v
4. Boron toxicity
   - Often at the edge of the leaf
5. Ozone damages
   - Due to boron deficiency?
6. Insect damages

4

5

Photos from http://www.hbci.com/~wenonah/min-def/potato.htm and Turkensteen