

# Management of crazy roots by cultivation techniques

**Wendy Vanlommel**\*, Céline Gilli, Sandrine Eberle,  
Alain Guillou, Bart Van Calenberge

\*Research Centre Hoogstraten  
Voort 71, B-2328 Hoogstraten (Meerle)  
Tel.: +32 (0) 3 315 70 52  
[Wendy.Vanlommel@proefcentrum.be](mailto:Wendy.Vanlommel@proefcentrum.be)

[www.proefcentrum.be](http://www.proefcentrum.be)



Symposium: monitoring and management of current and emerging plant pests and diseases in tomato and bell pepper

# Introduction

- Main symptoms
  - Excessive root development within and around the plant cube and the slab surface
  - More vegetative plant growth
  - Yield losses up to more than 10%
- Management of hairy root disease (HRD) difficult due to large diversity between rhizogenic agrobacteria (RA) strains and biofilm formation.
- Reduction of symptoms expression by cultivation techniques is one possibility.



# Overview cultivation techniques

Severeness of symptoms can be influenced by the choice of:

- Before the growing season
  - Substrate
  - Rootstock
  - Cultivar
- During the growing season
  - Generative steering: climate and irrigation
  - Generative measures: cultivation techniques

# Overview cultivation techniques

Severeness of symptoms can be influenced by the choice of:

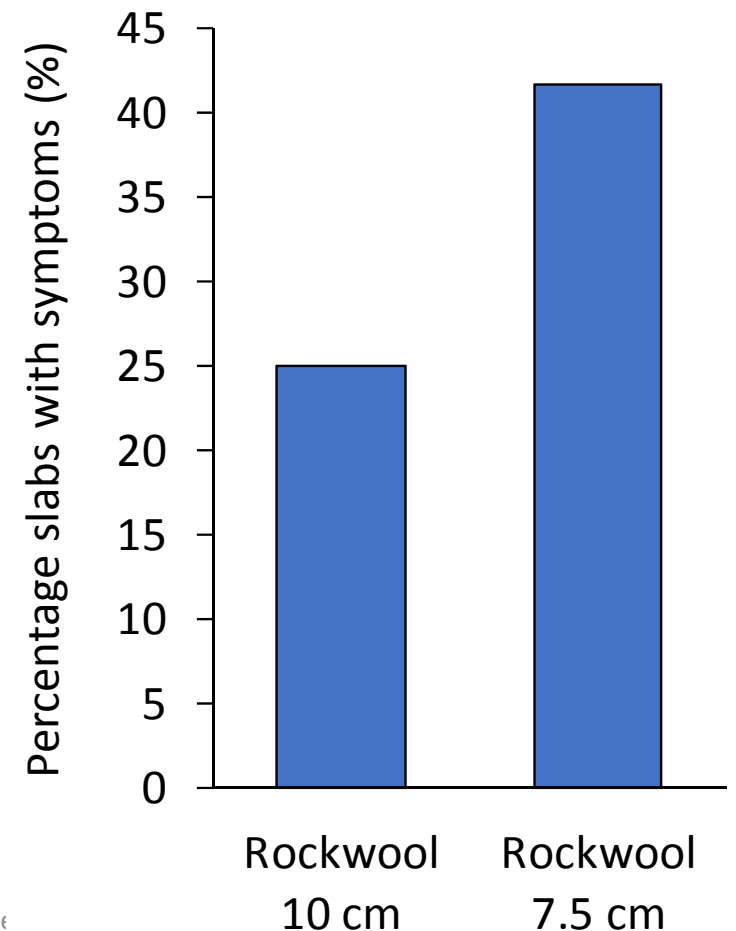
- Before the growing season
  - Substrate
  - Rootstock
  - Cultivar
- During the growing season
  - Generative steering
  - Generative measures





# 1. Substrate

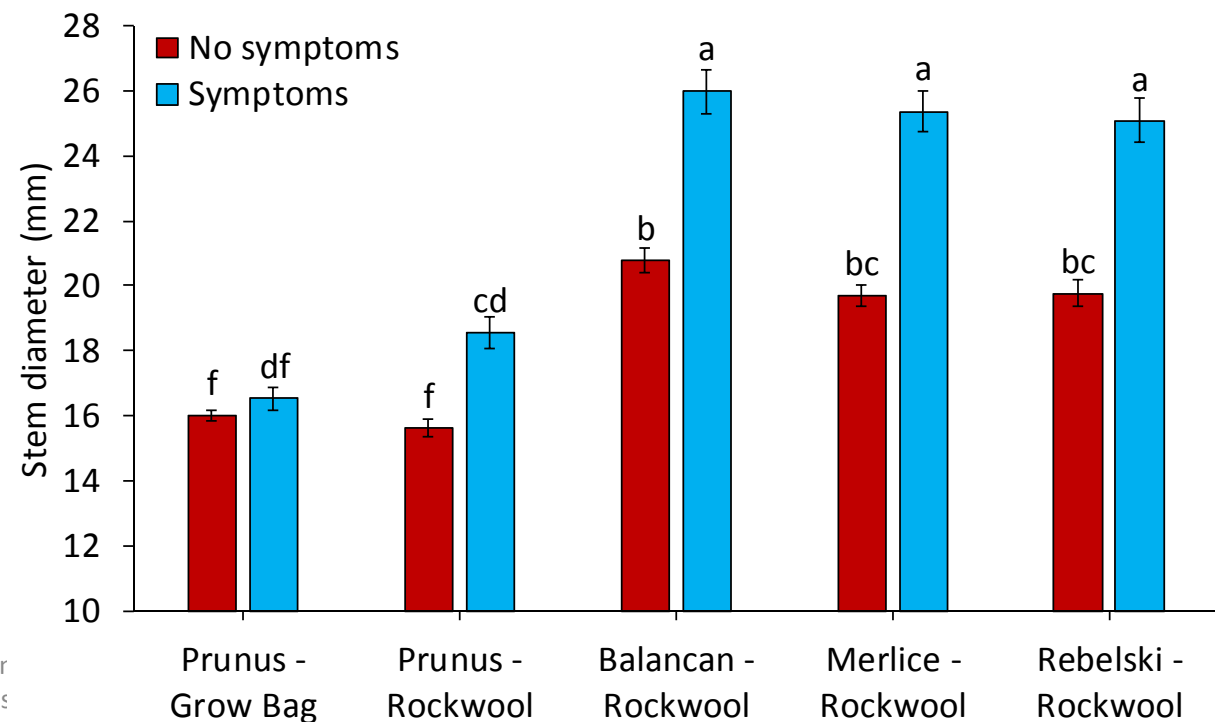
- A drier substrate gives less symptoms
- Depending on the chosen substrate, a drier root environment can be created more easily:
  - Polyurethane foam and Perlite are airy and drain easily (but also less security for irrigation management)
  - A higher **rockwool** slab results in a drier environment for the roots at the top of the slab.



# 1. Substrate

- Organic slabs made of different types of peat and coco fibres contain a wide range of microorganisms, which probably counteract RA
- Trial with different tomato cultivars
- 2 Substrates:
  - Rockwool
  - Grow Bag

⇒ Thickening of the stem base is prevented (excessive root growth is rare)



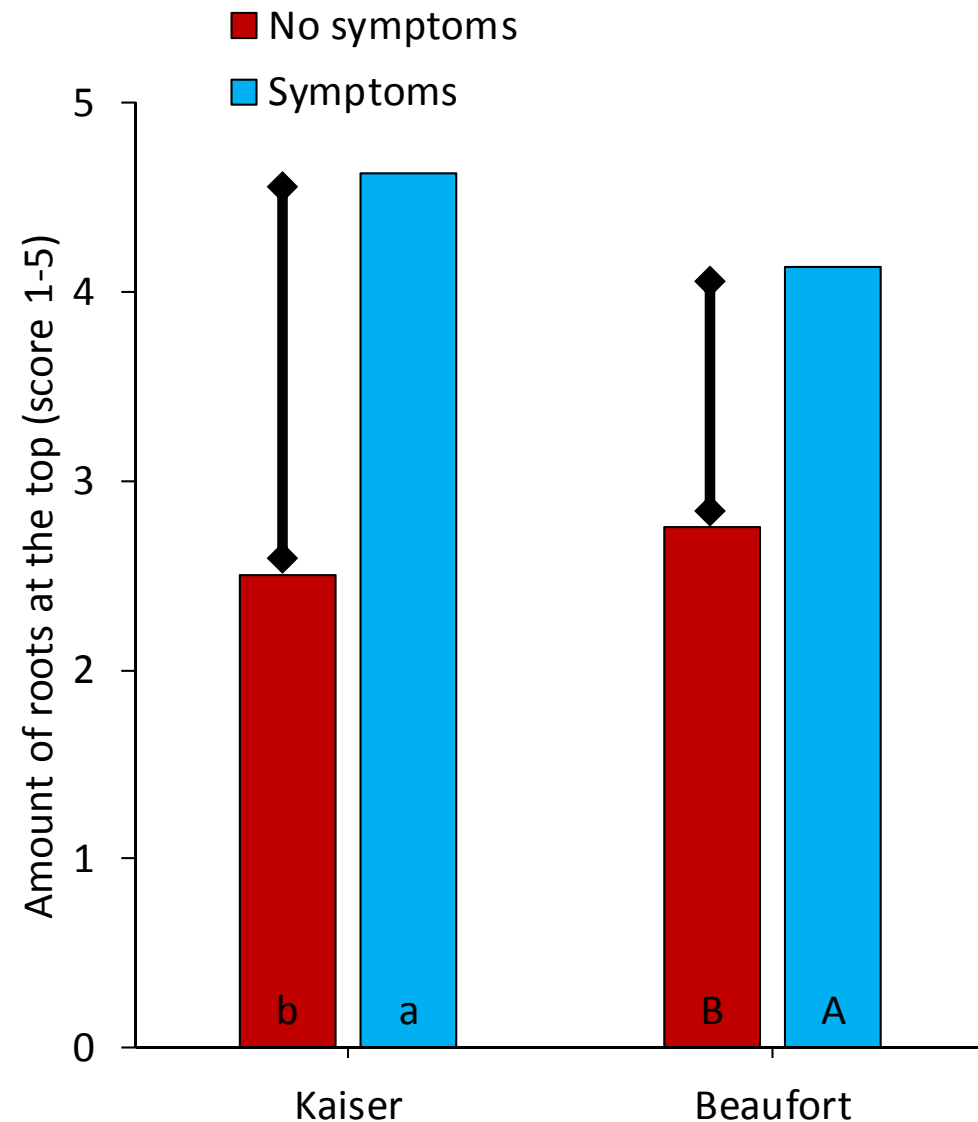
# 1. Substrate

- Conclusion

- A drier substrate gives less symptoms
- A certain microbial community in the slabs can counteract RA

## 2. Rootstock

- Scorpio (eggplant cultivar)
  - 2 Rootstocks:
    - Beaufort (more generative)
    - Kaiser (more vegetative)
  - Measurements:
    - Root development assessment with scoring system 1-5
- ⇒ Severeness of symptoms less pronounced with more generative rootstock

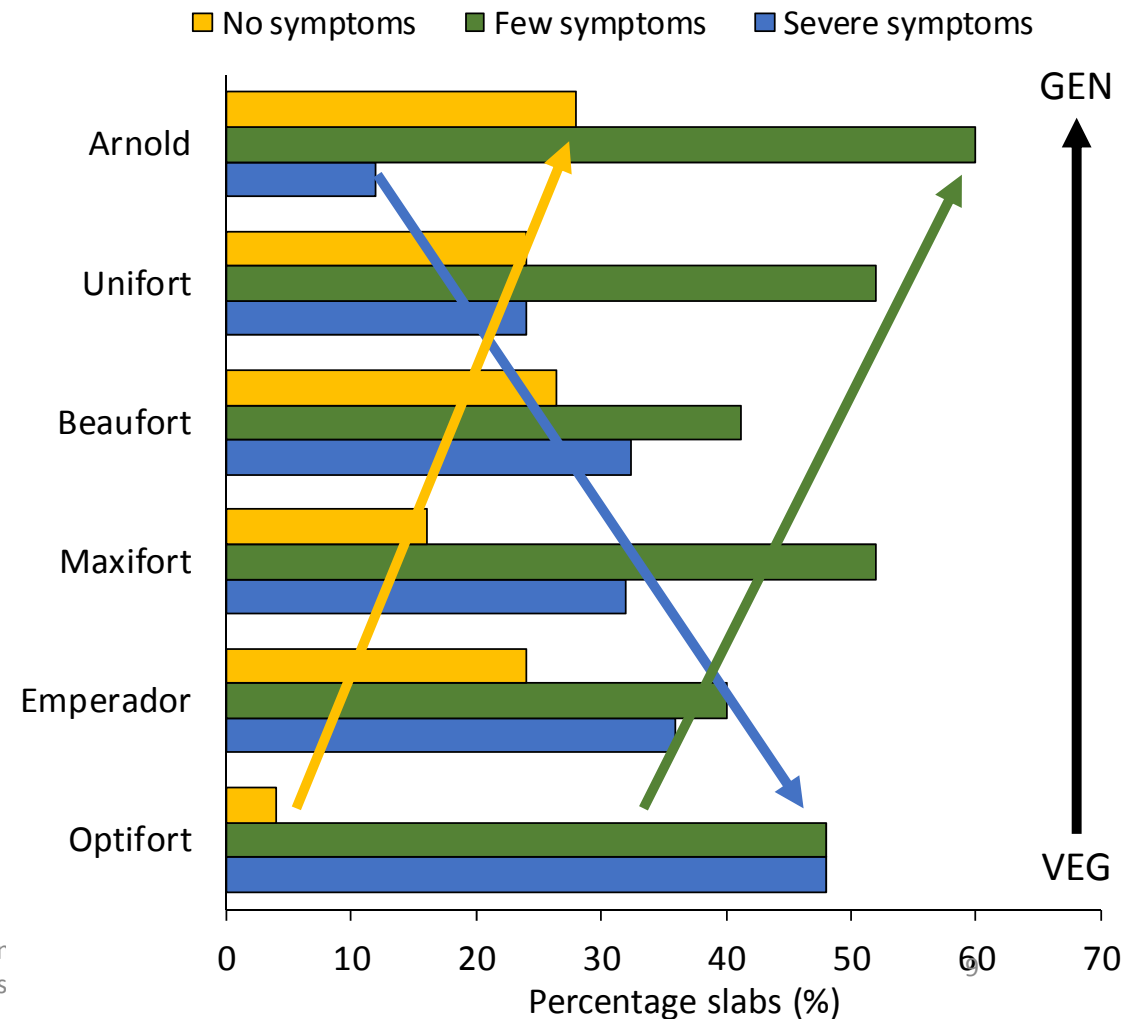




## 2. Rootstock

- Plaisance (tomato cultivar) on coco fibre slabs
- 6 Rootstocks:
  - Ranked from vegetative (bottom) to generative (top)

⇒ Prevention of symptoms not possible BUT severeness of symptoms strongly reduced



## 2. Rootstock

- Conclusion

- A more generative rootstock results in a reduction of severeness of symptoms caused by HRD.

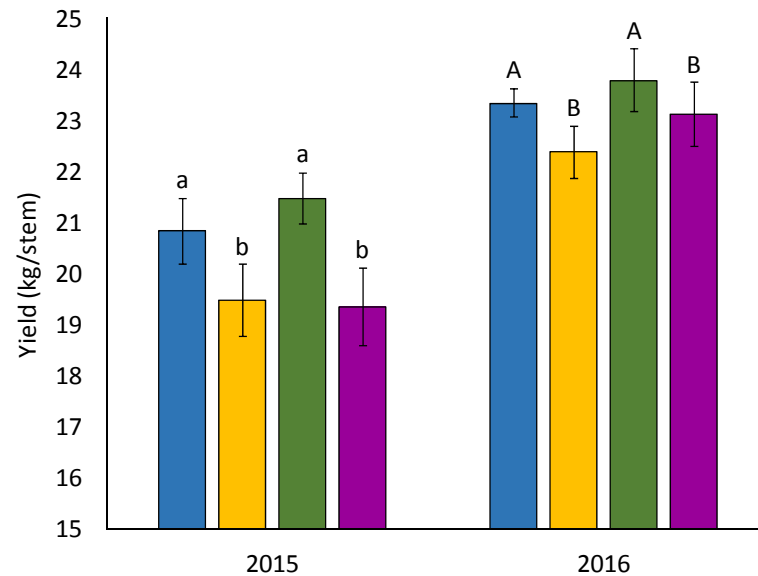
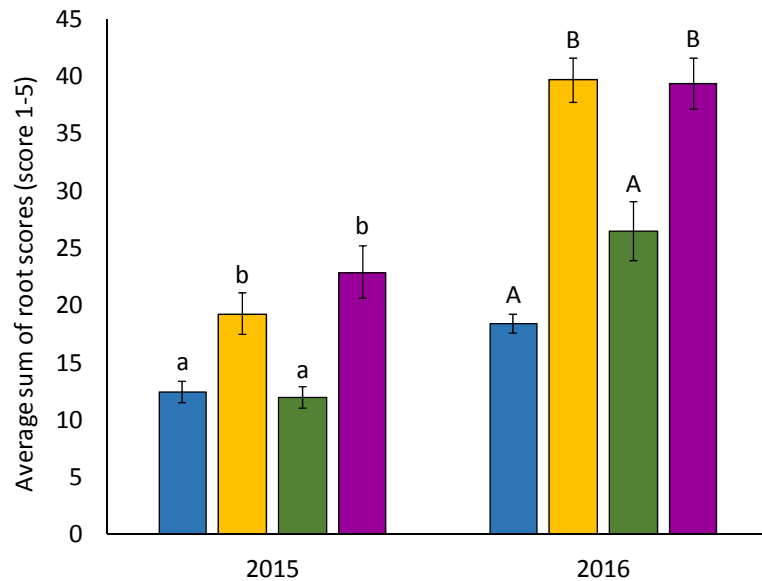
### 3. Generative measures

- Tomato trial
  - Rebelski (tomato cultivar), grafted on Maxifort
  - 4 Treatments:
    - Negative control: plants without symptoms
    - Positive control: plants with symptoms, but without interference
    - Opening slabs
    - Pruning leaves
  - Measurements:
    - Yield
    - HRD incidence (root development assessment every 2 weeks with scoring system 1-5)
  - Two consecutive years (2015-2016)



### 3. Generative measures

- Tomato trial

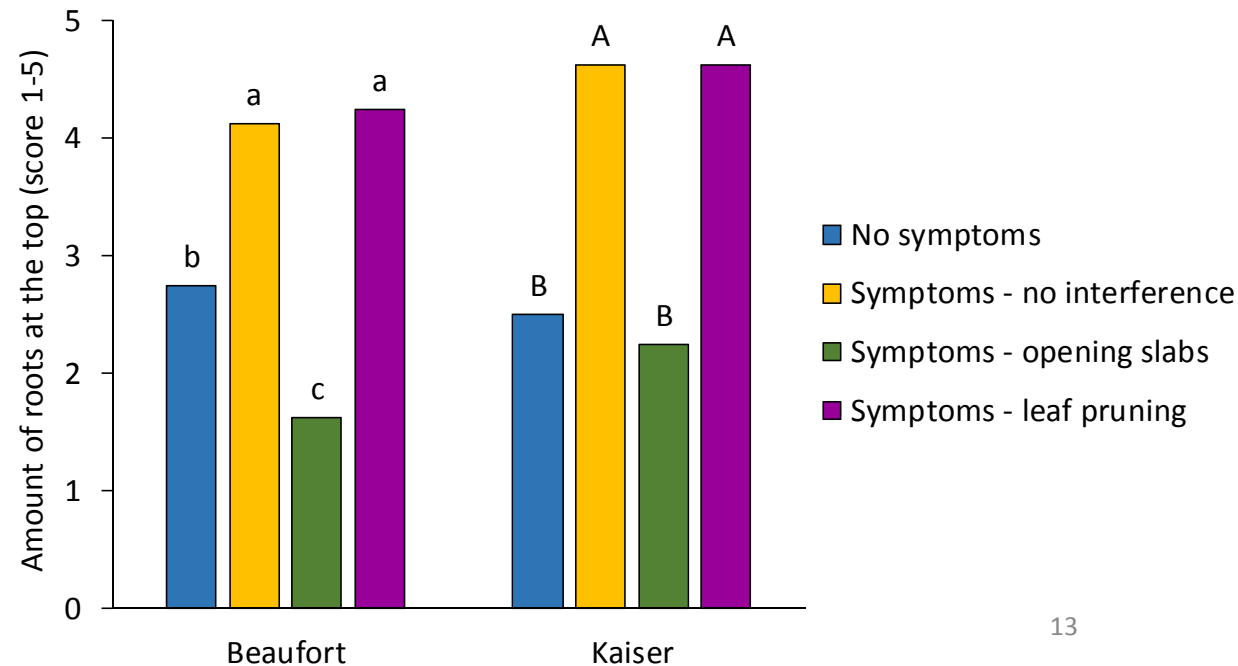


- No symptoms
- Symptoms - no interference
- Symptoms - opening slabs
- Symptoms - leaf pruning

- ⇒ Opening of the slabs is a good measure to reduce/prevent symptoms and yield losses on tomato
- ⇒ Prevention of symptoms confirmed on eggplant

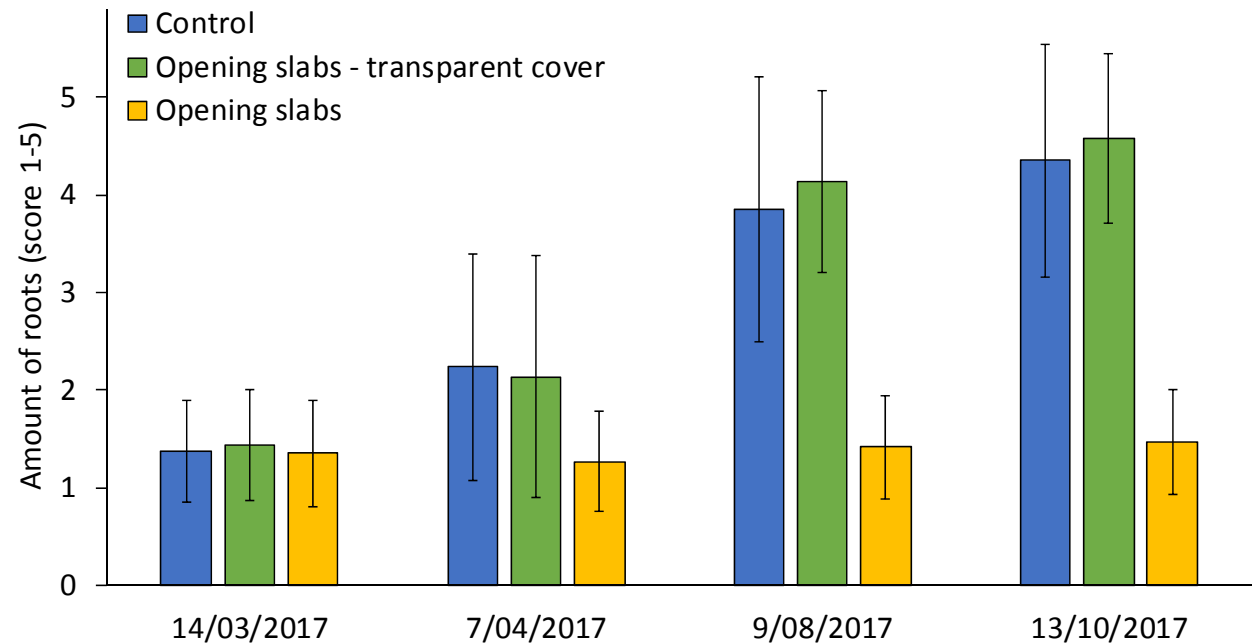
### 3. Generative measures

- Eggplant trial
  - Scorpio (eggplant cultivar), grafted on Beaufort/Kaiser
  - 4 Treatments:
    - Negative control: plants without symptoms
    - Positive control: plants with symptoms, but without interference
    - Opening slabs
    - Pruning leaves



### 3. Generative measures

- Explanation mechanism for opening of the slabs
  - Trial with cucumber
  - 3 Treatments
    - Control
    - Opening slabs – transparent cover
    - Opening slabs



⇒ A transparent cover is not sufficient to reduce root growth

⇒ Reduction of root development by opening of the slabs is thus primarily caused by a drier substrate and not by the light on the slabs



### 3. Generative measures

- Conclusions:
  - Opening of the plastics of the slabs prevents yield losses after infection successfully.
  - Leaf pruning did not prevent HRD symptoms in the trials HOWEVER in combination with a more generative climate and irrigation strategy, leaf pruning will probably be able to prevent yield losses due to RA.

# General conclusions

- Some cultivation techniques are able to reduce HRD symptoms
    - A generative rootstock can reduce the severeness of the symptoms
    - Choice of the slabs can reduce symptoms
    - Opening of the slabs prevents symptoms and yield losses
- } DRIER ENVIRONMENT
- The effectiveness of the techniques is not influenced by the type of RA strain present (e.g. catalase activity) HOWEVER cultivation techniques are not a solution on the long-term!
    - Biofilm formation not tackled
    - No direct effect on disease

## KU LEUVEN

- Pablo Vargas
- Bart Lievens
- Hans Steenackers
- Hans Rediers
- More info:  
[hans.rediers@kuleuven.be](mailto:hans.rediers@kuleuven.be)



- Céline Hamon
- Charlotte Roby
- Daniel Le Corre



- Alain Guillou
- Lucie Drogou
- Marine Guerret



- Wendy Vanlommel
- Lien Bosmans



- Bart Van Calenberge
- Lieve Wittemans

## Agroscope

- Céline Gilli
- Matthias Lutz
- Sandrine Eberlé
- Timea Szikora



- Barbora Jostiakova
- Stefan Van Kerckhove

