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**Agroscope**

# ***Jaunisses virales et Syndrome basses richesses en Suisse***

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# Jaunisses (« virus yellows », VY)

Several viruses :

*Beet yellows virus (BYV)*

*Beet mild yellowing virus (BMYV)*

*Beet chlorosis virus (BChV)*

*Beet western yellows virus (BWYV)*

*Beet mosaic virus (BtMV)*

Several aphid vectors:



*Myzus persicae*



Healthy

BYV



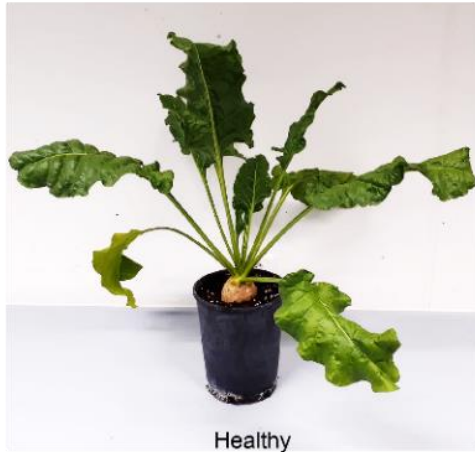
Healthy

BChV

Neonicotinoid on seeds:

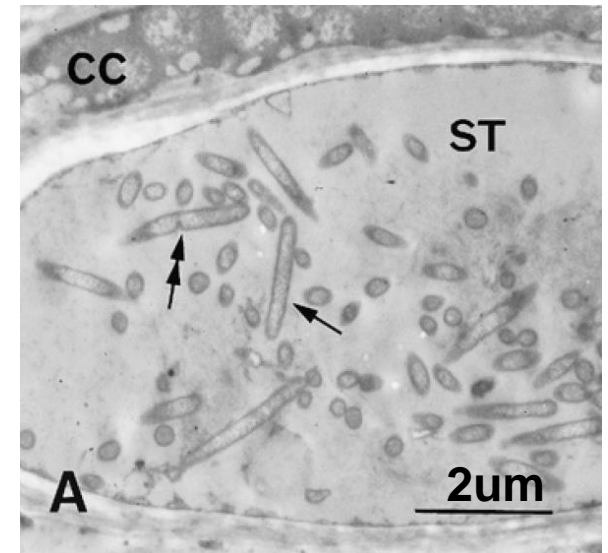


# Syndrome basses richesses (SBR)



*Pentastiridius leporinus*

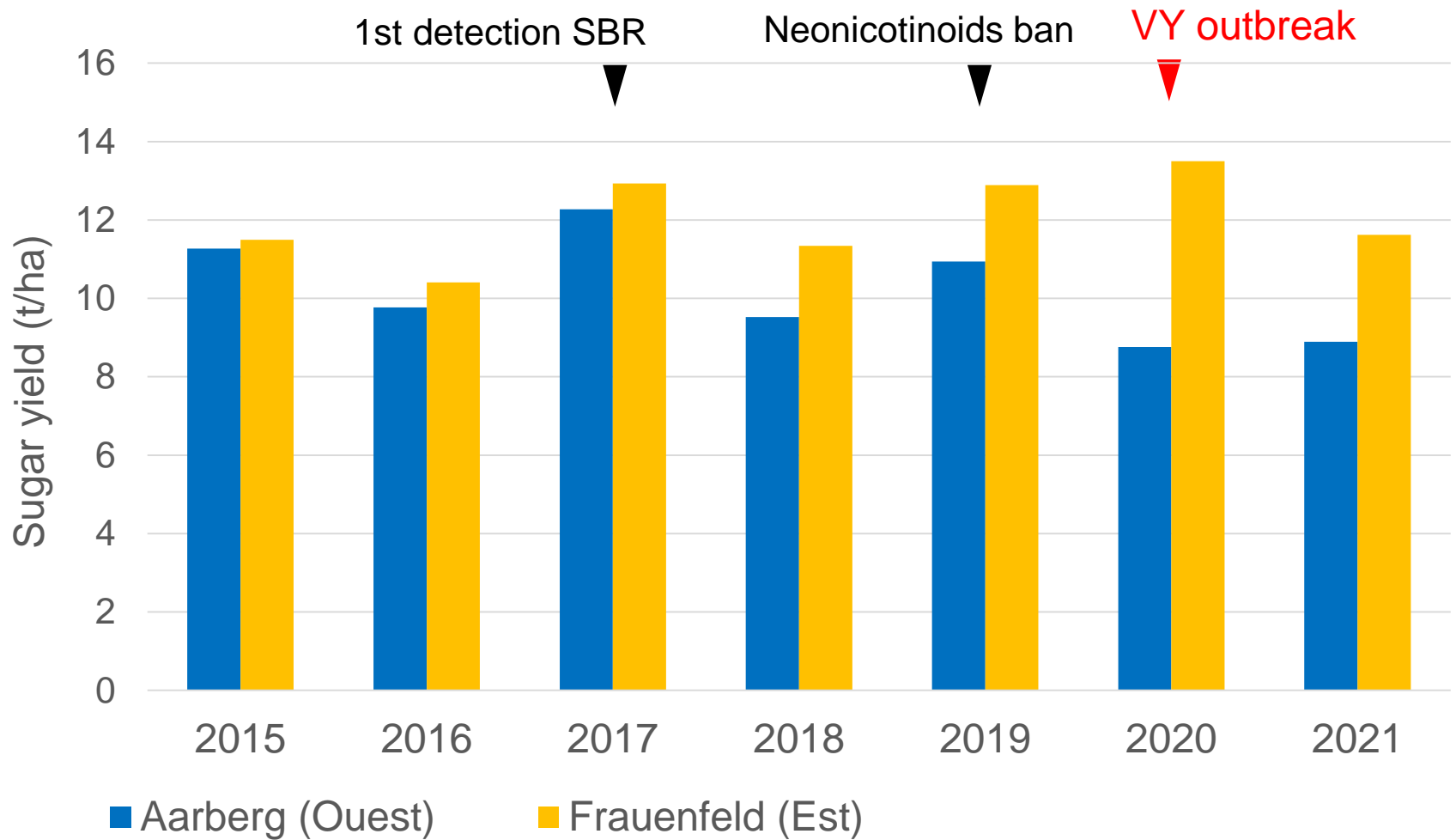
*Arsenophonus phytopathogenicus*



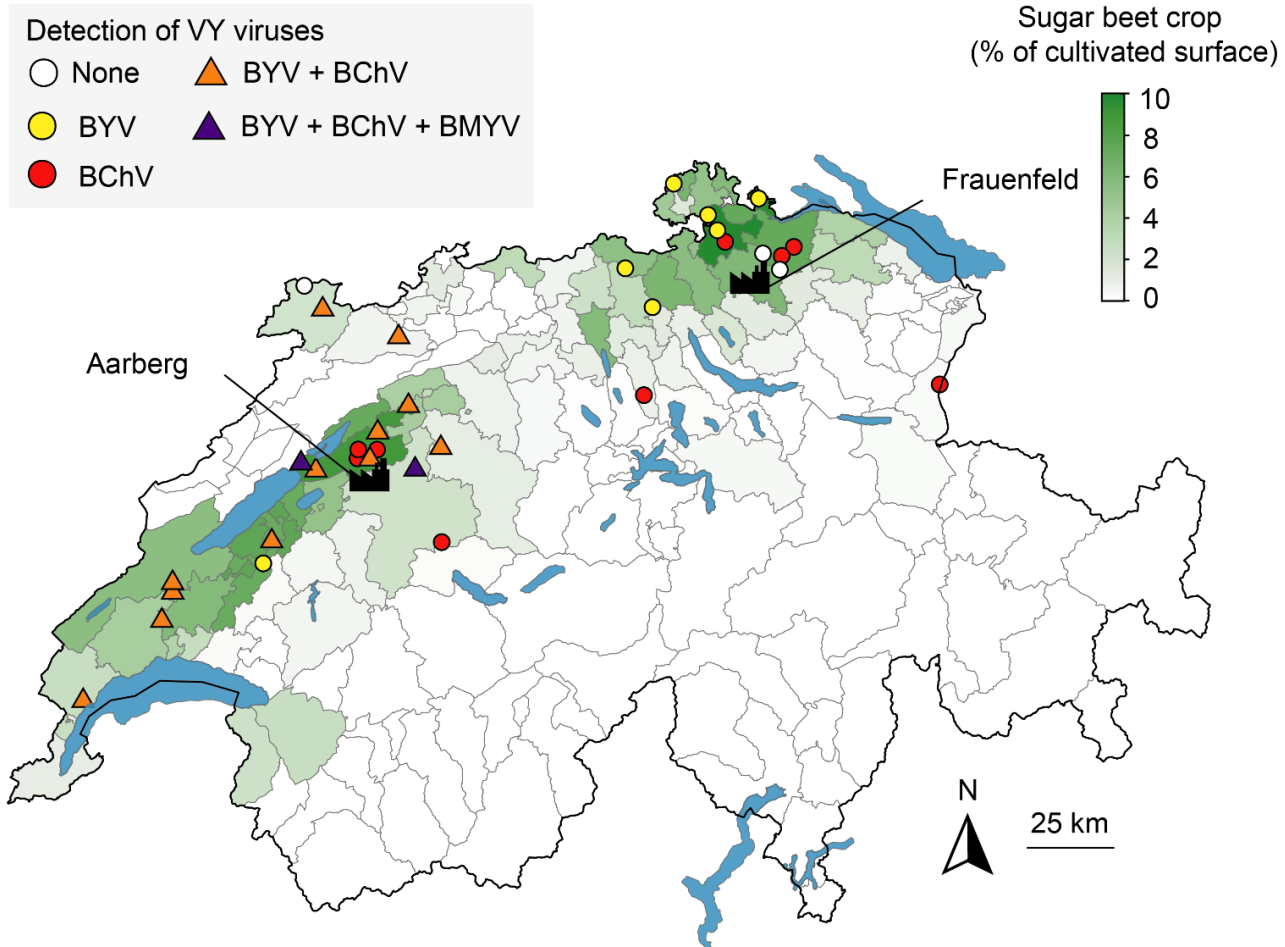
Gatineau et al. 2002



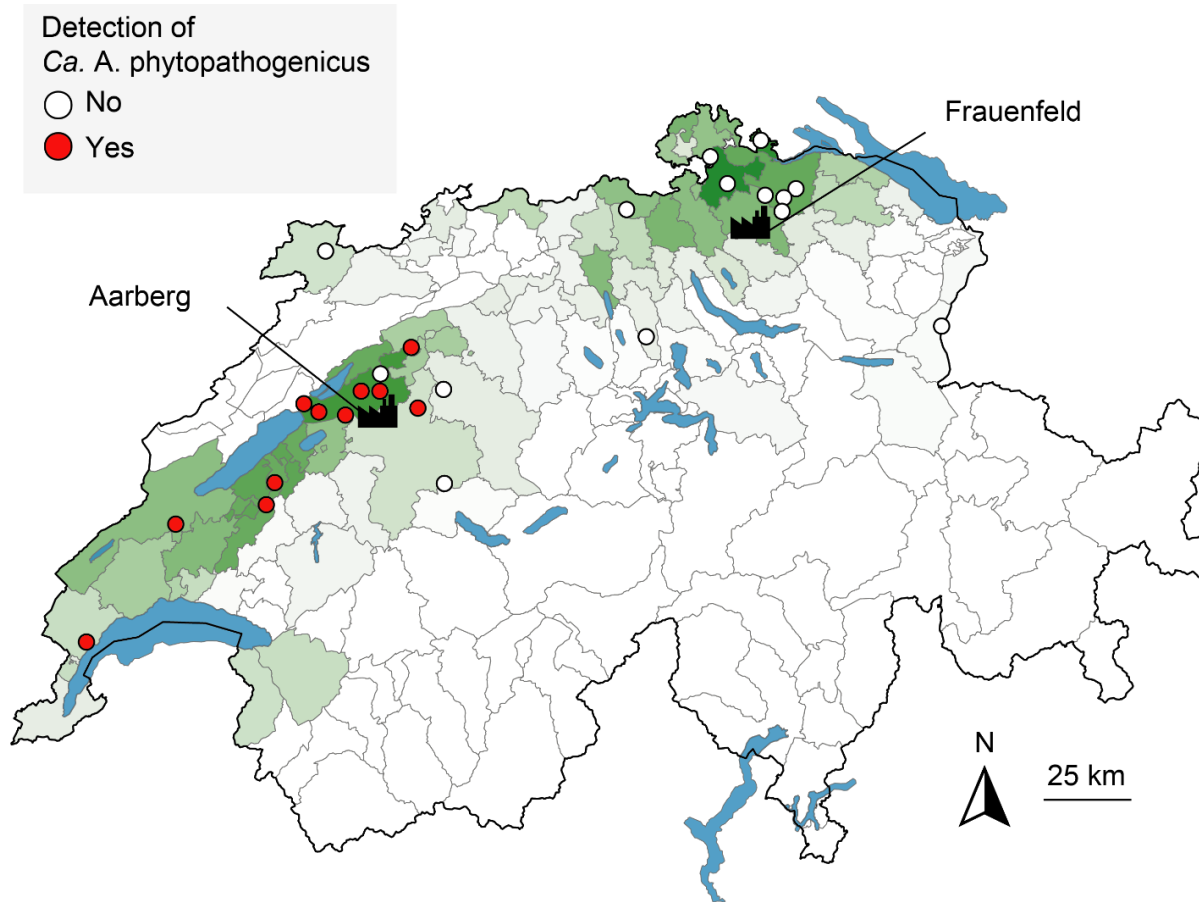
# Impact in Switzerland



# 2020 outbreaks



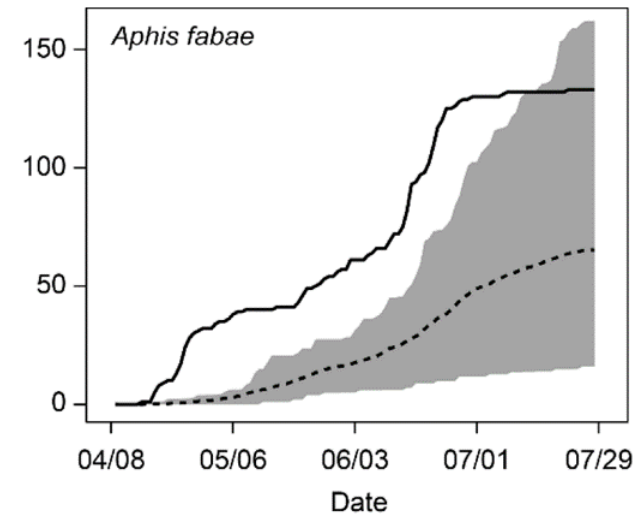
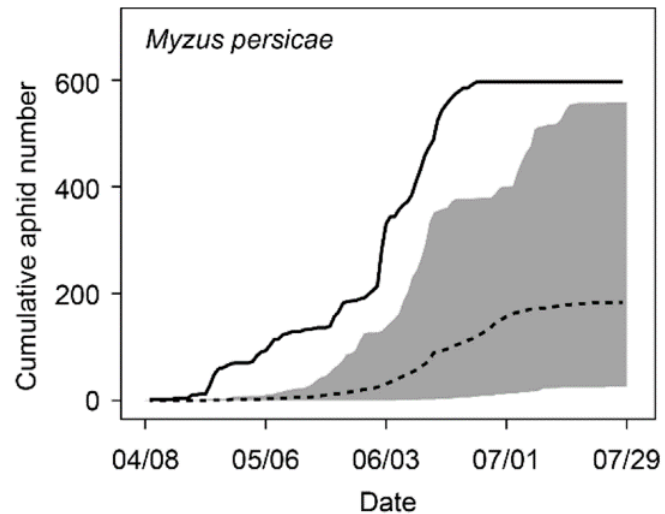
# 2020 outbreaks



# VY epidemiology

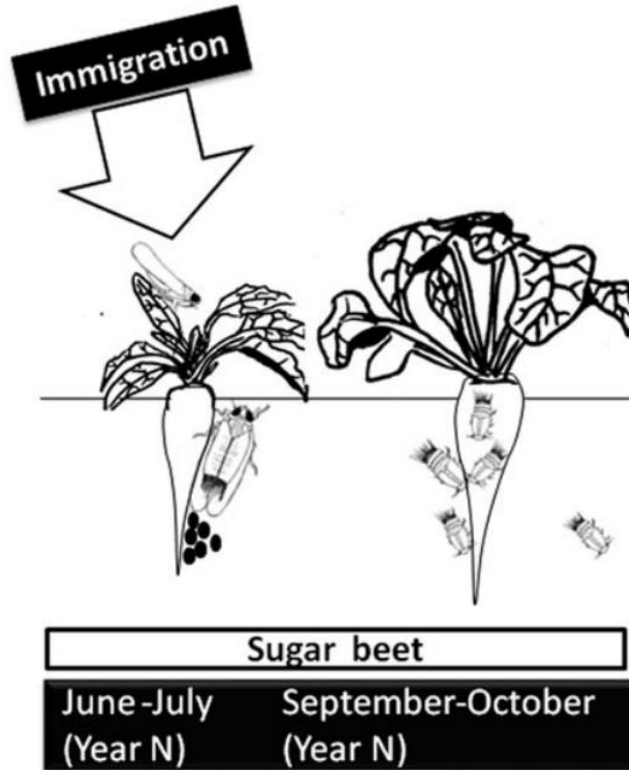
VY severity depends on aphid survival in winter  
= f (# frost days, average T °C in early spring)

Climate change = increase in VY outbreaks !



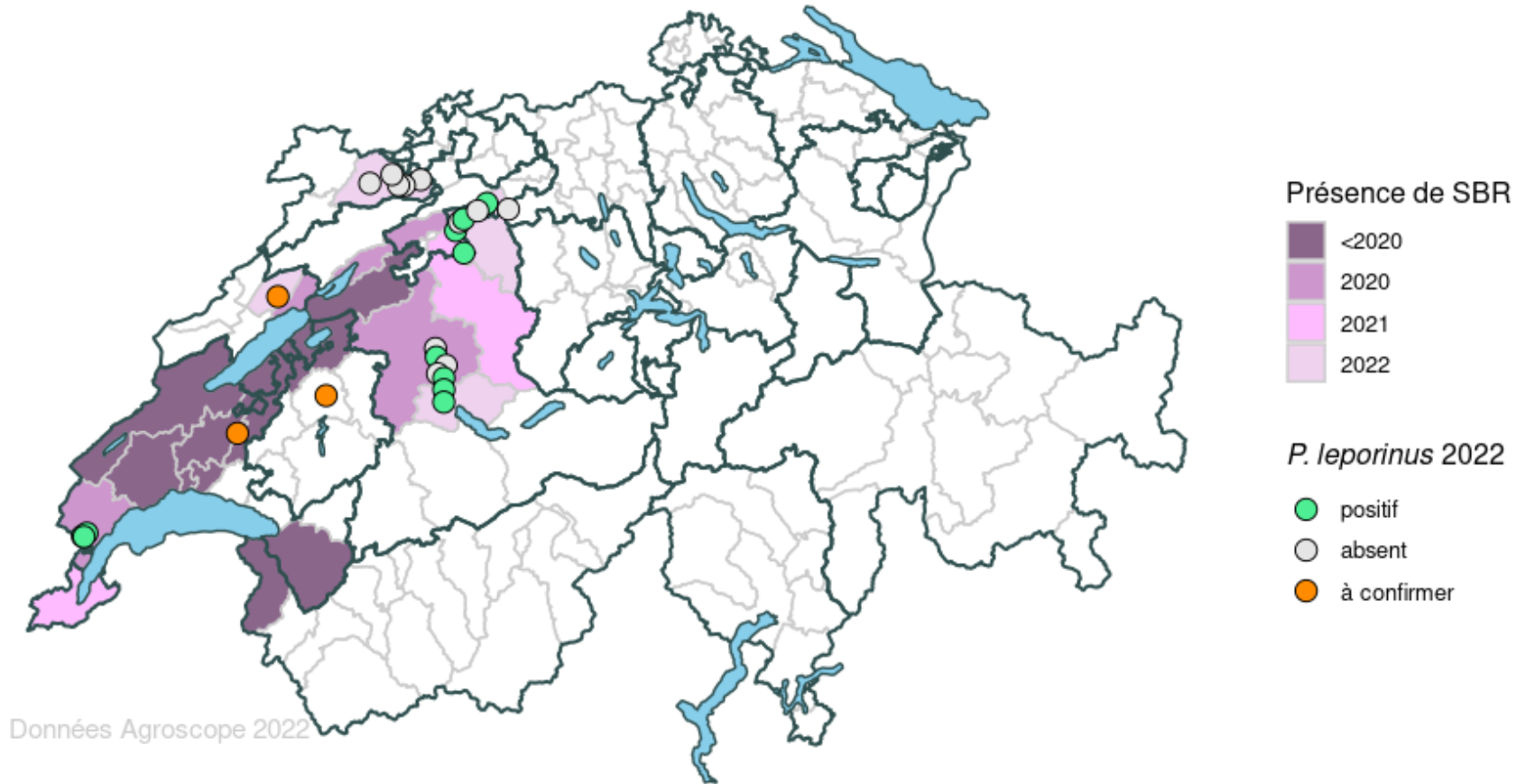
— 2020  
- - - Average 2000–2019  
■ Quantile 5–95%

# SBR epidemiology





# SBR epidemiology



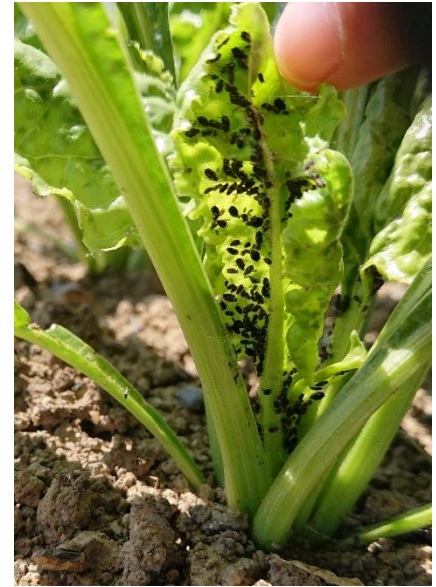
# Control measures

## Virus yellows:

- No more seed treatment
- Insecticide spray allowed (but less efficient)
- «Tolerant» cultivars

## SBR:

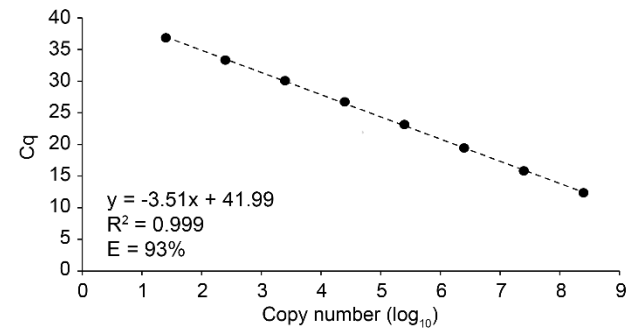
- No insecticide available
- Avoid winter wheat after sugar beet in the rotation
- «Tolerant» cultivars



# Work at Agroscope (with partners)

## Development of diagnostic tools

- Cultivar screening
- Disease spreading



## Development of inoculation methods

- Vectors rearing

## Disease reservoirs

- No other vector for SBR
- New SBR plant host identified
- Alternative host for aphids via barcoding



# Work at Agroscope (with partners)

## SBR

- How did SBR emerge ?
- Genome of *A. phytopathogenicus*
- Pure culture for *A. phytopathogenicus*
- Comparison between susceptible/tolerant cultivars



## Virus yellows

- Interaction VY + SBR
- Use of drones (quantification)
- Alternative control method (see next presentation)



**Thank you for your attention**

**Vielen Dank für Ihre Aufmerksamkeit**

**Questions/Fragen ?**

## ***Candidatus Arsenophonus phytopathogenicus***

- Gram negative, *Gammaproteobacteria*
- Order *Enterobacterales*
- Family *Morganellaceae*

### **Features :**

- Facultative endosymbiont
- Unknown impact on insect
- Vertical transmission (30%)
- Non cultivable
- No artificial inoculation
- Infection on periwinkle



Healthy

SBR

# Genome sequencing

