



# Turnip Yellows Virus (TuYV): Incidence and impact on yield in European winter oilseed rape

Stefan Abel, Laurent Hanneton, Vasilis Gegas



# TUYV (Turnip yellow virus) in winter oilseed rape

- Transmitted by Aphids (*Myzus persicae*)
  - Infection in autumn + spring

- Symptoms
  - Red/purple leaves
  - Reduction of leaf area and vigour
  - Shorter plants, less branches
  - Reduced number of seeds per pod
  - Yield depression
  - Lower oil content

- other factors can cause similar symptoms (Nutrient deficiency, water excess, ...)

- Verification with ELISA-test



Susceptible hybrid

TuYV Resistant hybrid



Incidence of TuYV in Europe



Impact of TuYV on seed yield



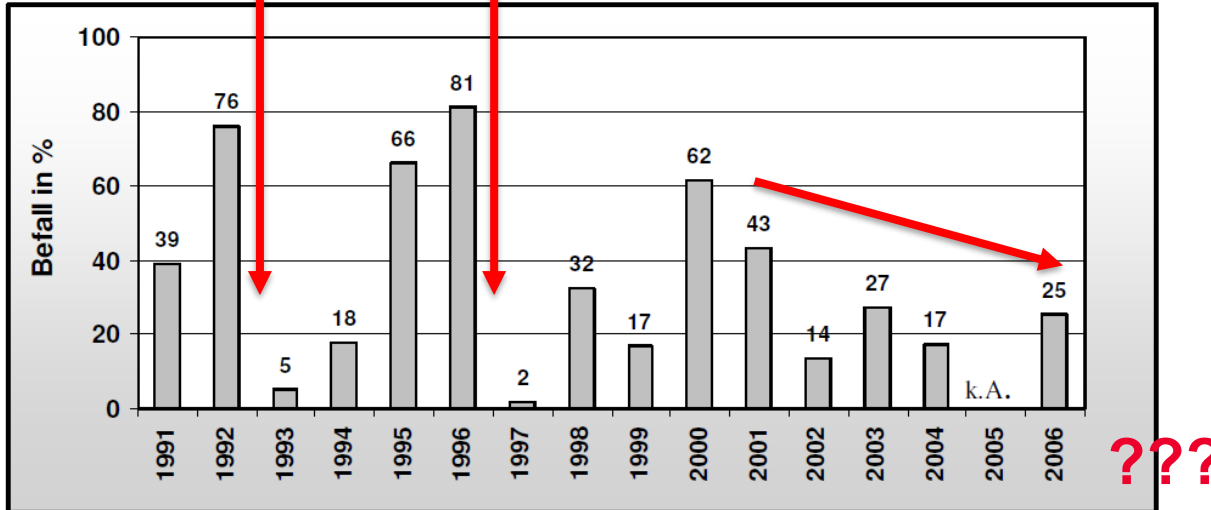
# Evolution of TuYV-Infection rates in Germany

Historical data (1991-2006)

Strong winter

Strong winter

Use of neonic seed dressing



After Schaardt; Master thesis (2007)



# TuYV Monitoring surveys 2015-2019

(DAS-ELISA, initiated by Limagrain Europe)

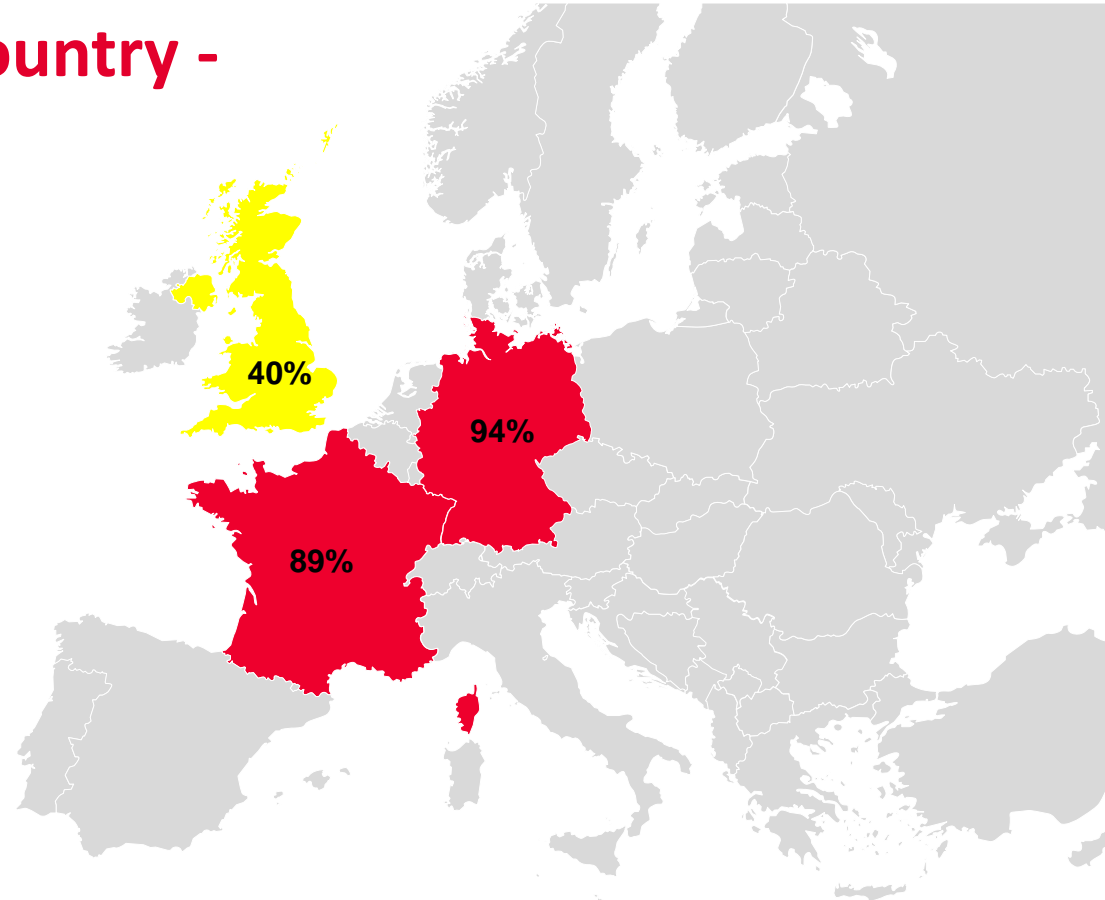
Year	Period; Scope	lab	No. Of locations
2015	Spring; FR, DE, UK	Warwick (UK)	23
2016	Spring; Europe	JKI (DE)	329
2017	Spring; Europe	Limagrain (FR)	>700
2018	Spring; Europe	Limagrain (FR)	373
2019	Spring; Europe	Limagrain (FR)	307



# TuYV Monitoring Spring 2015

## – infection rates /country -

- First monitoring on research sites
- 23 locations
- Very strong infection in Germany and France

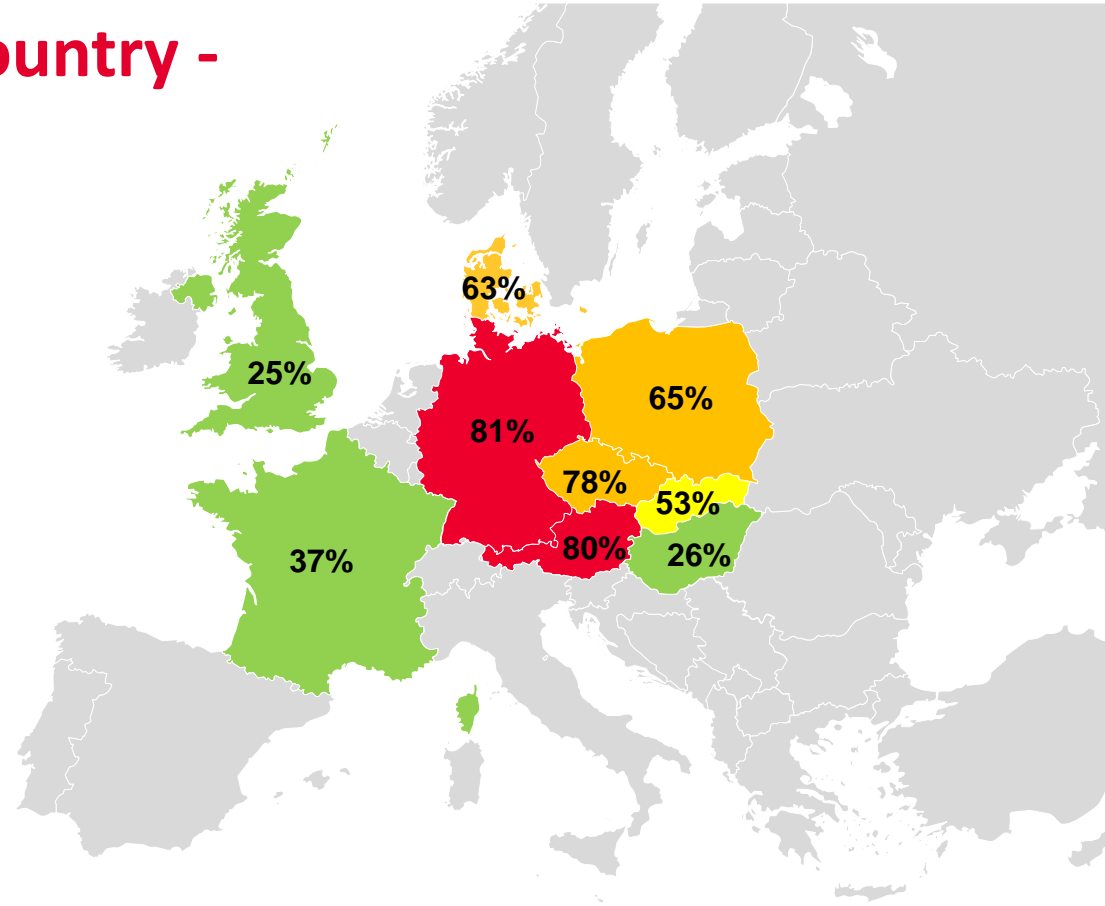


- Very low infection (<20%)
- Low infection (20% - 39%)
- Medium infection (40% - 59%)
- Strong infection (60% - 79%)
- Very strong infection (>80%)

# TuYV Monitoring Spring 2016

## – infection rates /country -

- wide monitoring on across Europe
- 329 locations
- Very strong infection in central Europe, less infection in the west and southeast of Europe

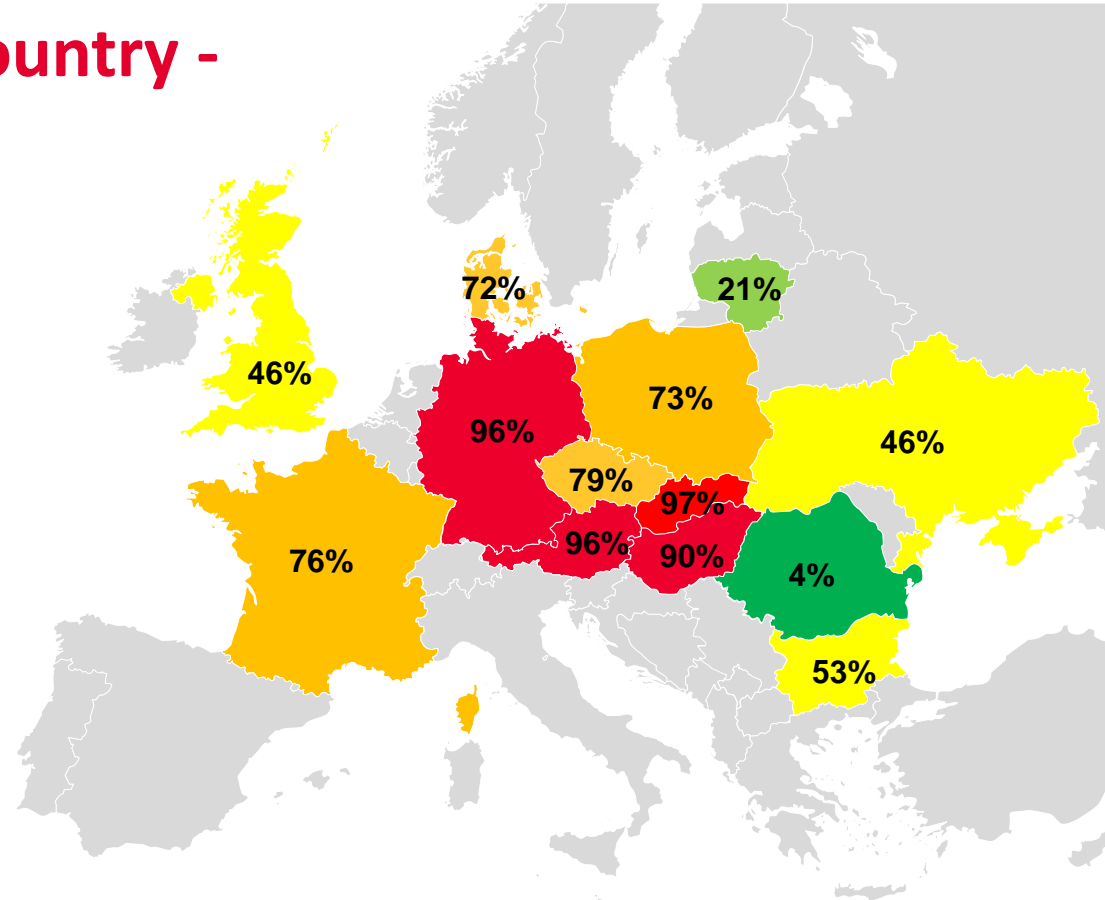


- Very low infection (<20%)
- Low infection (20% - 39%)
- Medium infection (40% - 59%)
- Strong infection (60% - 79%)
- Very strong infection (>80%)

# TuYV Monitoring Spring 2017

## – infection rates /country -

- wide monitoring on across Europe
- >700 locations
- Very strong infection across Europe, less infection in the UK and east of Europe



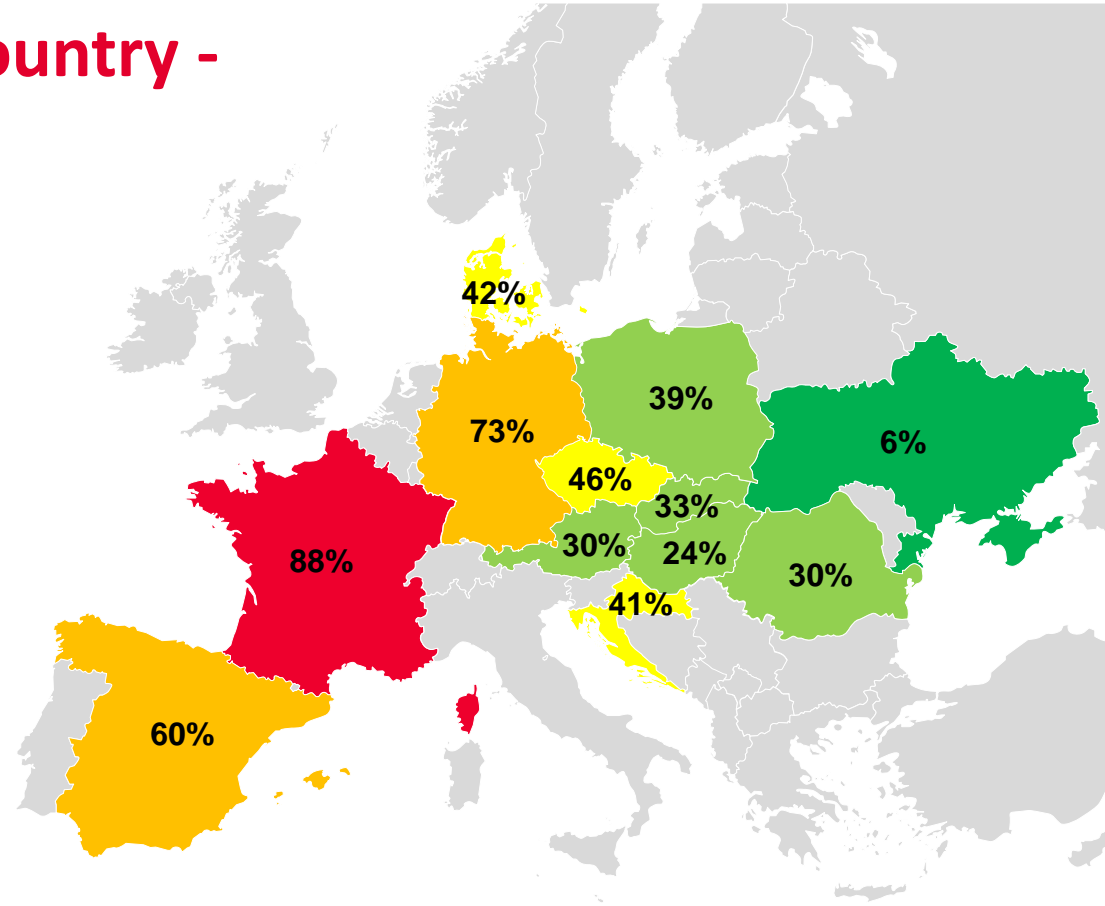
- Very low infection (<20%)
- Low infection (20% - 39%)
- Medium infection (40% - 59%)
- Strong infection (60% - 79%)
- Very strong infection (>80%)



# TuYV Monitoring Spring 2018

## – infection rates /country -

- 373 locations
- Very strong infection in France, low infection in the east of Europe

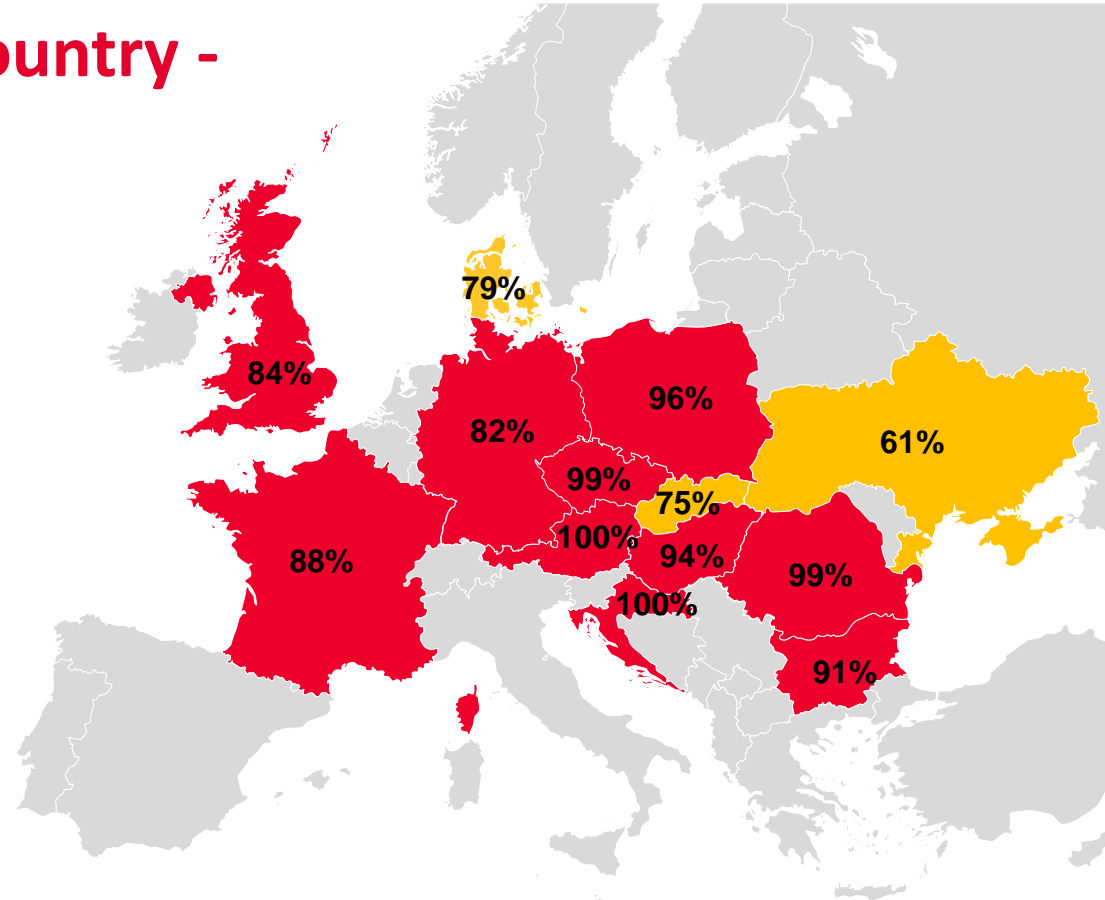


- Very low infection (<20%)
- Low infection (20% - 39%)
- Medium infection (40% - 59%)
- Strong infection (60% - 79%)
- Very strong infection (>80%)

# TuYV Monitoring Spring 2019

## – infection rates /country -

- 307 locations
- Very strong infection all over Europe

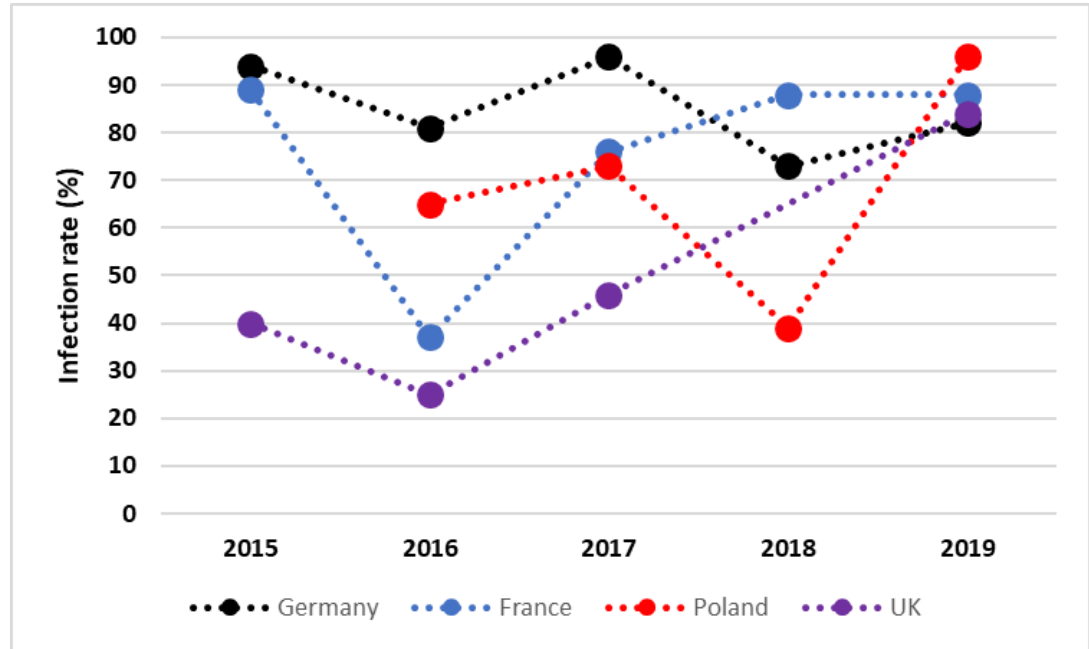


- Very low infection (<20%)
- Low infection (20% - 39%)
- Medium infection (40% - 59%)
- Strong infection (60% - 79%)
- Very strong infection (>80%)



# Evolution of TuYV-Infection rates in main areas of cultivation of WOSR (2015-2019)

- Stable and very strong infection in Germany
- UK tends to have lower infection rates
- Poland, France: strong infection in most of the years





# Evolution of TuYV-Infection rates in Germany

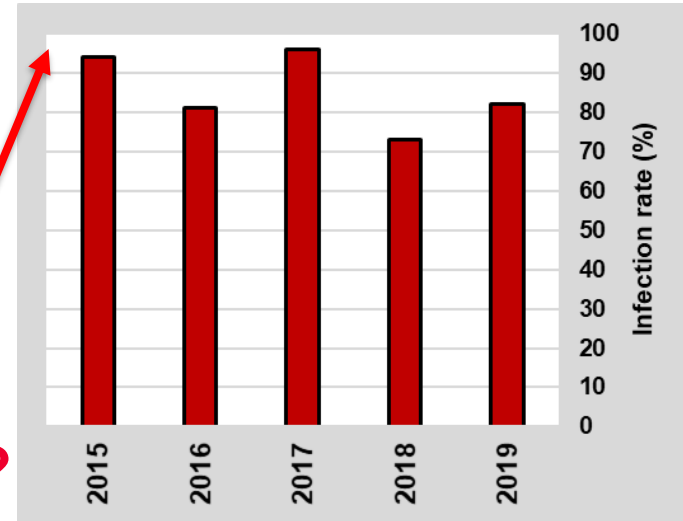
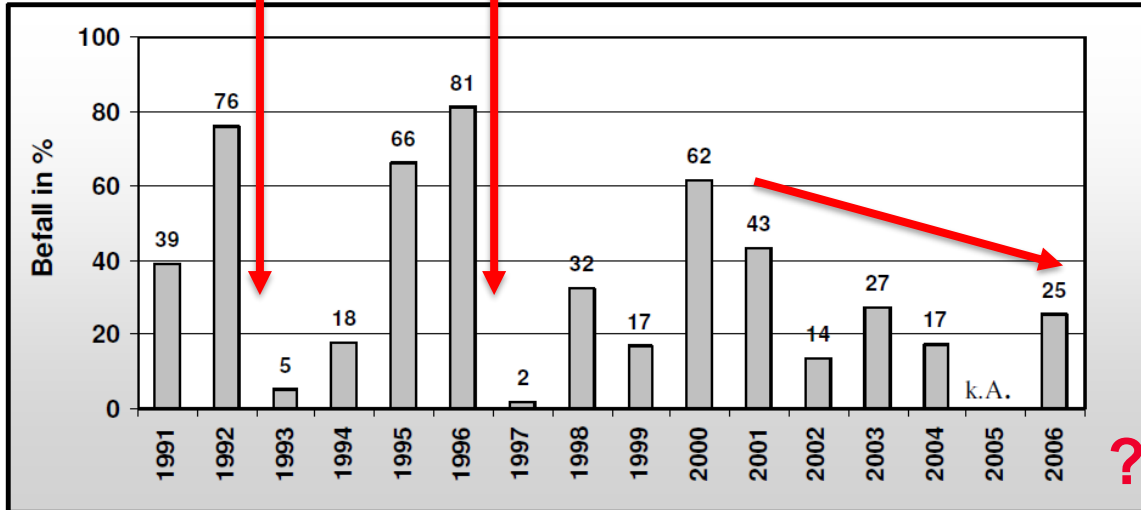
Historical data (1991-2006) and Limagrain monitoring (2015-2019)

Strong winter

Strong winter

Use of neonic seed dressing

Ban of neonic seed dressing, mild winters



After Schaardt; Master thesis (2007)



Incidence of TuYV in Europe

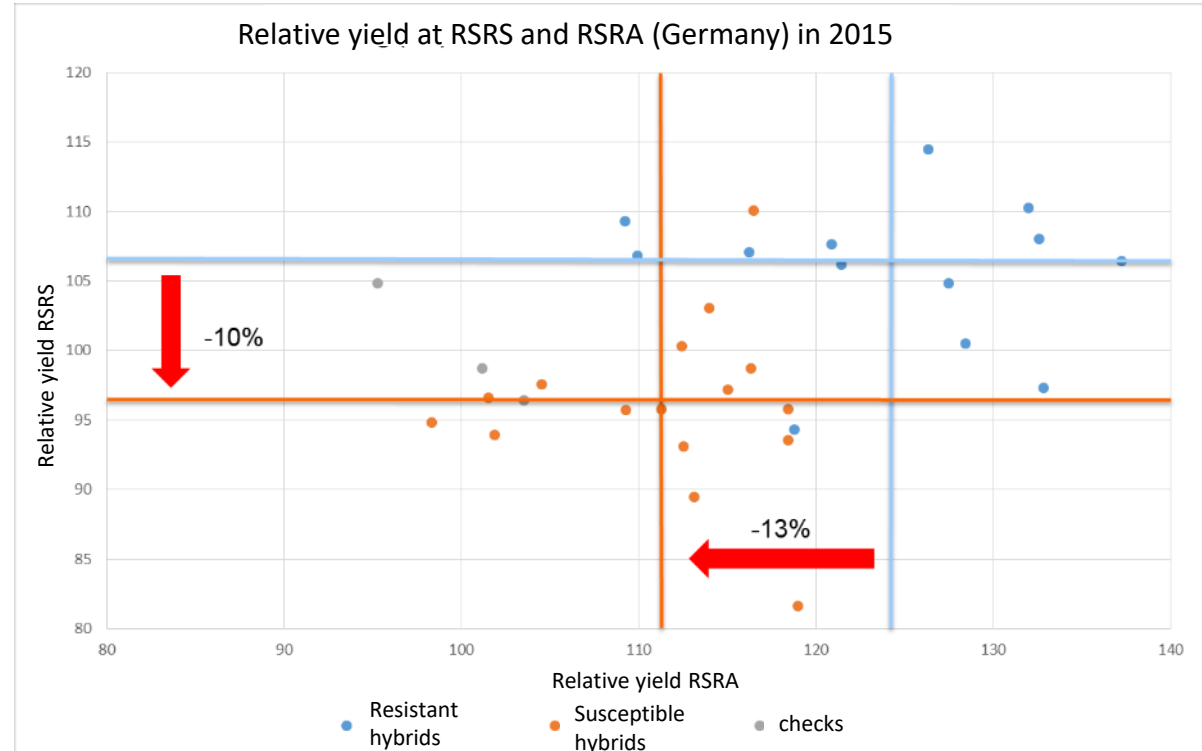


Impact of TuYV on seed yield



# What is the impact of TuYV infections on yield?

- Testing of a set of near isogenic hybrids under natural infection
- Average yield of resistant hybrids is clearly better than isogenic susceptible hybrids
- Yield advantage of resistant hybrids exceeds 10%

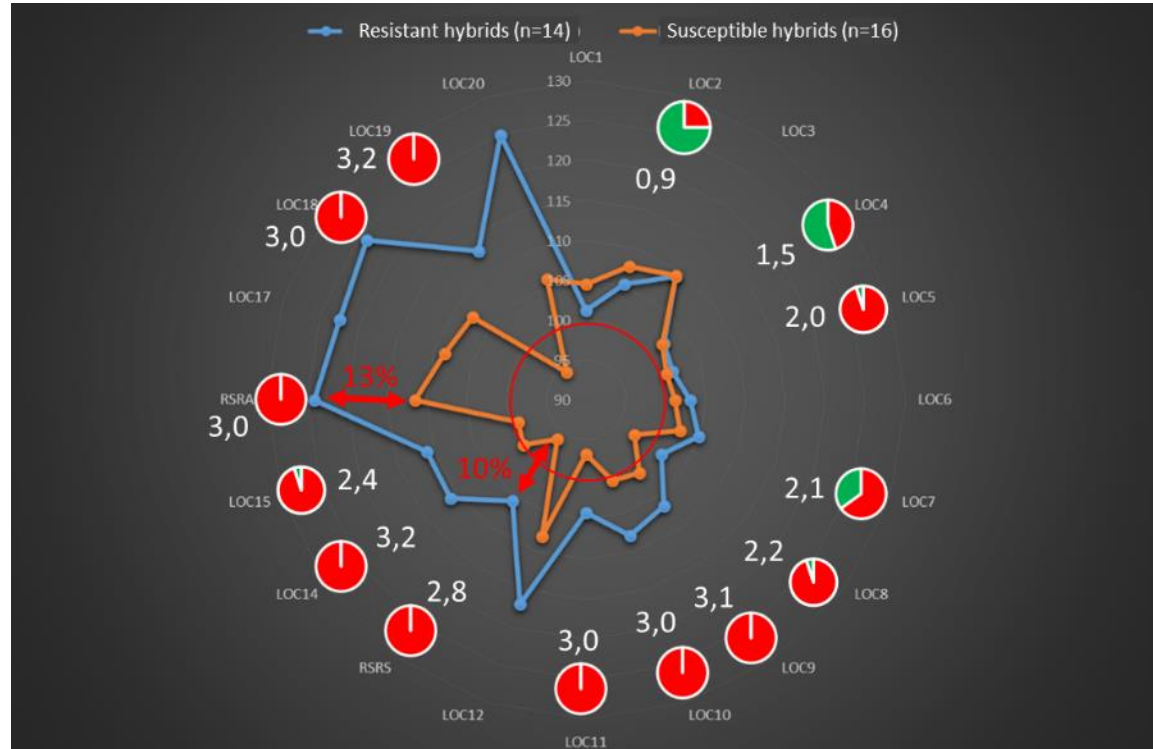




# 2015 yield comparison across Europe

TuYV resistant vs. susceptible hybrids

- Average yield advantage of resistant hybrids: 7%
- Range from -3% to 19%
- Highest difference on locations with strong infection

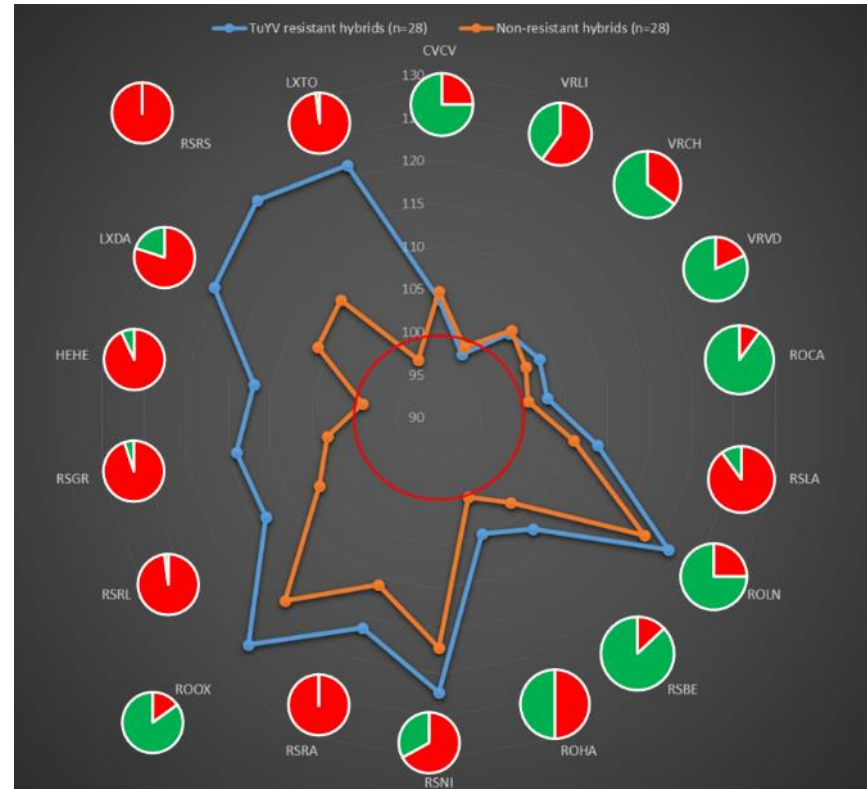




# 2016 yield comparison across Europe

TuYV resistant vs. susceptible hybrids

- Average yield advantage of resistant hybrids: 7%
- Range from -1% to 25%
- Highest difference on locations with strong infection

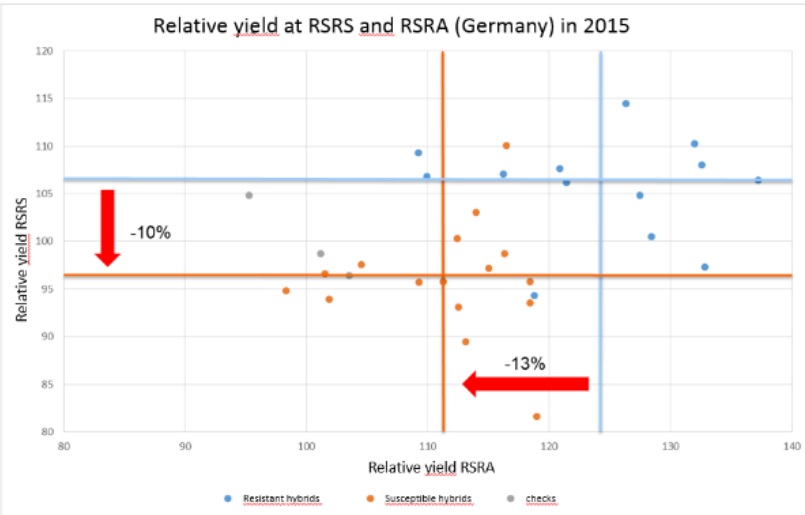






# Summary yield comparison across Europe

TuYV resistant vs. susceptible hybrids



Year	Min	Max	Mean	No. Of locations
2015	-3%	19%	<b>7%</b>	20
2016	-1%	25%	<b>7%</b>	19
2017	-7%	11%	<b>5%</b>	20
2018	-6%	22%	<b>7%</b>	20

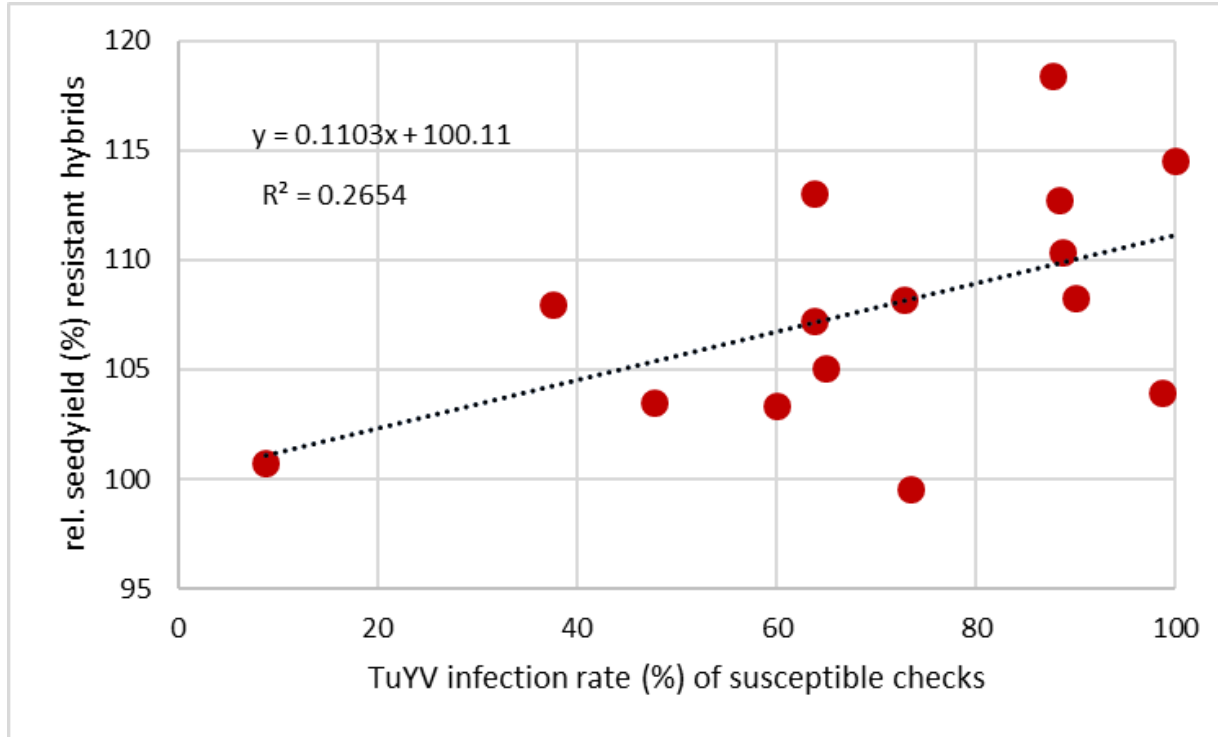
Trialnetwork: France (6), Germany (6), UK (5), Poland (2), Czech Rep. (1)

Impact of TuYV-resistance on yield:  
**5 to 15%**



# Postofficial trial 2018 - Germany

relative performance of resistant hybrids (n=3) on locations with varying TuYV infection rates



Slope of regression:  
**11%**



# Conclusions

- **High infection rates after ban of neonicotinoid seed dressing , especially in Germany, France, Poland, Czech Rep. and Austria**
- **Nearly complete infection all over Europe in 2019**
- **Good correlation between outperformance of resistant hybrids and level of infection**
- **Average yield effect of TuYV resistance in the trial network: 6.5%**
- **Effect of complete TuYV infection on yield is estimated to be 10-15%**





**Thanks for your  
attention !**