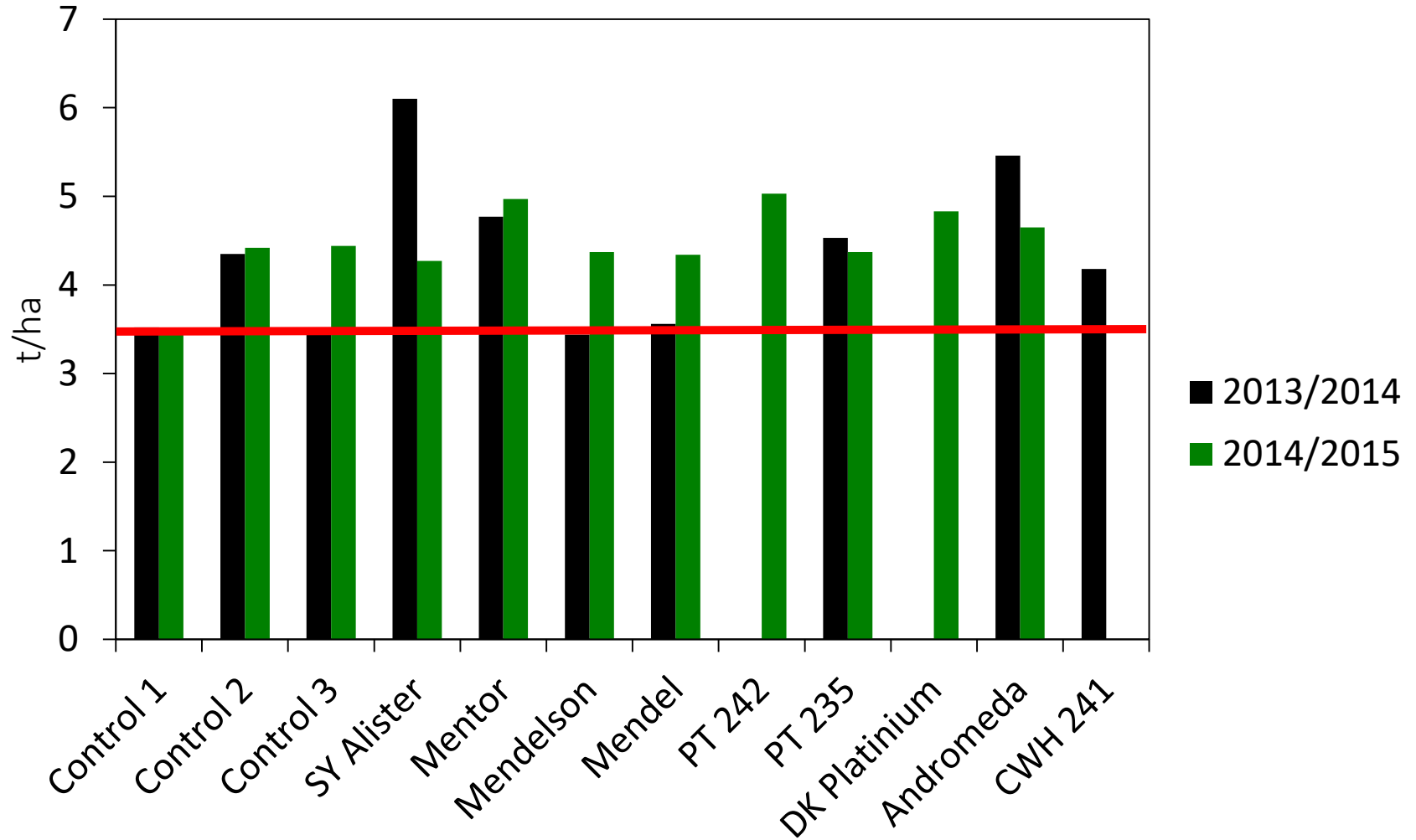
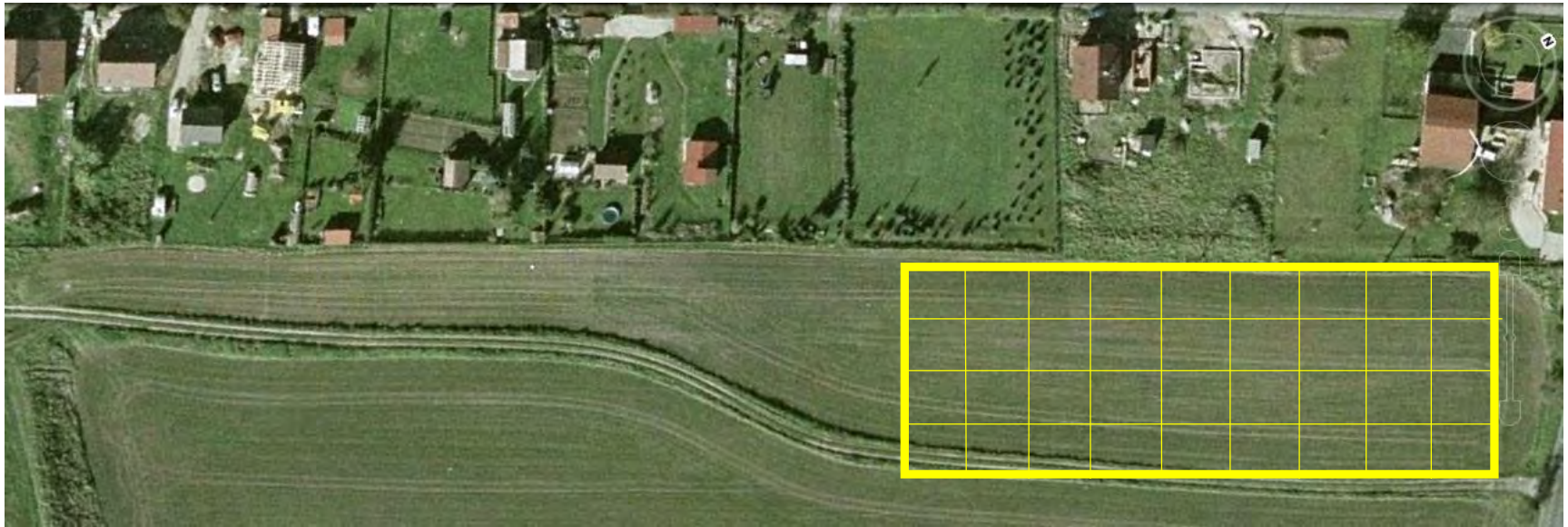


Yield

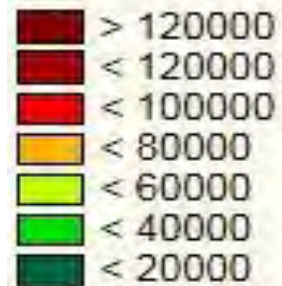


The field infestation mapping

- 72 soil samples –rectangle nett 4 x 9
- Each sample - 3 subsamples – depth 20 cm
- Samples were homogenized, dried, DNA extraction, q PCR with SYBR green – number of spores quantified
- Map created in SADIE analysis (*Spatial Analysis by Distance IndicEs*) based on index of spores agregation



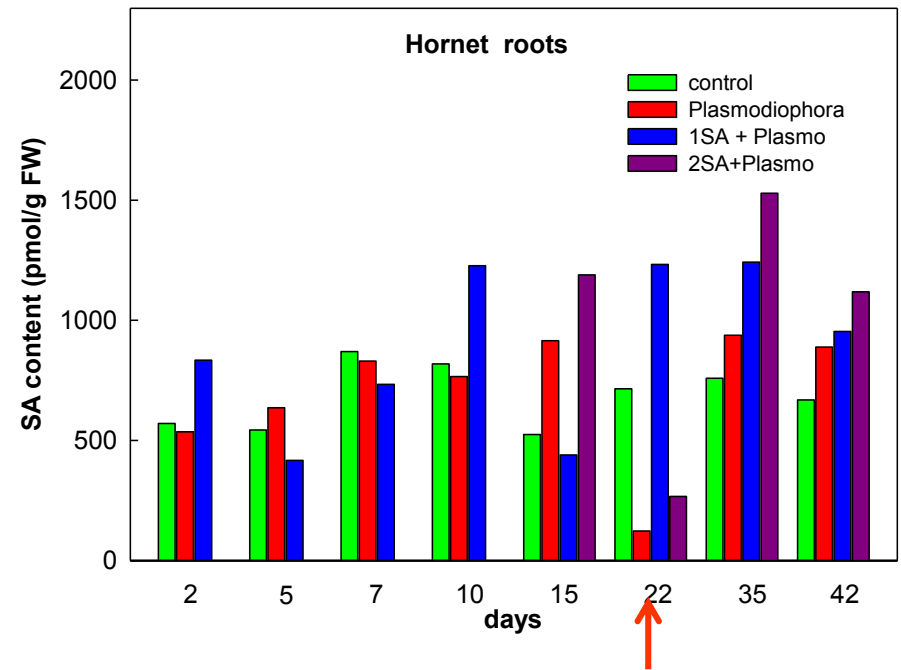
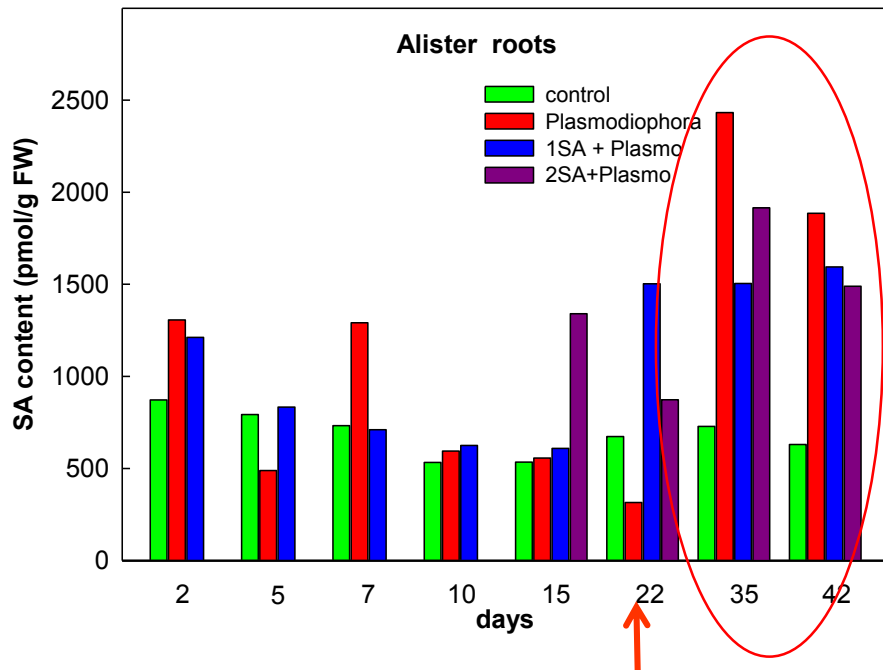
Map of infestation



Koncentrace spor v 1 g půdy

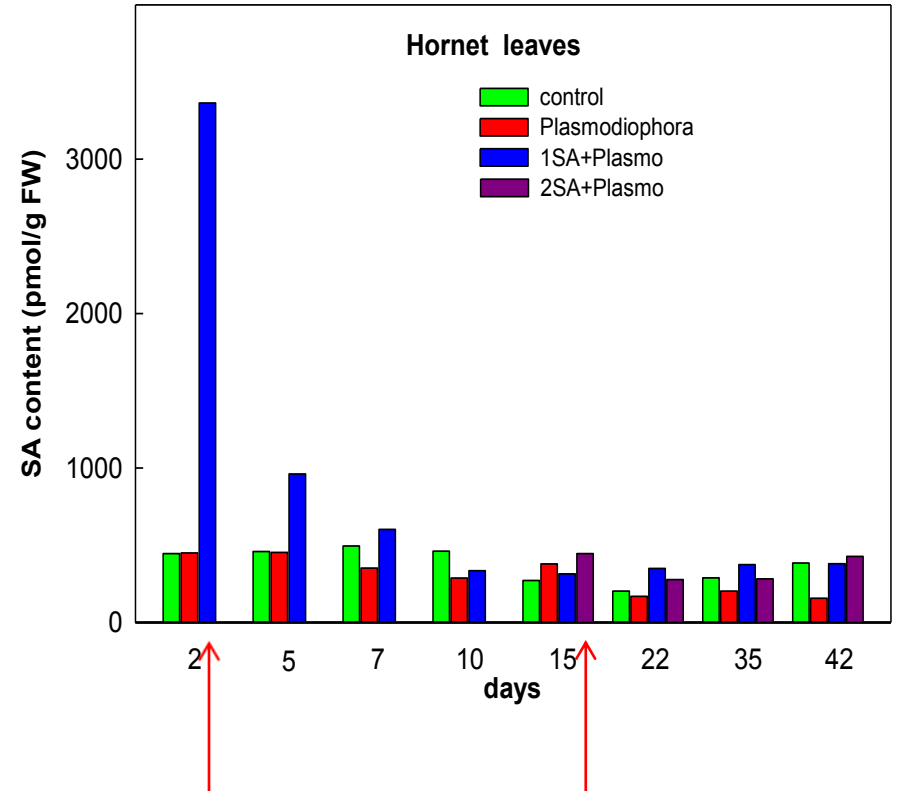
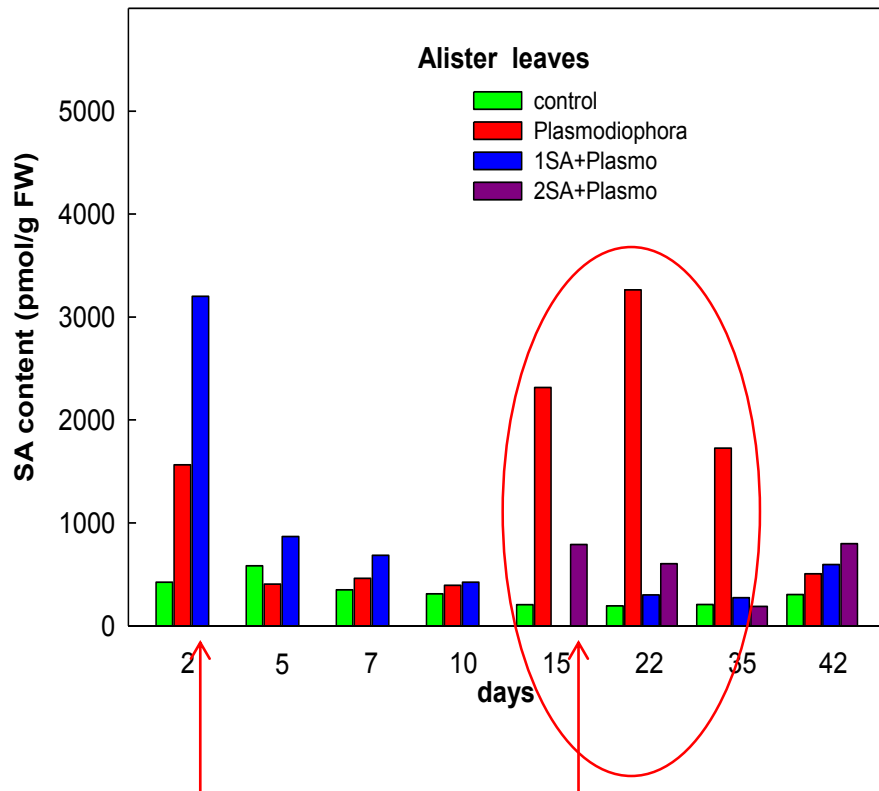
Credits to Vojtěch Hlavjenka

Comparison of hormonal dynamics in resistant and susceptible cultivars during *P. brassicae* infection



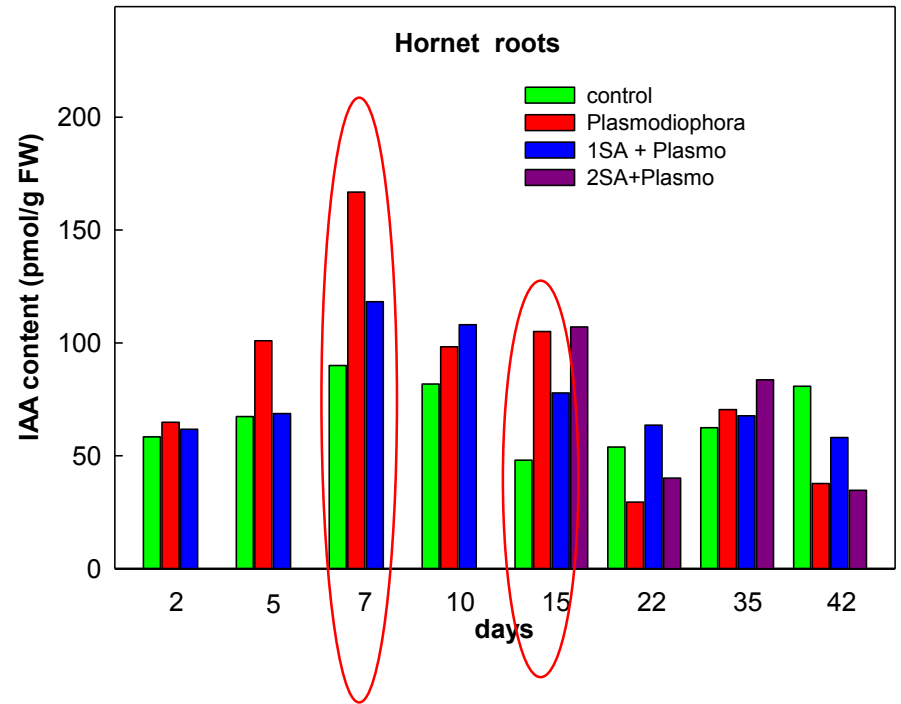
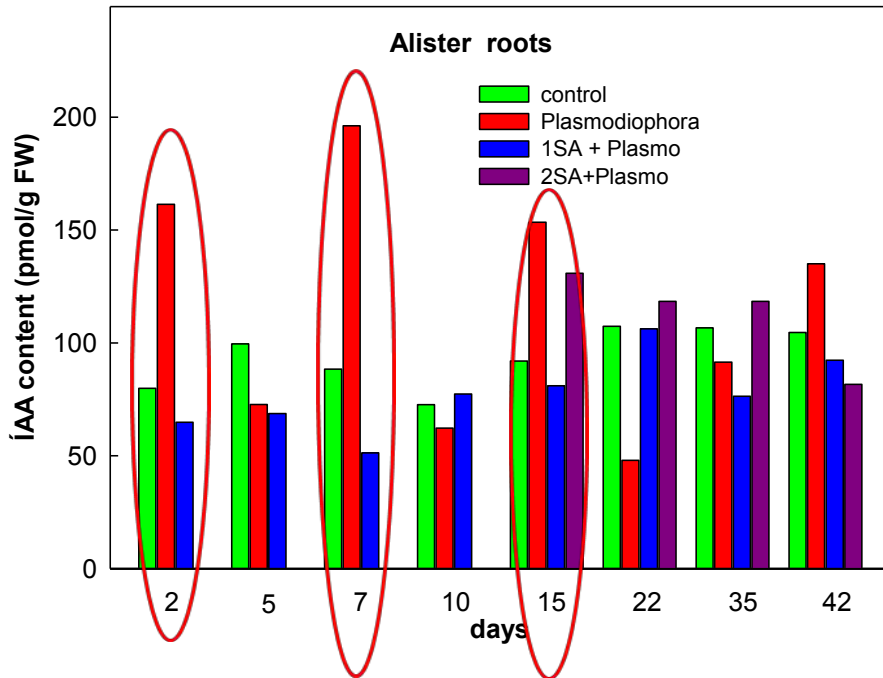
Salicylic acid (SA) – the key hormone in the response to biotrophs

- SA was down-regulated at the beginning of club formation (22 days after infection)
- In Alister – SA was enhanced after 2, 7 and especially after 35 – 42 days
- Exogenous application of 1 mM salicylic acid (at the beginning of infection, also after 15 days)



SA application by sparing the shoots

In leaves – SA elevation during infection progression in Alister

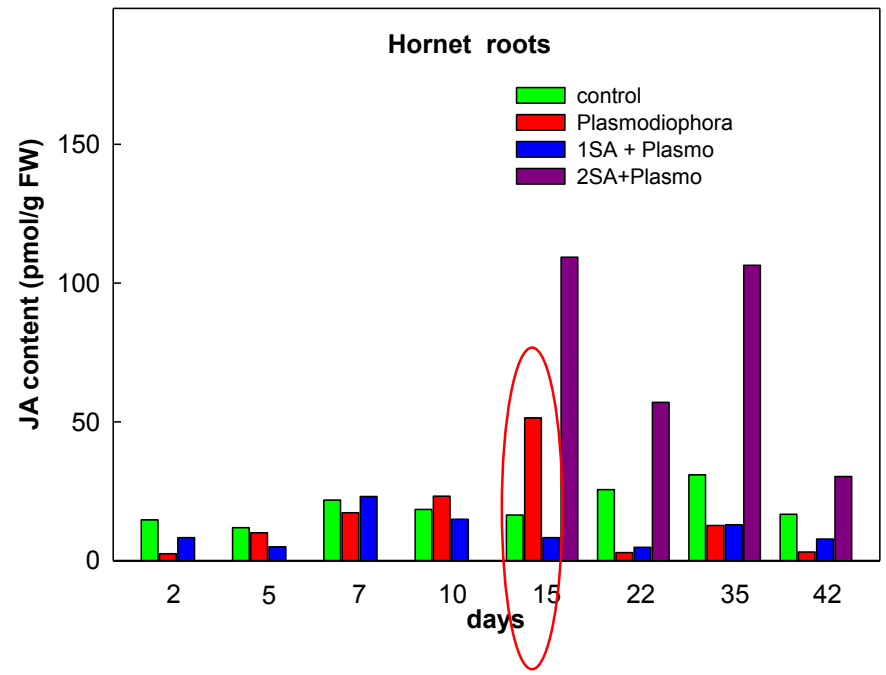
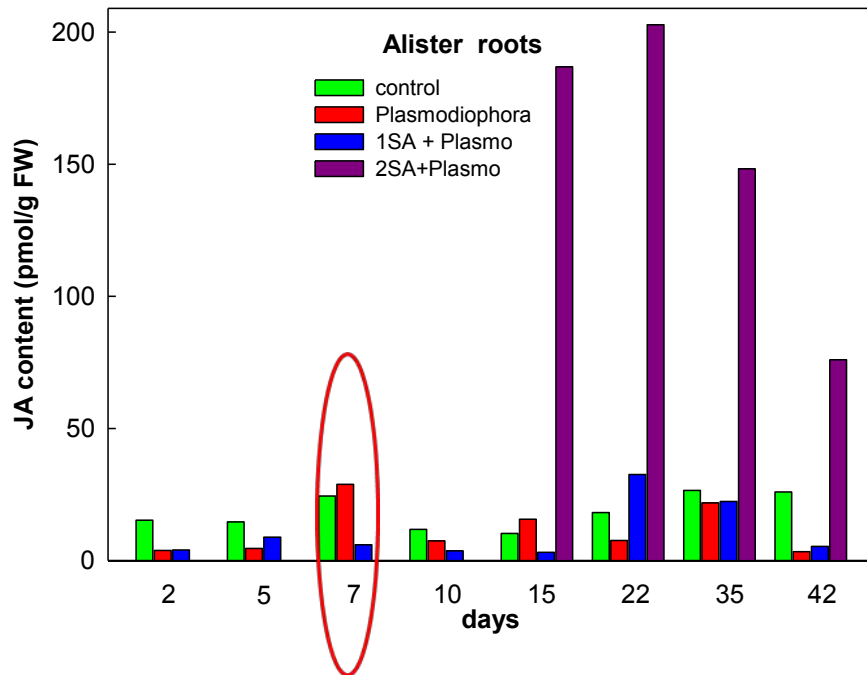


Plasmodiophora brassicae = biotroph



up-regulation of growth promoting hormones in order to induce **club** development

- auxin - **indole-3-acetic acid (IAA)** - high content early after inoculation, after 7 d, at the onset of club formation

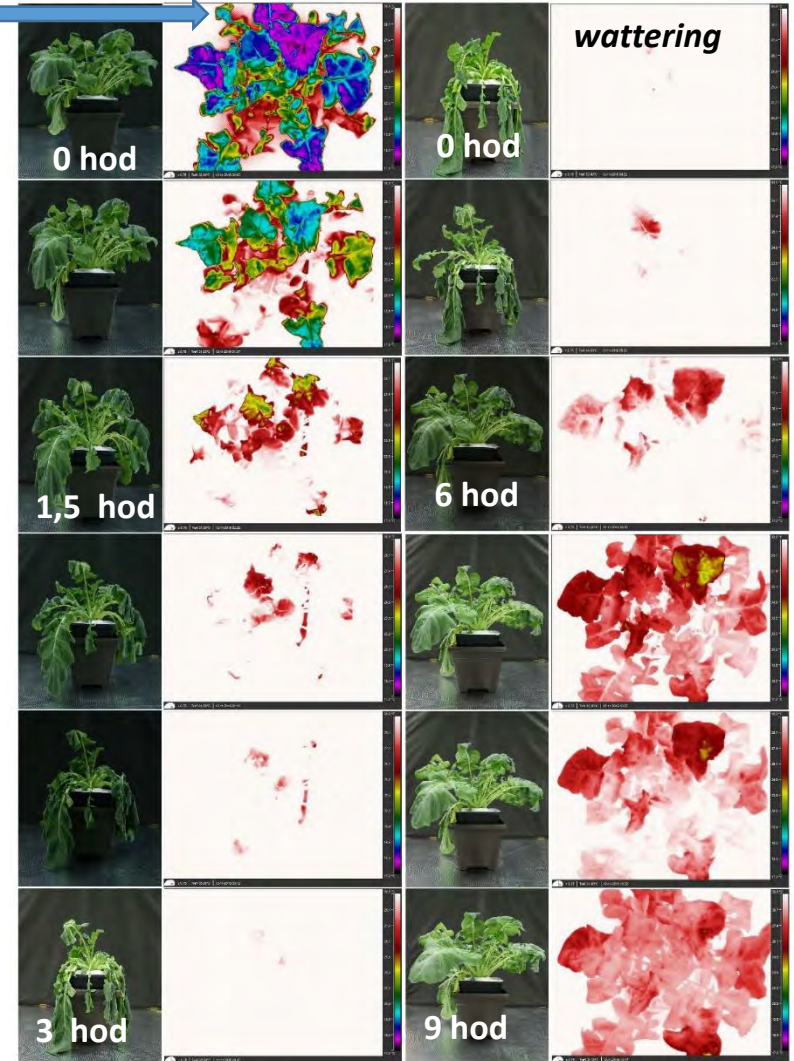
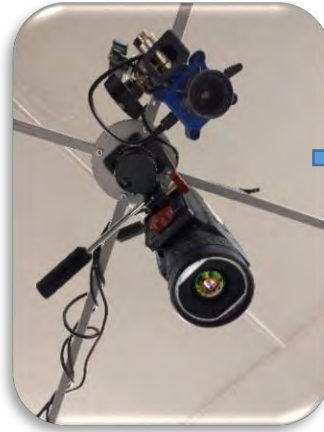


jasmonic acid (JA)

- suppressed after inoculation with biotroph, later on increase
- up-regulated at the beginning of club development in the sensitive cv. Hornet (pathogen effect?)

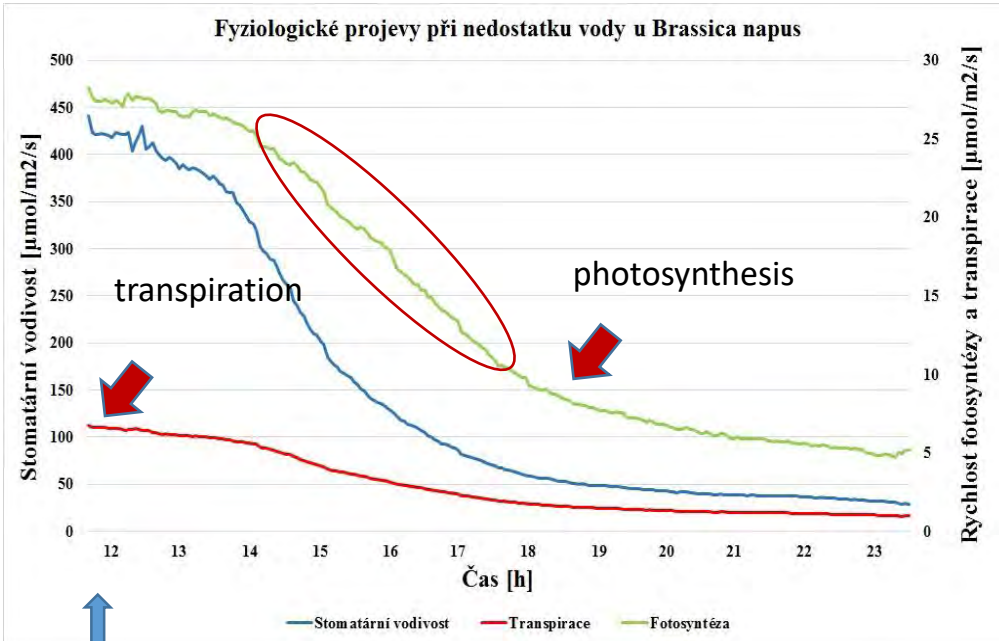
Pathogens influence on plant physiology

Water stress measurements



Plant temperature like indicator of water stress

Water deficit



Beginning of water stress manifestation after 12 h

Pathogens influence on plant physiology



Check

Plasmodiophora brassicae

Check

Plasmodiophora brassicae

Check

Plasmodiophora brassicae



The effect of pathogens infection and water stress on physiology of plants



| | | Transpiration | | | Photosynthesis | |
|-------------------------------|-----|------------------------|--|---|------------------------|-------|
| Variant | n | mmol/m ² /s | | n | μmol/m ² /s | |
| Plasmodiophora – water stress | 98 | 0,4 | | a | 98 | -0,26 |
| Check – water stress | 105 | 2,1 | | b | 105 | 6,61 |
| Plasmodiophora | 127 | 5,0 | | c | 127 | 16,99 |
| Check | 100 | 8,2 | | d | 100 | 17,14 |

Virus diseases of winter oilseed rape

**Turnip yellows
virus
(TuYV)
Former BWYV**

**Turnip mosaic virus
(TuMV)**

**Cauliflower mosaic
virus
(CaMV)**

Tymoviridae

Potyviridae

Caulimoviridae

Persistent transmission

Non-persistent transmission

Non-circulative
(semipersistent)

Isometric

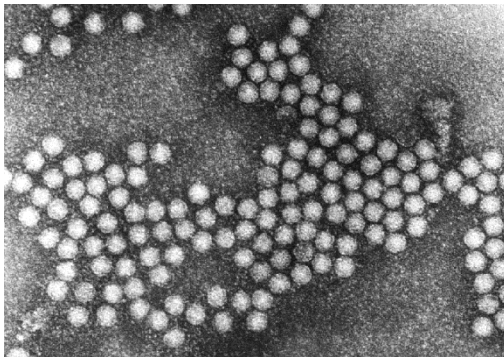
Fibrous

Isometric

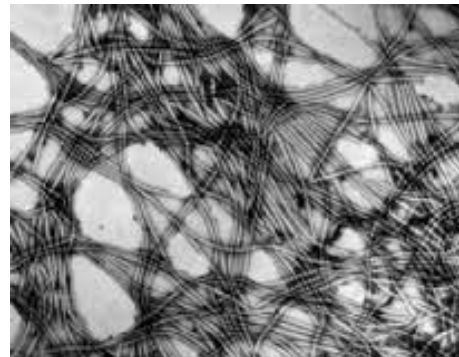
Green peach aphid (*Myzus persicae*), Cabbage aphid (*Brevicoryne brassicae*)

89 aphid sp. (mainly Green peach aphid, Cabbage aphid)

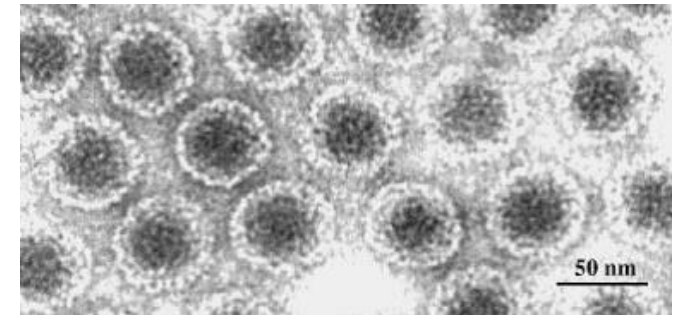
27 aphid sp. (mainly Green peach aphid, Cabbage aphid)



Stevens et al. (2008)



C. Clay, The University of Warwick



https://commons.wikimedia.org/wiki/File:Virions-Electron_micrograph_of_CaMV_virions.png

Main vector - Green peach aphid (*Myzus persicae*)



Ban of neonicotinoids





Traps for monitoring

Obr. 2 - Rozmístění sacích pastí v ČR



Traps measurement in autumn 2016

| | Název | Eppo kód | Čáslav | Chrlice | Lípa | Věrovany | Žatec |
|---------------|-------------------------------------------------------|--------------------|-----------|-----------|----------|----------|---------|
| 12.9.-18.9. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE | 893 | 161 | 62 | 282 | 567 |
| 19.9.-25.9. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE | 874 | 655 | 56 | 475 | 1616 |
| 26.9.-2.10. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE ♂ | 1310 3 | 1854 1 | 544 2 | 936 | 1028 |
| 3.10.-9.10. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE ♂ | 155 2 | 273 | 40 | 144 1 | 21 |
| 10.10.-16.10. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE ♂ | 1089 2 | 9250 2 | 573 | 727 2 | 142 |
| 17.10.-23.10. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE ♂ | 369 1 | 195 | 15 | 83 2 | 73 2 |
| 24.10.-30.10. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE ♂ | 222 2 | 905 2 | 19 | 461 6 | 31 |
| 31.10.- 6.11. | Myzus persicae (<i>mšice broskvoňová</i>) | MYZUPE ♂ | 35 1 | 28 4 | 8 | 33 | 0 |



19.11.2016



Autumn 2016

2014

43. týden (19.10. - 25.10.2014)

| | | | | | | | |
|----------------------------------------------|------------|--------------------|---------|---------|--------|---------|---------|
| Myzus persicae (mšice broskvoňová) | 107 | MYZPER ♂ | 25 0 | 25 0 | 4 0 | 39 0 | 12 0 |
|----------------------------------------------|------------|--------------------|---------|---------|--------|---------|---------|

42. týden (12.10. - 18.10.2014)

| | | | | | | | |
|----------------------------------------------|-----------|--------------------|--------|---------|--------|---------|--------|
| Myzus persicae (mšice broskvoňová) | 70 | MYZPER ♂ | 3 0 | 18 0 | 2 0 | 46 0 | 1 0 |
|----------------------------------------------|-----------|--------------------|--------|---------|--------|---------|--------|

2009

| Month | September | September | September | September | October | October | October | October |
|-----------------------|-----------|-----------|-----------|-----------|---------|---------|---------|---------|
| Week | 36. | 37. | 38. | 39. | 40. | 41. | 42. | 43. |
| <i>Myzus persicae</i> | 6 | 27 | 153 | 396 | 407 | 791 | 24 | 55 |

Symptomes TuYV



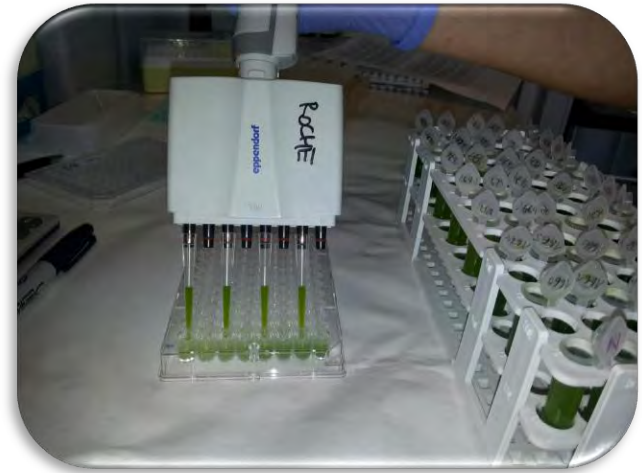
Symptomes TuMV



Diagnosics

Methods

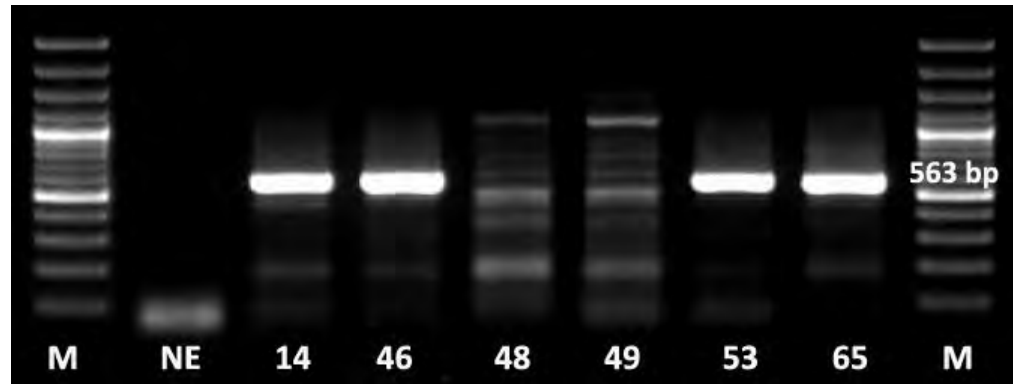
- Serological: **DAS/TAS-ELISA** (antibodies LOEWE a firmy DSMZ)
- Molecular: RT-PCR (specific primers MpxBW+/MpxBW-)



Elisa test



PCR test



Results

Autumn 2016

Tested 68 localities out of the Czech Republic

| Virus | No. Samples | Positive | Negative |
|-------|-------------|--------------|----------|
| TuYV | 834 | 781 (93.7 %) | 53 |
| TuMV | 613 | 1 (0.2 %) | 612 |

Spring 2017

Tested 27 localities out of the Czech Republic

| Virus | No. Samples | Positive | Negative |
|--------------------|-------------|---------------|-----------|
| TuYV | 1460 | 1454 (99.6 %) | 6 (0.4 %) |
| TuMV | 6 | 0 (0 %) | 6 |
| Resistant cultivar | 70 | 64 (91.4 %) | 6 (8.6 %) |



Symptomes TuYV
Autumn 2016

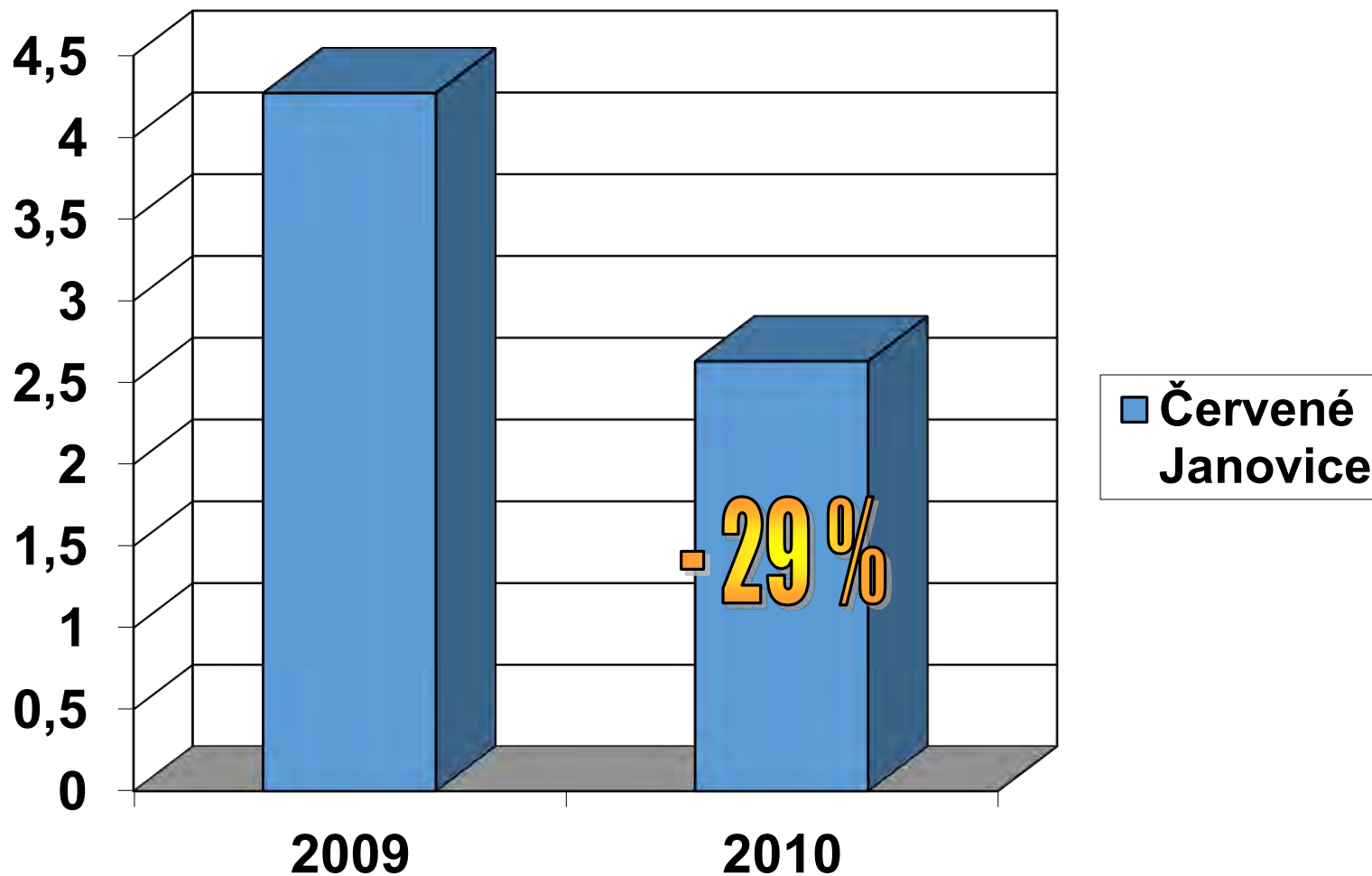


Symptomes TuYV Spring 2017





Decrease in yield on locality Červené Janovice 2010



Thank you for your attention!

Thanks for help:

J. Kazda, Petr Baranyk, Stephen Strelkov, Malgorzata Jedryczka, RNDr. Radka Vaňková, Václav Brant, Petr Záborský, Vojtěch Hlavjenka, Eva Zusková, Lenka Grimová, great people from University of Alberta lab

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