Observations and Studies on Sunflower Rust and Virus Diseases in Nebraska.

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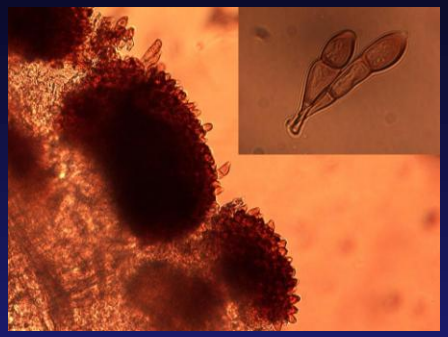
Rust in Nebraska

- Sunflower rust, caused by the obligate fungal pathogen *Puccinia helianthi*
- Rust is present to some extent each year in Nebraska - both cultivated and wild sunflowers
- In commercial production it has often occurred late enough in the season that yields are not affected and treatment is not considered to be necessary
  - However, it can still cause significant losses on susceptible hybrids under conducive conditions

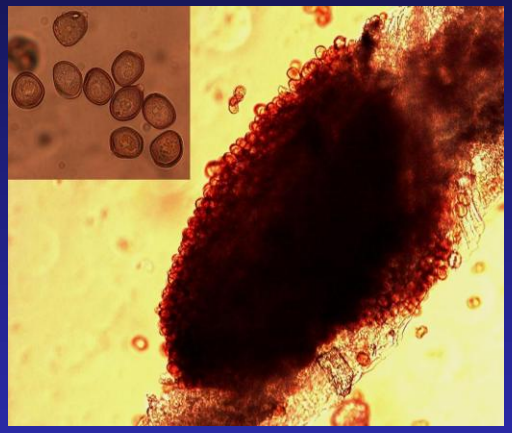
Pathogen Life Cycle

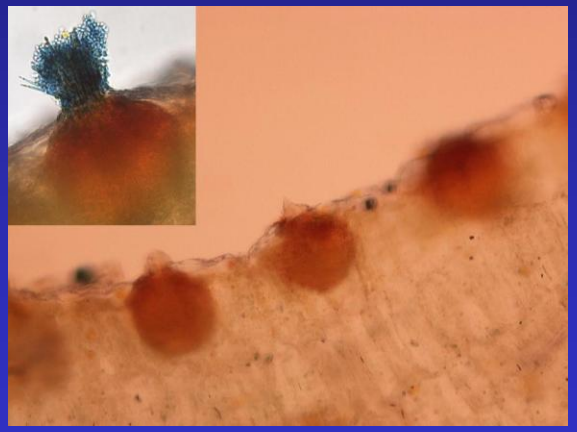
Uredia change to telia with cooler temperatures



Overwinters as teliospores

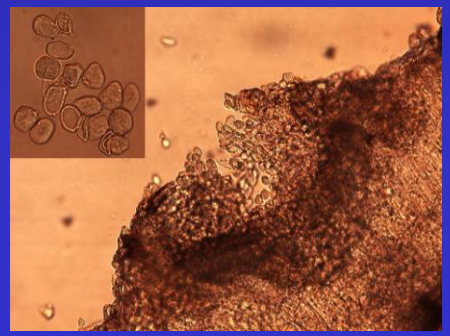
Basidiospores infect sunflowers and form pycnia





Early Spore Stages

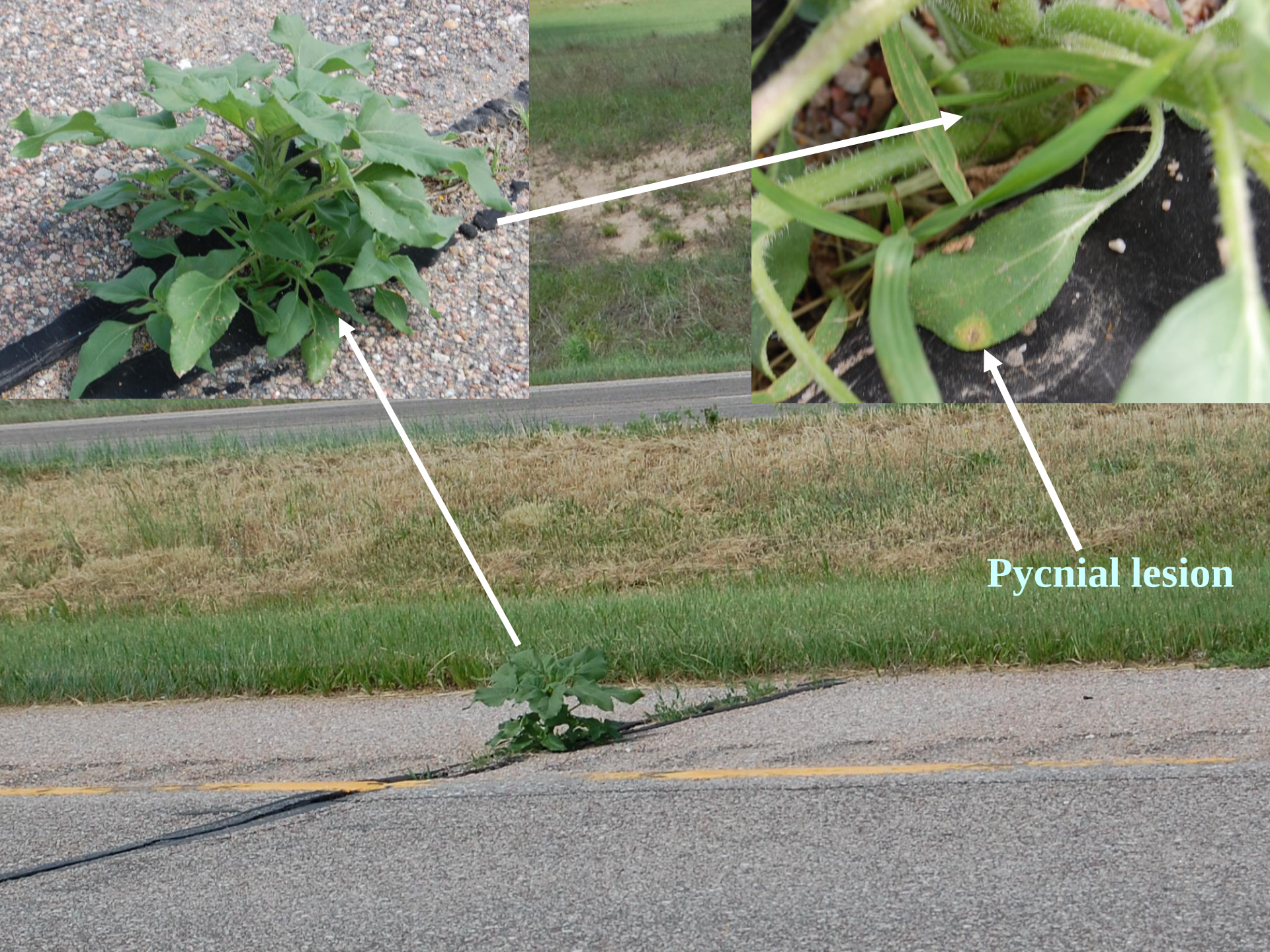
Aeciospores re-infect sunflowers creating new uredia

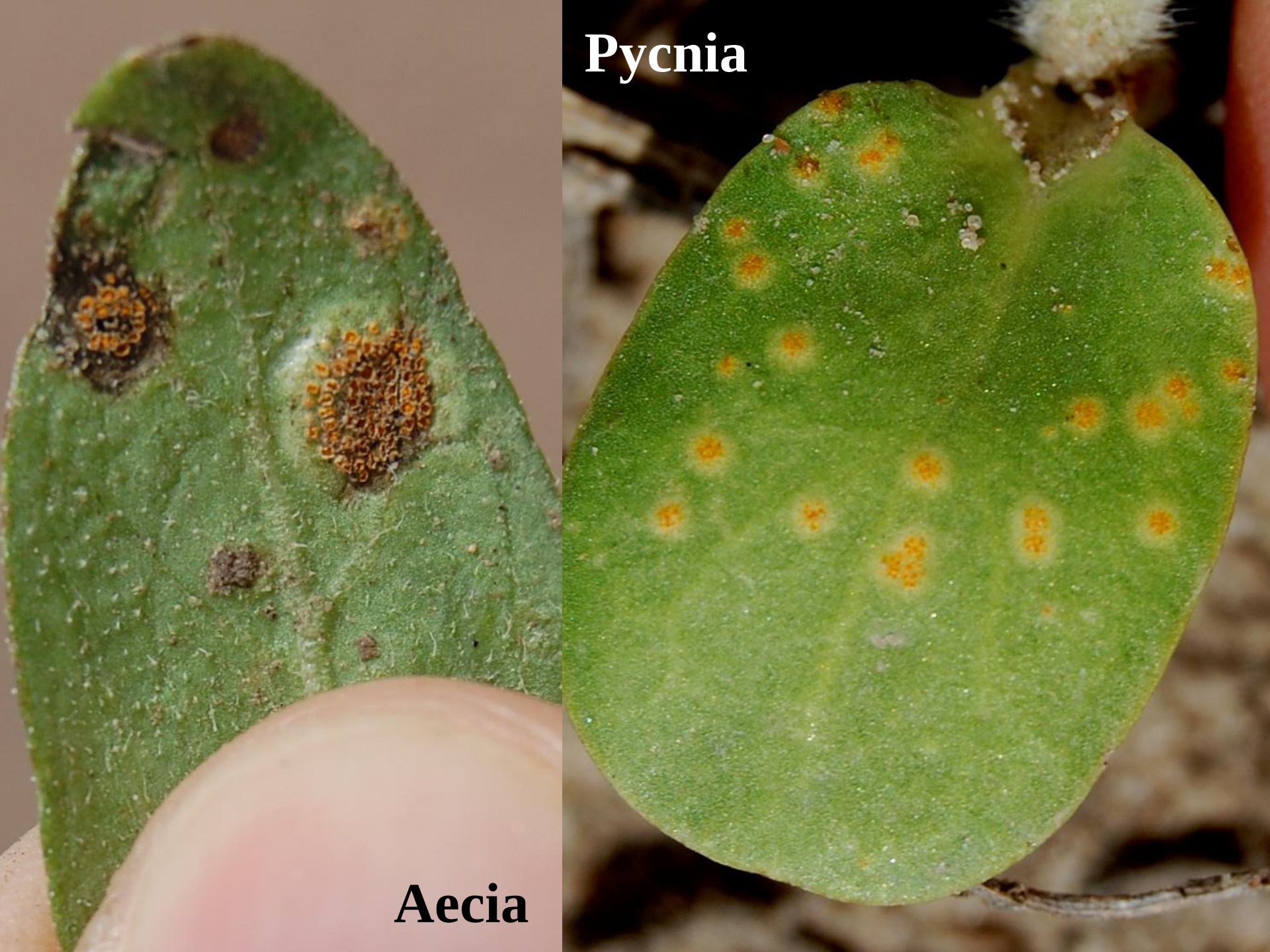


Aecia develop from the pycnia

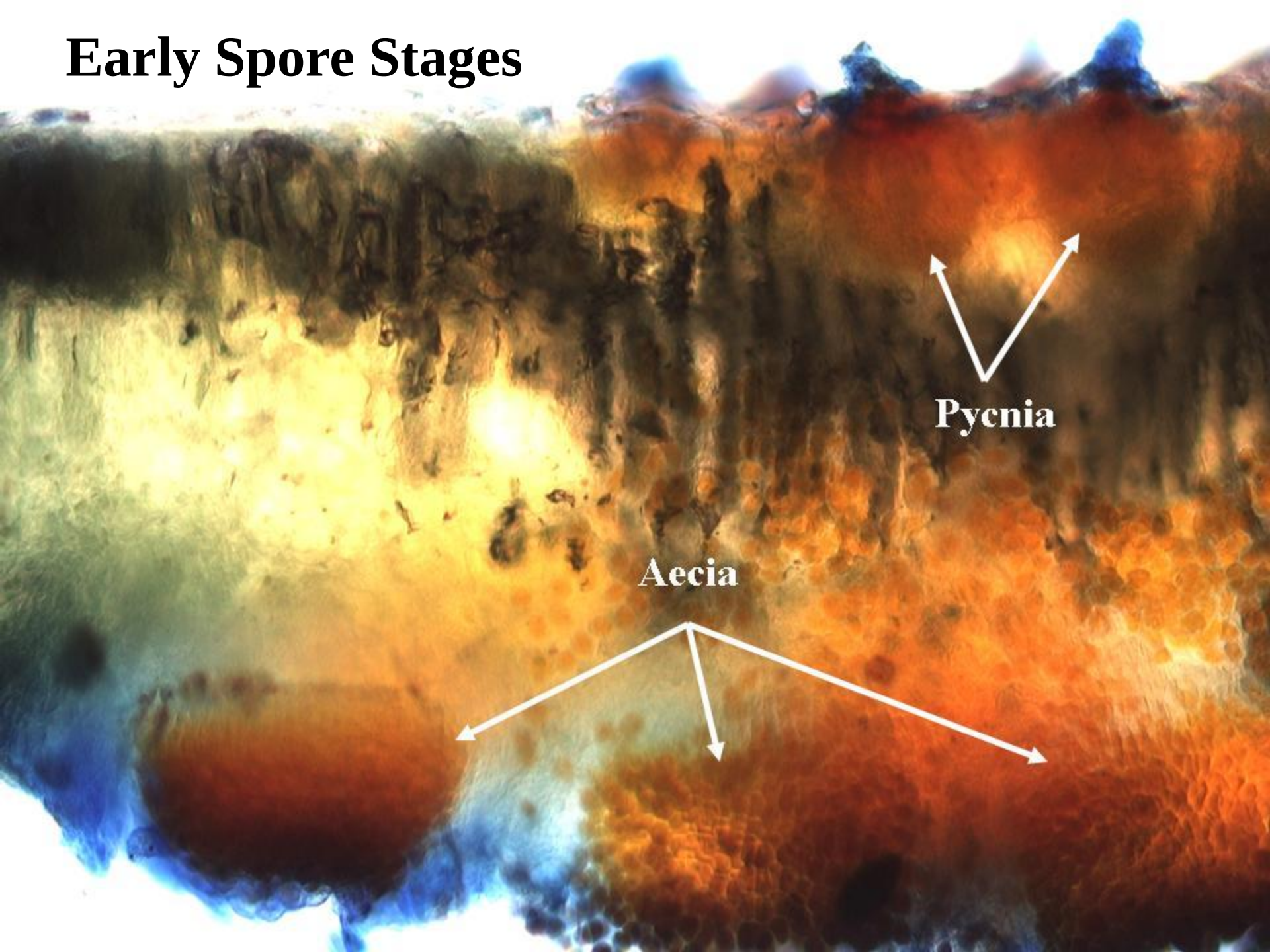
Rust Survey in 2010

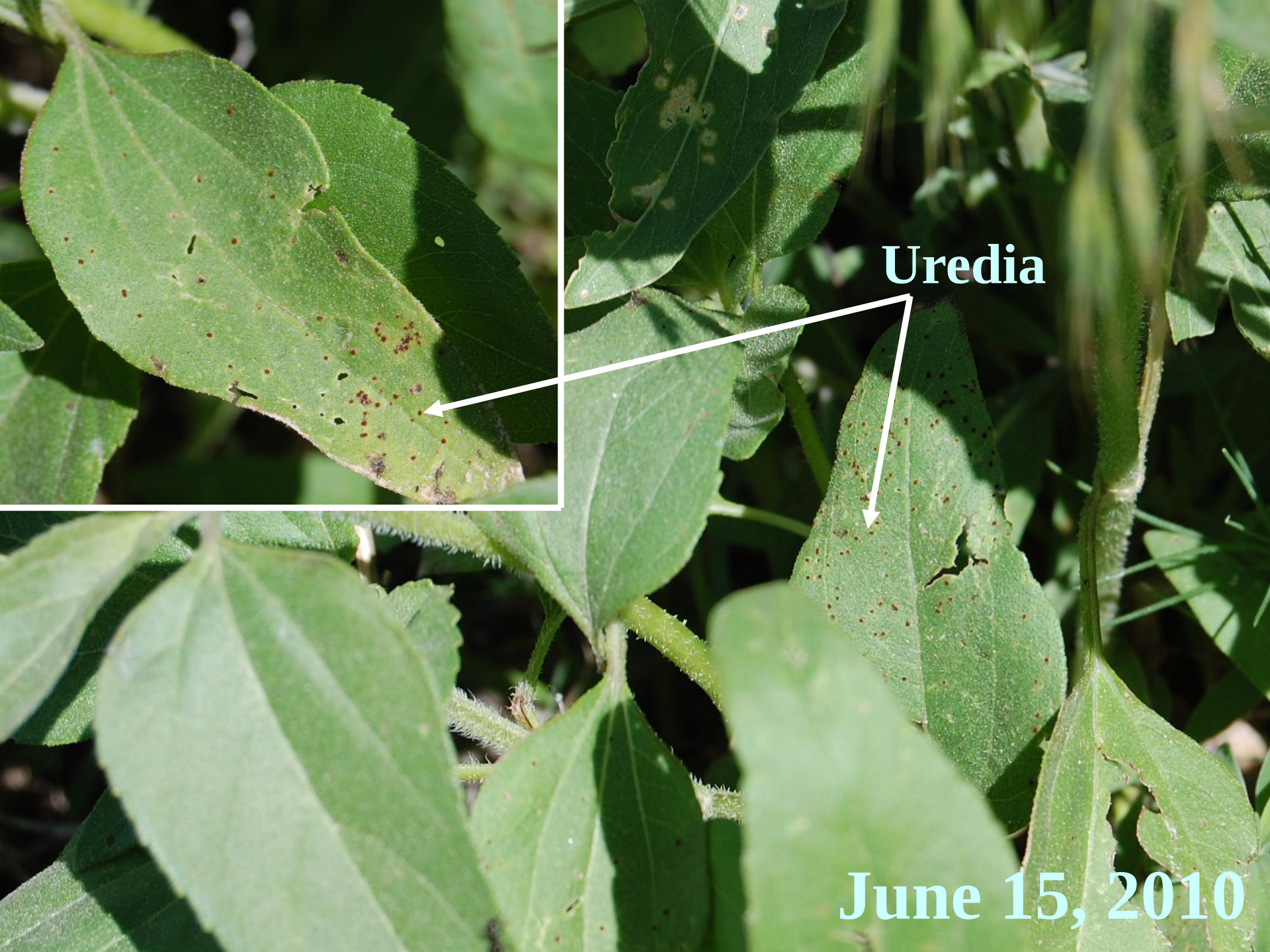
- Temperatures between March-August were similar to those from 2009 - 5°F cooler with 11.5 inches rainfall (75% of yearly total)
- First pycnia and aecia observed in late May
- A survey of western Nebraska conducted over the next four weeks – on volunteers from 2009 production fields and wilds in ditch banks and field perimeters (>40 fields/locations)
- Early spore stages found in 26 (65%) of surveyed sites


Pycnial lesion


Pycnia
Aecia

Early Spore Stages




Uredia
June 15, 2010

Fungicide Evaluations - Methods

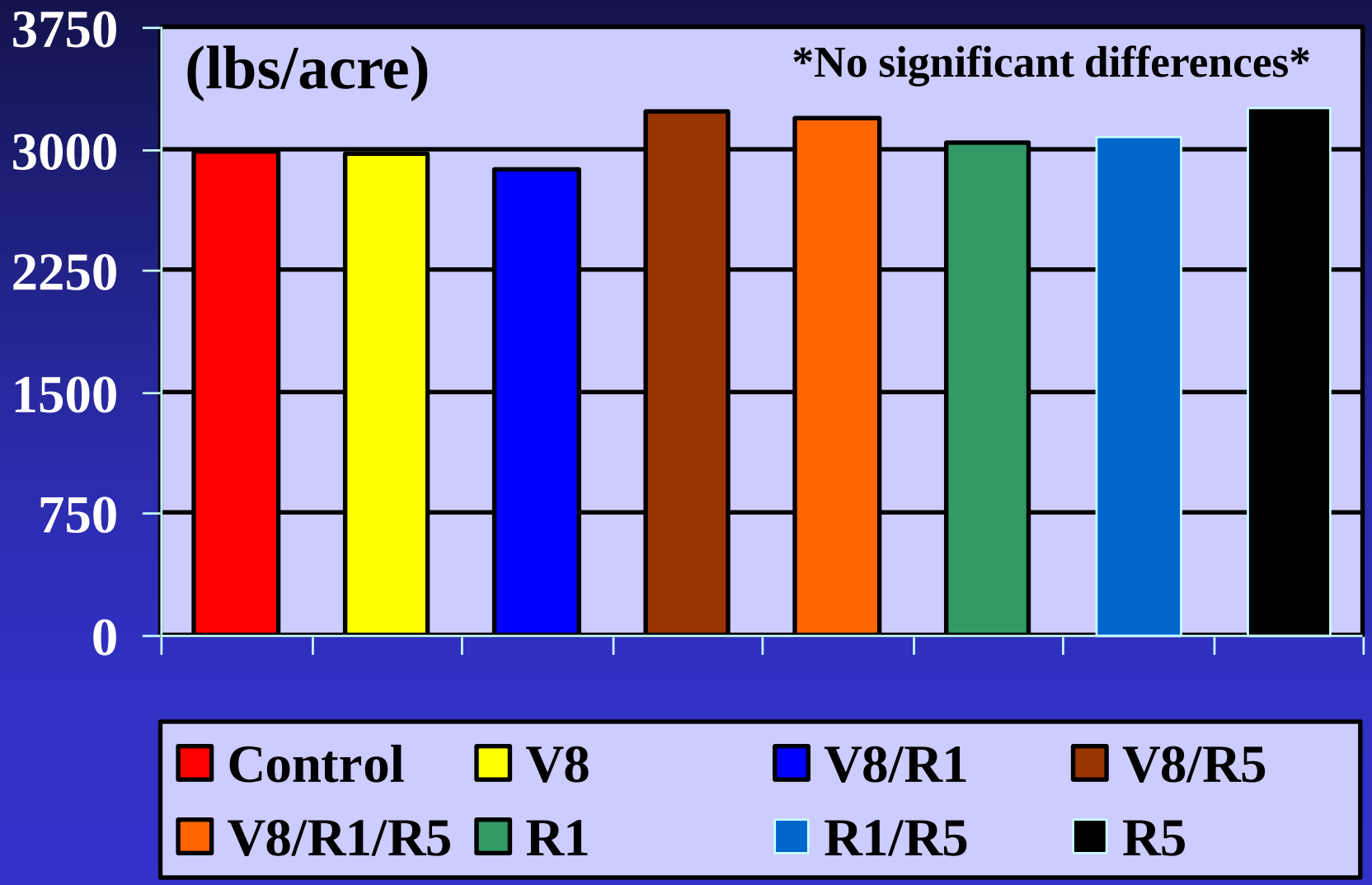
- Fungicide application timings of Headline utilizing 8 treatments:

1 – Control
2 – V8
3 – V8 and R1
4 – V8 and and R5
5 – V8, R1, and R5
6 – R1
7 – R1 and R5
8 – R5

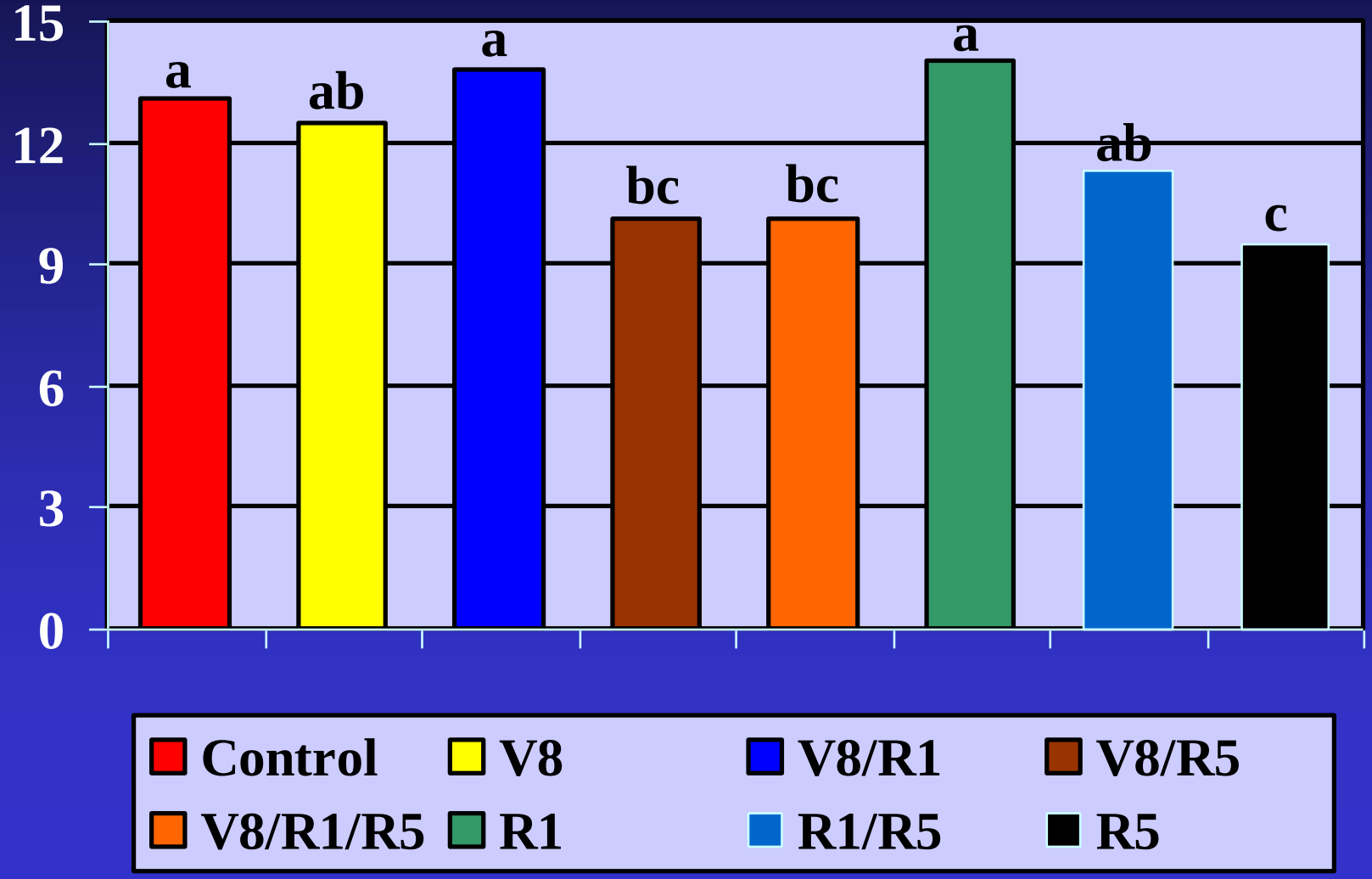
Methodology

- Planted - 6/21
- Plots - four 30 inch rows, 30 ft long under sprinkler irrigation
- Plots inoculated - 7/12
- Sprays made at V8-10 (7/19), R1 (7/26), and R5-6 (8/13) growth stages
- Ratings made 8/30, 9/10, and 9/24 on upper two leaves from each of ten plants per plot
- Harvested – 10/25
- One last rating made 11/17 after harvest

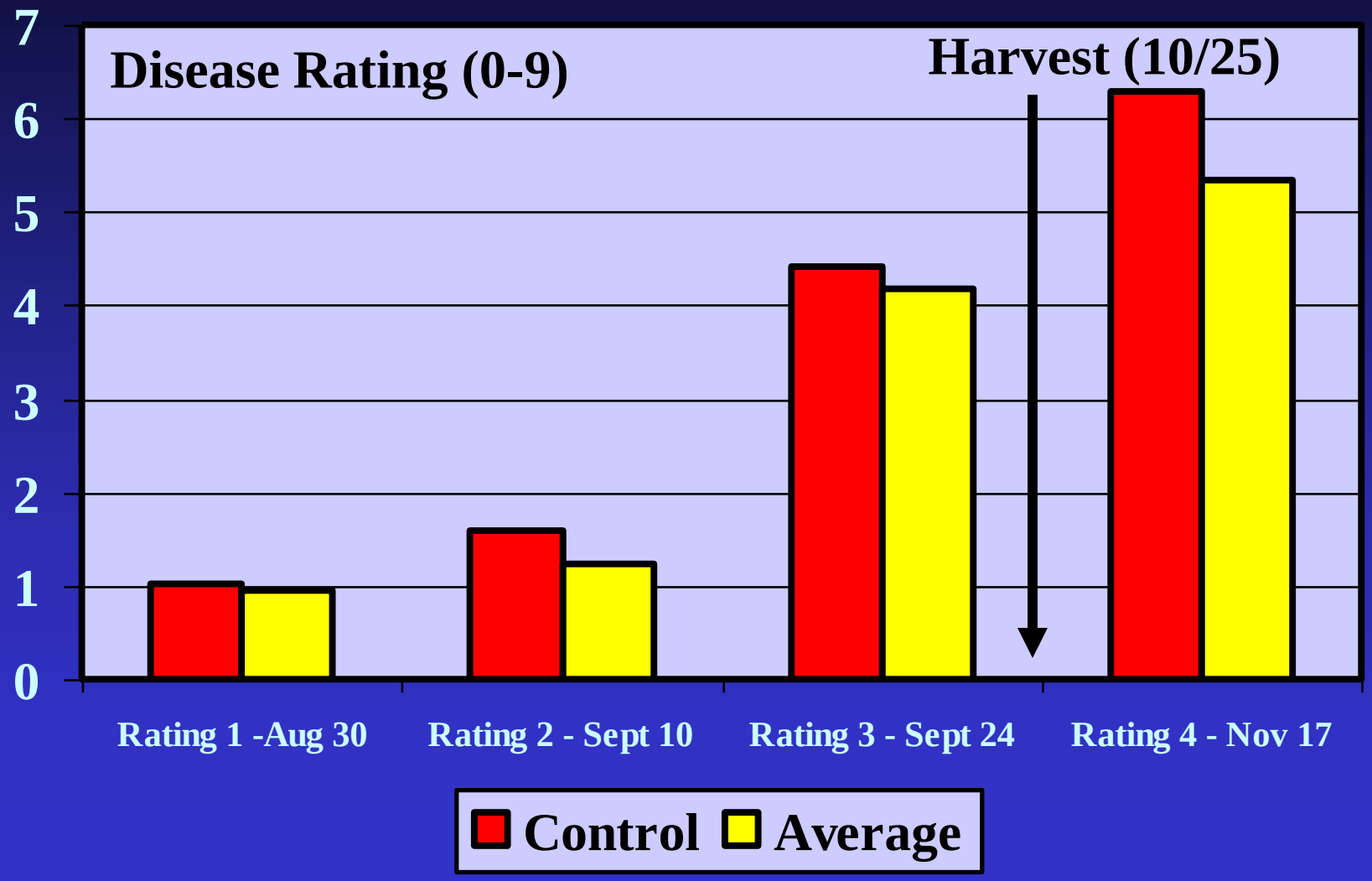
Sunflower Rust Fungicide Timing Evaluations – Yield (2010)



Sunflower Rust Fungicide Timing Evaluations – Cumulative Disease Ratings (2010)



Disease Progress in 2010

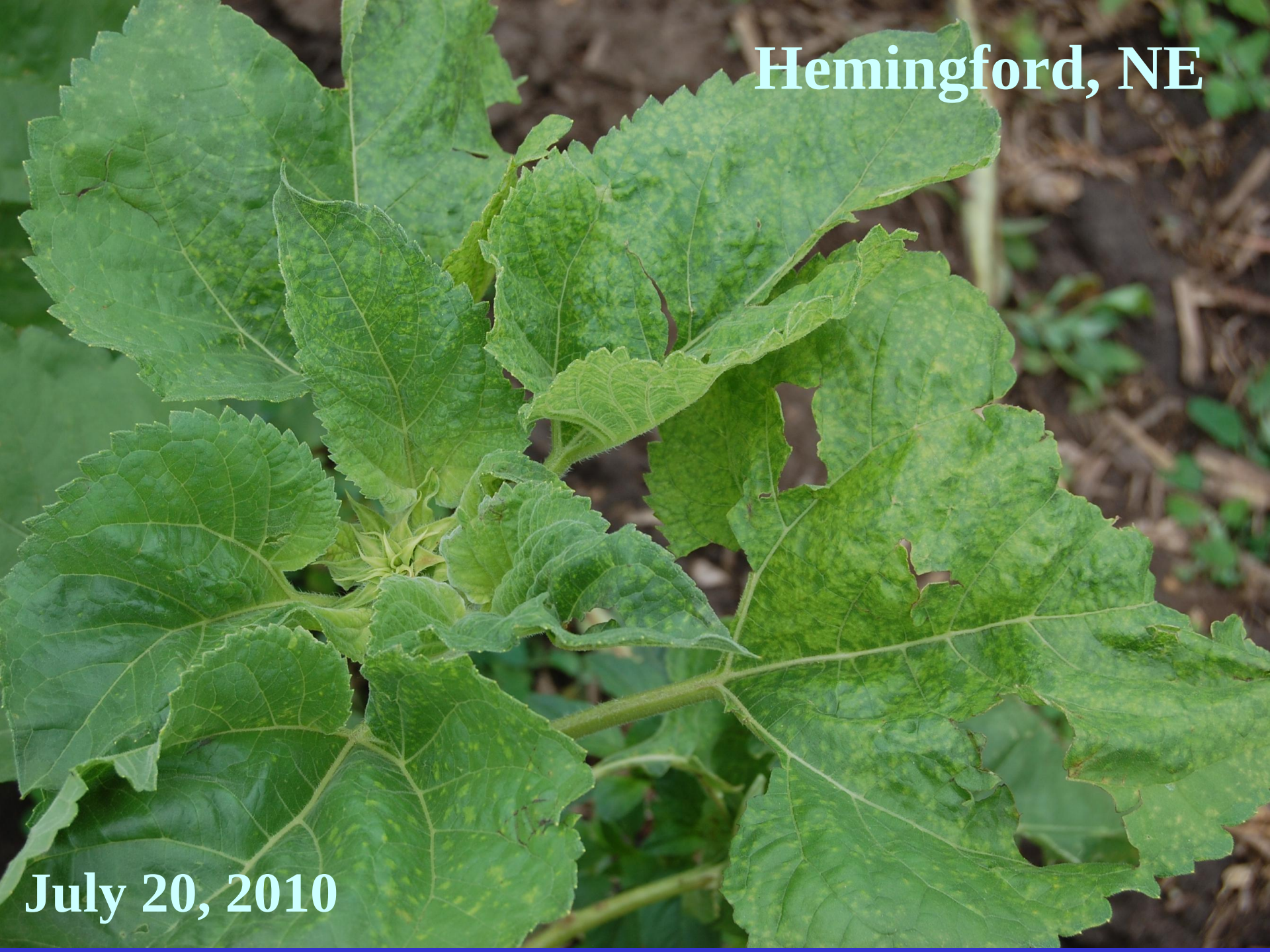


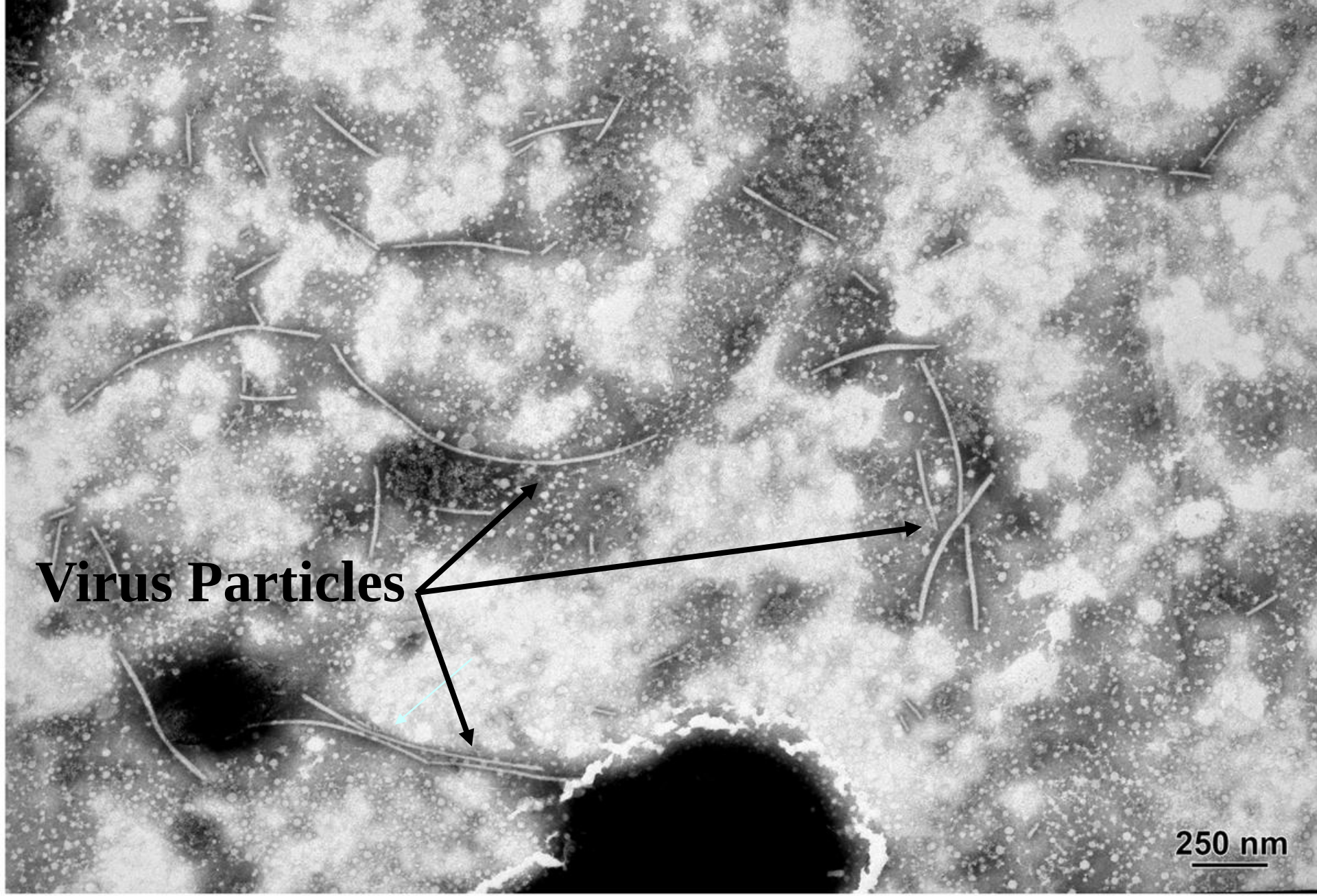
Rust Summary

- Despite the moisture and presence of early spore stages, rust severity in plots did not develop as expected
- Disease continued to develop and spread after harvest – fungicide treatments were still protecting plants – also reducing pathogen inoculum for future crops
- Most effective fungicide applications were those applied at the R5 growth stage
- Yield unaffected by disease – no significant increases or decreases were observed from treatments

Virus/Unknown Diseases?

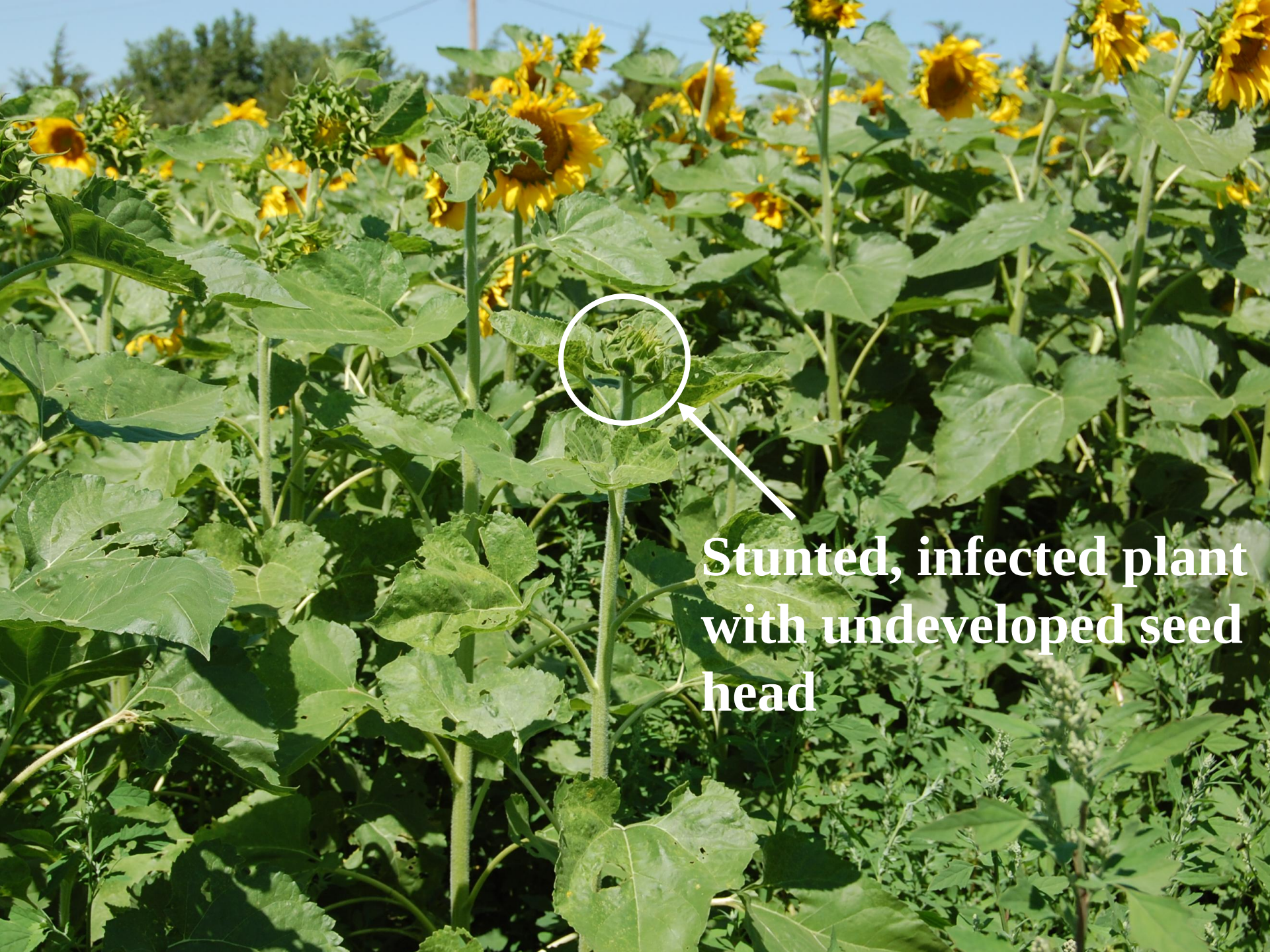

August 30, 2010


Hemingford, NE
July 20, 2010



18134 T. GULYA 58,700x
102832 NEB INFECTED SUNFLOWER 8/24/2010


August 12. 2010


Stunted, infected plant with undeveloped seed head


09/24/10


10/17/10


12/21/10


12/21/10

Unknown Virus Summary

- Symptoms first observed in July 2010 and flexuous rod-like particles found in EM leaf dips
- Field symptoms faded substantially over time
- Mechanical transmission of disease occurred on the third attempt
- Symptom development occurred 12-15 days after inoculation, and began as small chlorotic spots
- After several weeks, ring spots additionally appeared in some inoculated plants
- Transmission and pathogenicity confirmed and repeated three times

Thank You - Questions?