

**A Summary of a Three Year
Disease Survey of Nebraska
Sunflower Production Fields,
Including the Appearance of an
Unknown Virus Disease**

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Objectives

- Conduct a comprehensive disease survey of Nebraska production fields, including all growing regions of the state (primarily western half – Panhandle)
- Surveying at least twice during the season to correspond with crop growth stages
- Identify diseases and establish their relationships with crop growth stage and distribution in both irrigated and dry-land fields.

Methodology

- Consisted of >90 fields
 - 60 irrigated/30 dry-land
 - Each was surveyed at least once
 - 80 were surveyed twice
- Spent approximately 30-45 minutes per field, per visit

Summary of Results – Percentage of Surveyed Commercial Fields Affected

- Rust – 88%
- Downy Mildew – 56%
- Verticillium – 54%
- Bacterial LS – 70%
- Apical chlorosis – 12%
- Stalk rots – 56%
 - Phoma, Phomopsis, Erwinia
- WM/Sclerot. HR – 9%
- Stem rot – 6%
- Heat canker/soil problem – 17%
- Rhizopus HR - 13%
- Unknown viruses ? – 10%
- Unknown – 29%

Sunflower Rust



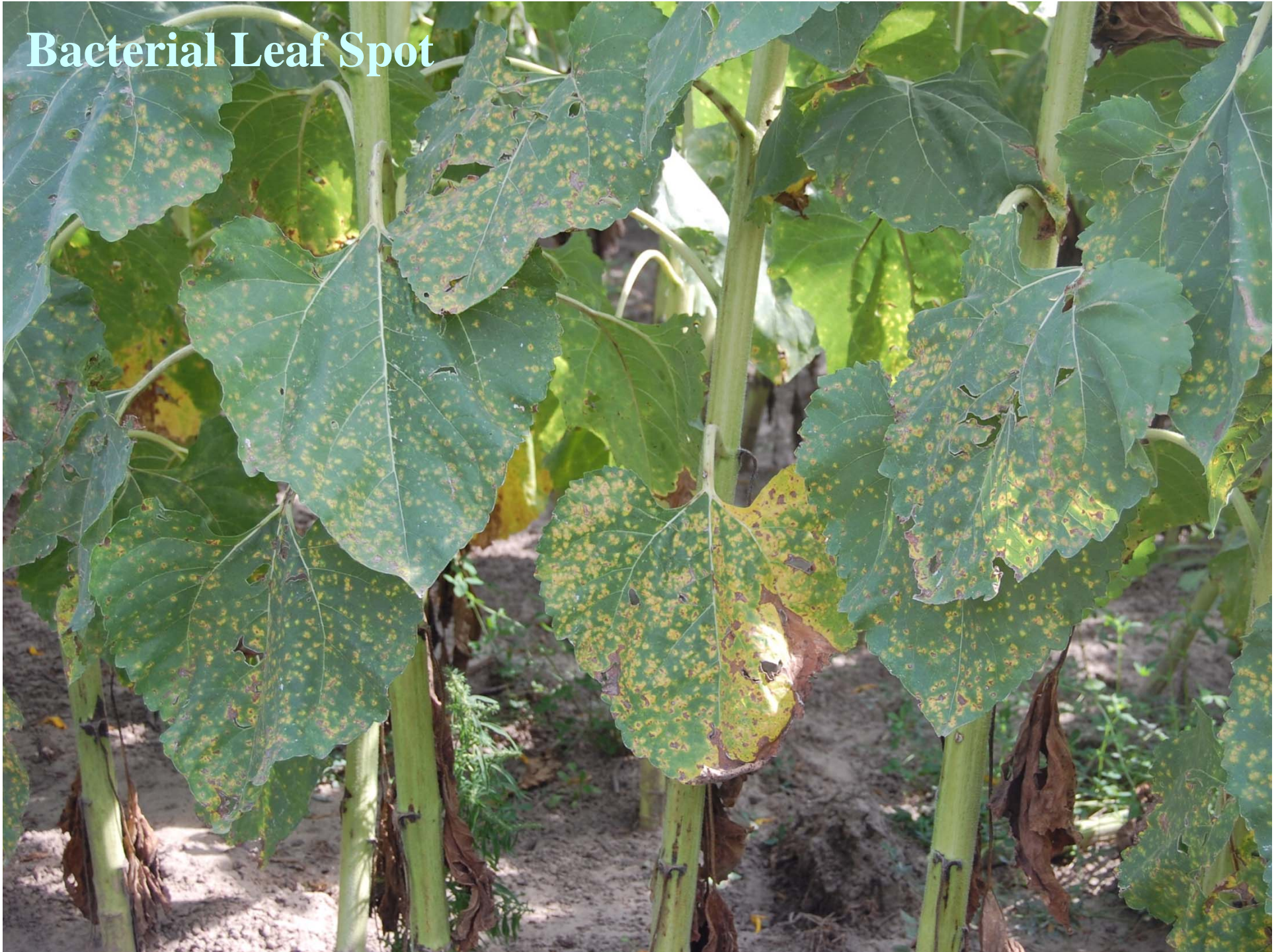


Bacterial Leafspot



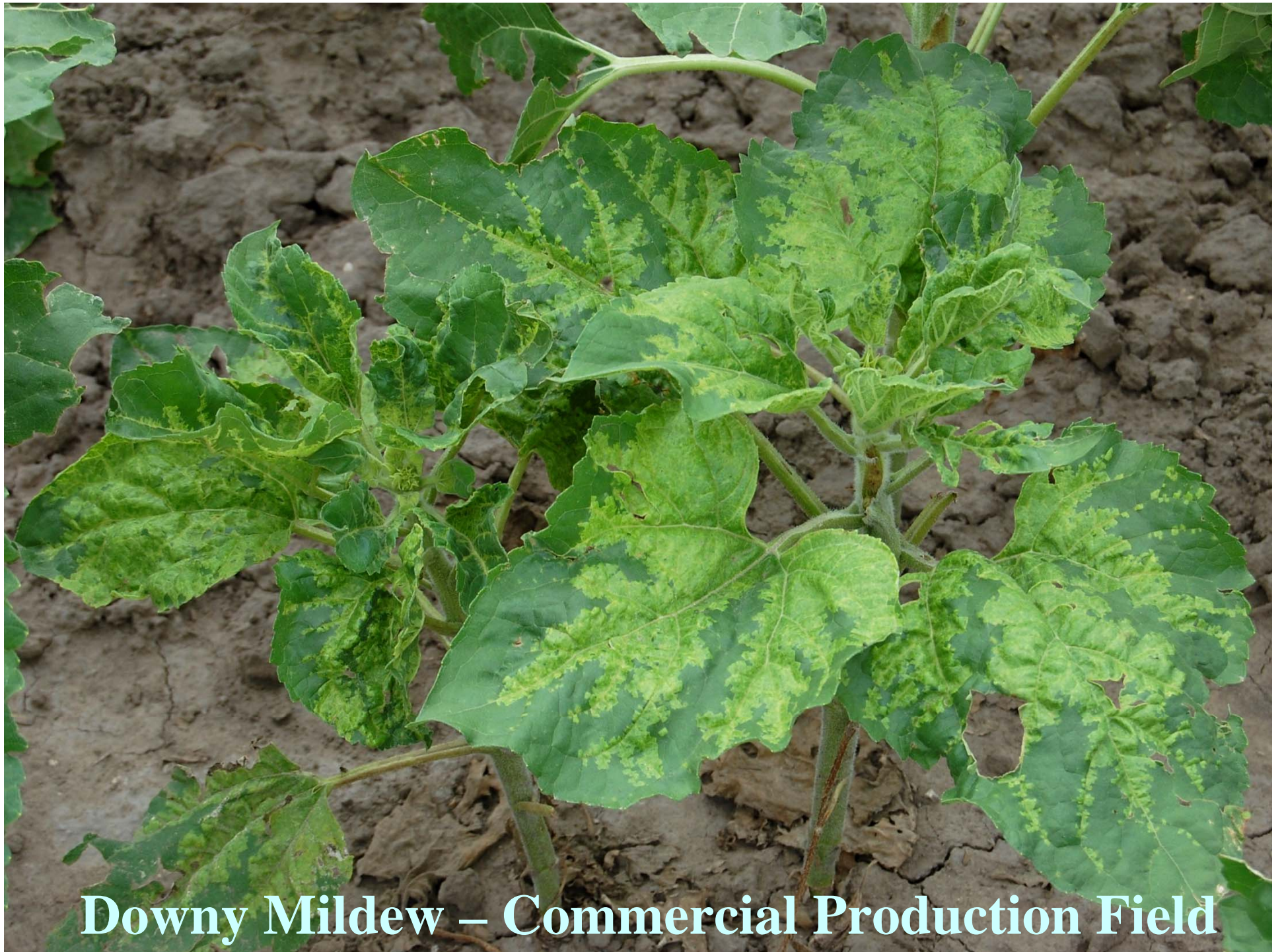
Bacterial Leaf Spot

Bacterial Leaf Spot





Downy Mildew - Wilds

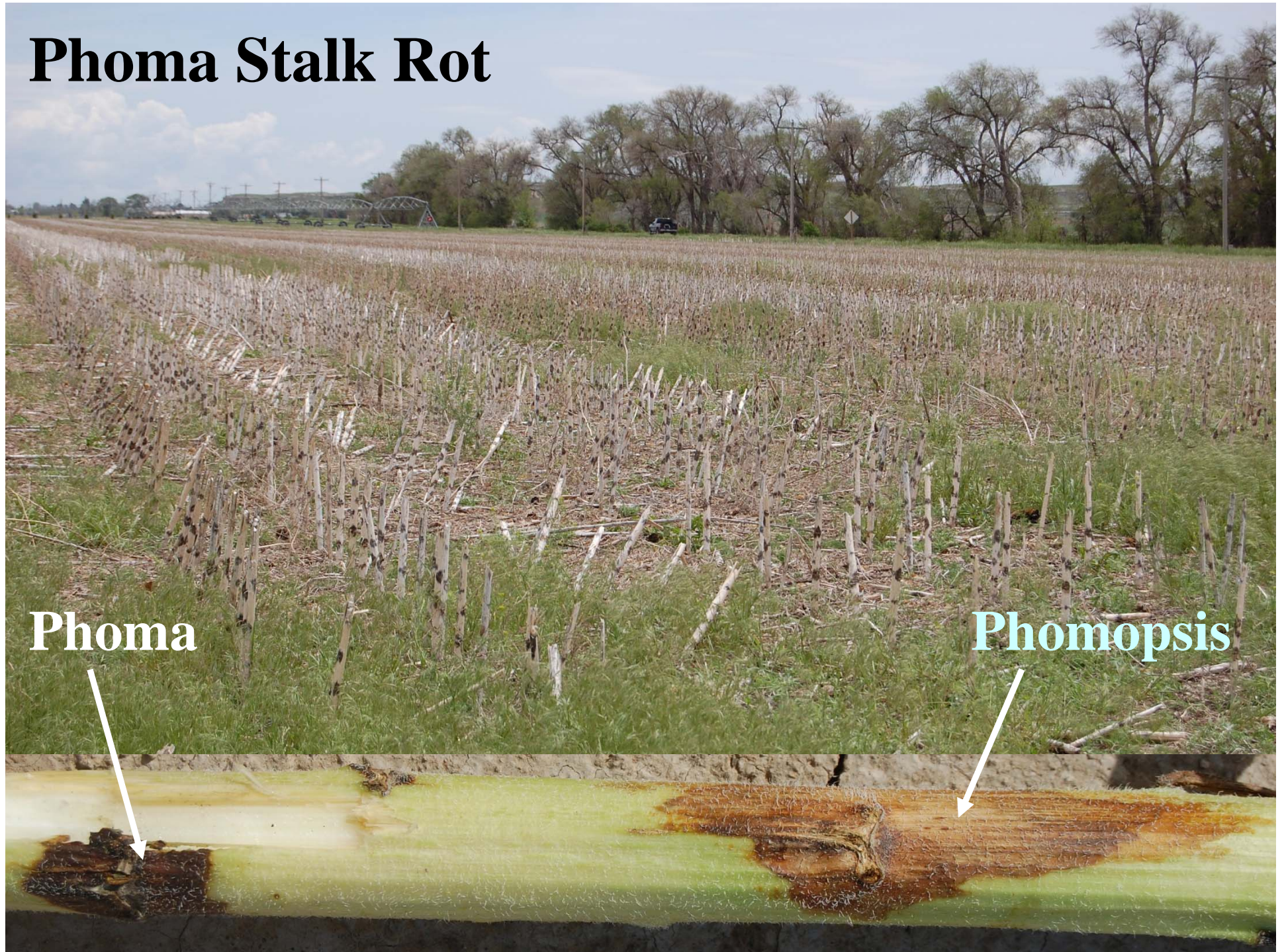


Downy Mildew – Commercial Production Field

Apical Chlorosis



Phoma Stalk Rot



Phoma

Phomopsis



Stem Rot



Results and Conclusions

- Rust – most widespread and common disease (88%) of surveyed fields
- Stalk rots – found in 56% of fields
- Other high incidence diseases – DM (56%) BLS (70%), and Verticillium (54%)
- Stem rot and AC found in all 3 years
- Unknown Virus found in 2010 and 2011 from both research and commercial fields

New Virus Disease Summary

- Plants with virus-like symptoms were observed in 2010 and 2011 consisting of stunting, leaf distortion, ringspots, and mosaic or mottle-type symptoms
- Symptoms were first observed each year in early to mid-July from both commercial fields and volunteers from 2010 in research plots
- Field symptoms faded rapidly, particularly from the research field in 2011
- Late in the 2011 season, leaf symptoms on field-infected plants exhibited bright yellow ringspots on upper leaves



Hemingford, NE

July 20, 2010

August 12 2010





**Stunted, infected plant
with undeveloped seed
head**

**Volunteers - Panhandle REC
research field – July 1, 2011**



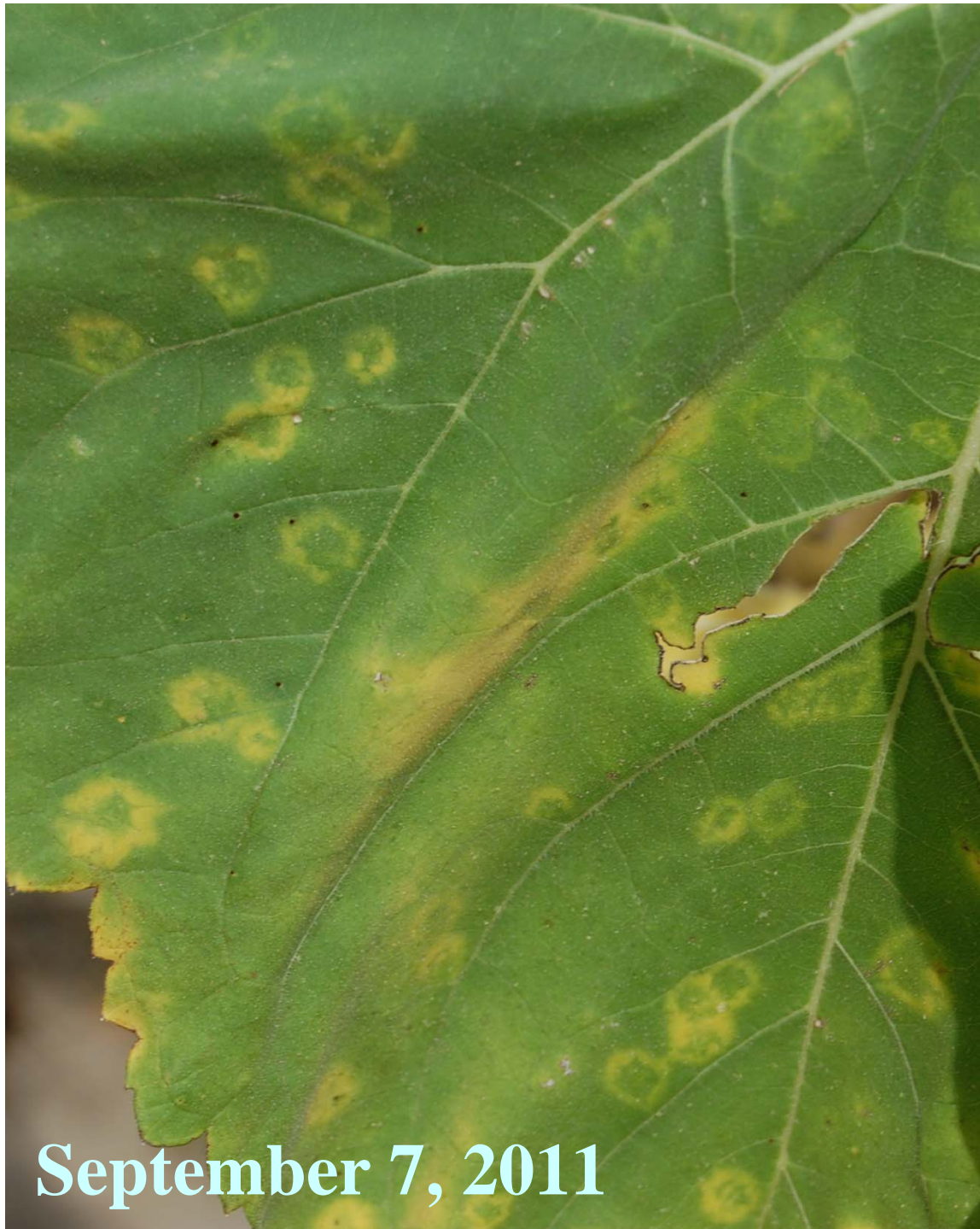
July 14, 2011

Alliance, NE



July 27, 2011





September 7, 2011



Greenhouse Inoculations

- Mechanical transmission was successfully performed multiple times from infected field plants to seedlings in the greenhouse in both years
- New symptoms on inoculated seedlings appeared 10-15 days after inoculation, and began as small chlorotic spots followed by ring spots in some inoculated plants
- Greenhouse symptoms tended to fade over time like those of the field symptoms

09/24/10



10/17/10



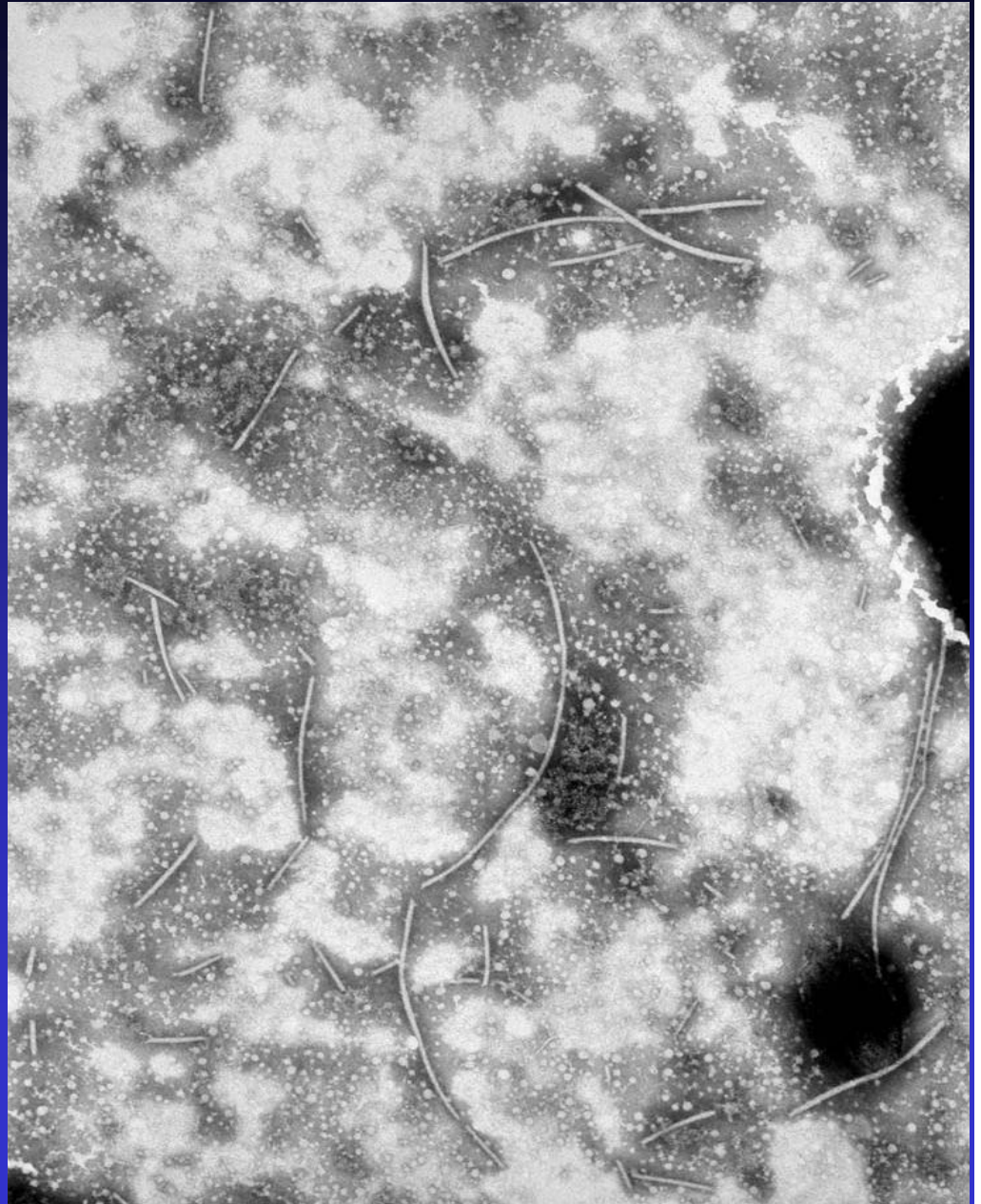
12/21/10





Additional Diagnostic Efforts

- Flexuous rod particles observed in EM from initial samples collected from 2010 field but negative for SuMV with serological methods
- Inoculated samples from 2011 field also tested negative for SuCMoV by collaborators in Argentina (S. Lenardon)



Yield Reduction Potential - 2011



Yield Data Estimates

	<u>Infected Plants</u>	<u>Non- Infected Plants</u>
Head Wt (Dry)	60 g	646 g
Seed Wt (100 seed)	6.6 g	16.1 g
Ave Seed Wt (wt per head)	18 g	158 g

Future Studies?

- Will continue to work with collaborators to identify the pathogen (pathogens?)
- Harvested heads from 2011 plots on Panhandle REC land – plant and grow out to observe whether pathogen is seedborne
- Will monitor volunteers in the same location for presence of insects and early symptoms after emergence
- Will be more aggressive on mechanical transmission of suspected samples

Greetings from Nebraska – Questions?



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Thank you! Questions?

