An Unknown Virus Disease in Nebraska?

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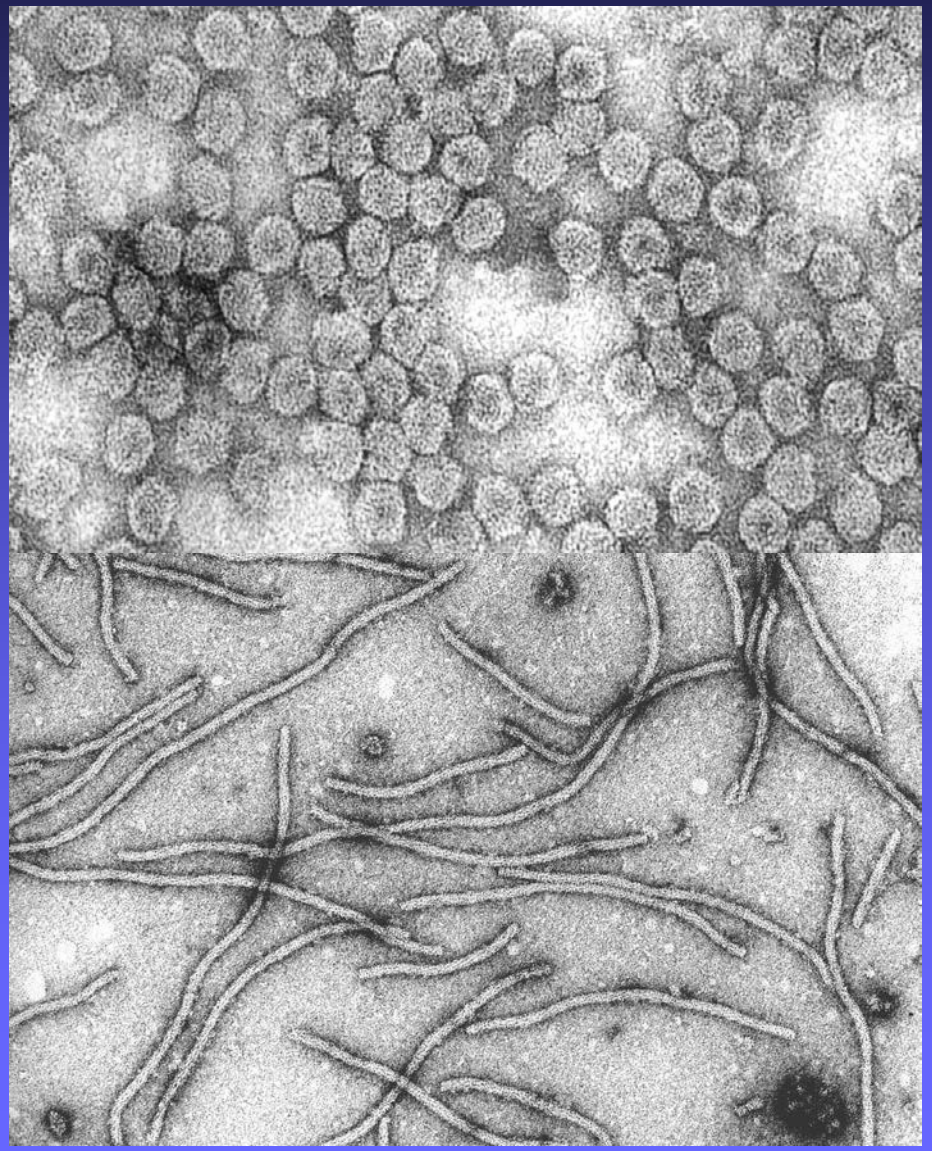
Viruses - Characteristics

- Simple biochemical molecules - consist of nucleic acid (RNA or DNA) and protein coat
- Are not visible with compound microscope because of small size



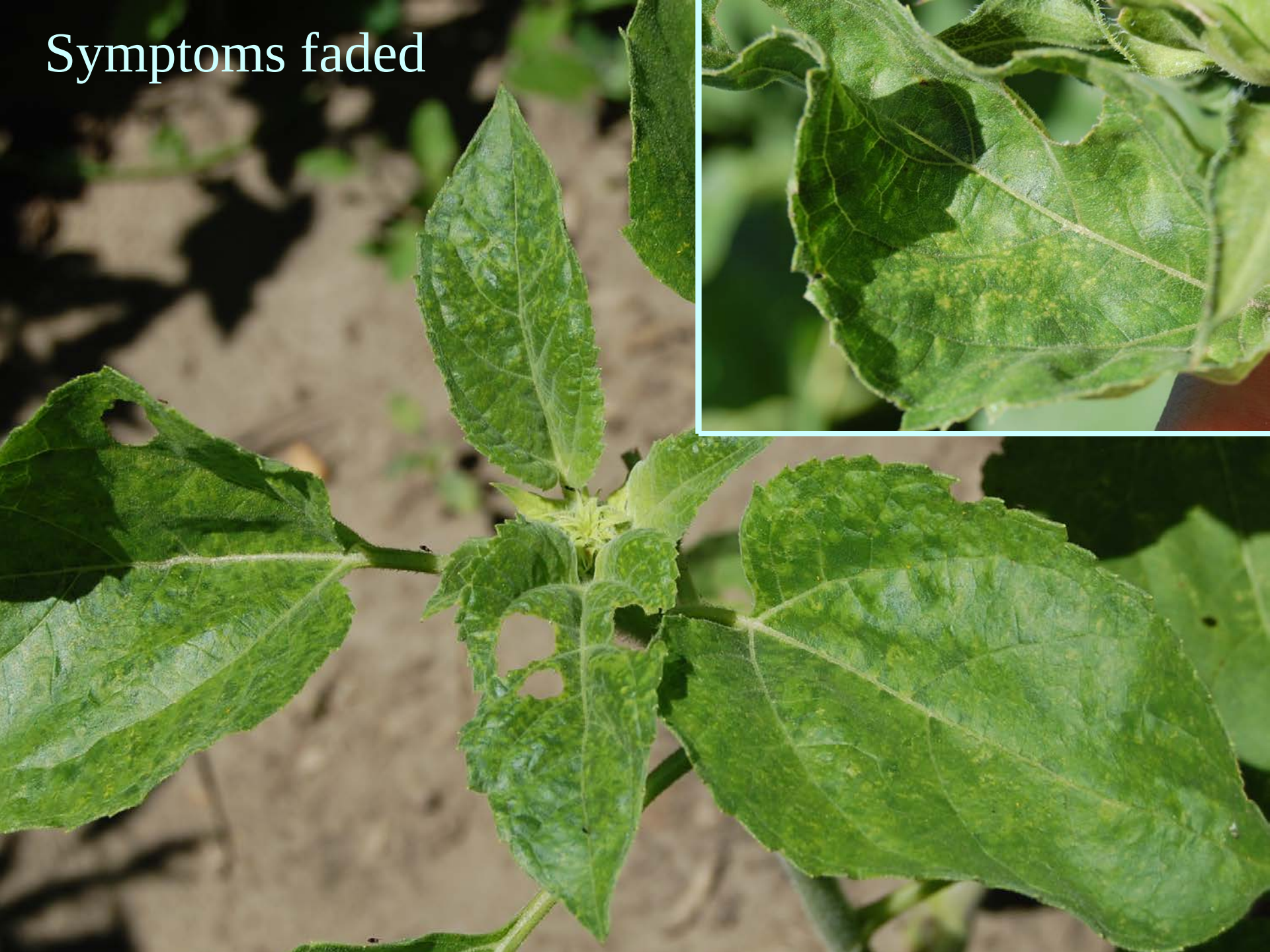
Viruses - Characteristics

- Transmitted by many methods – insects and mites, fungi, nematodes, seed, pollen, or mechanically in sap
- Obligate parasite – cannot be cultured on artificial media
- Detected sometimes by symptoms, but more often by other complex techniques based on either protein coat or nucleic acid


August 30, 2010


Hemingford, NE
July 20, 2010

Symptoms faded




Stunted, infected plant with undeveloped seed head


July 14, 2011
Alliance, NE


July 27, 2011

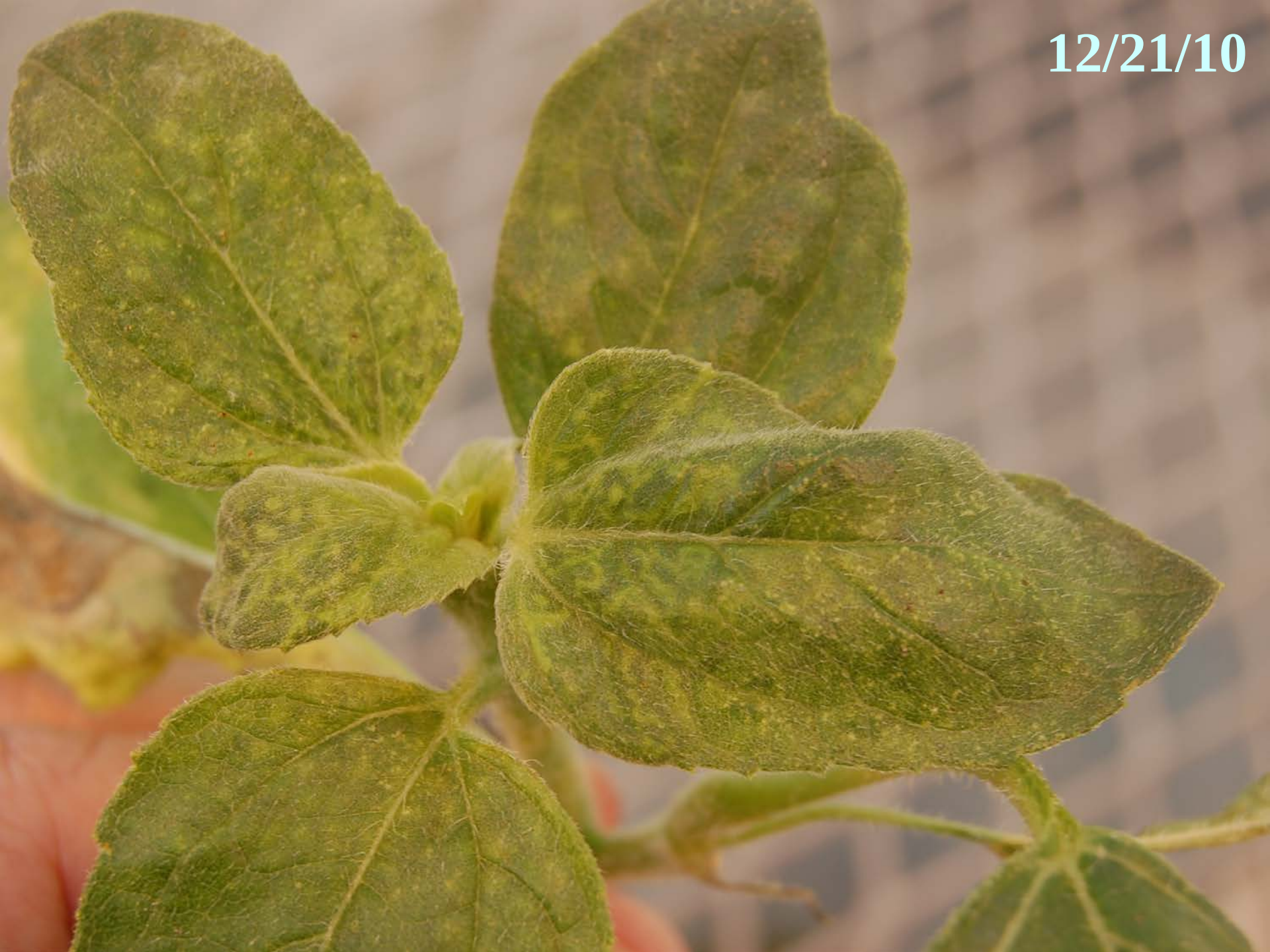

September 7, 2011

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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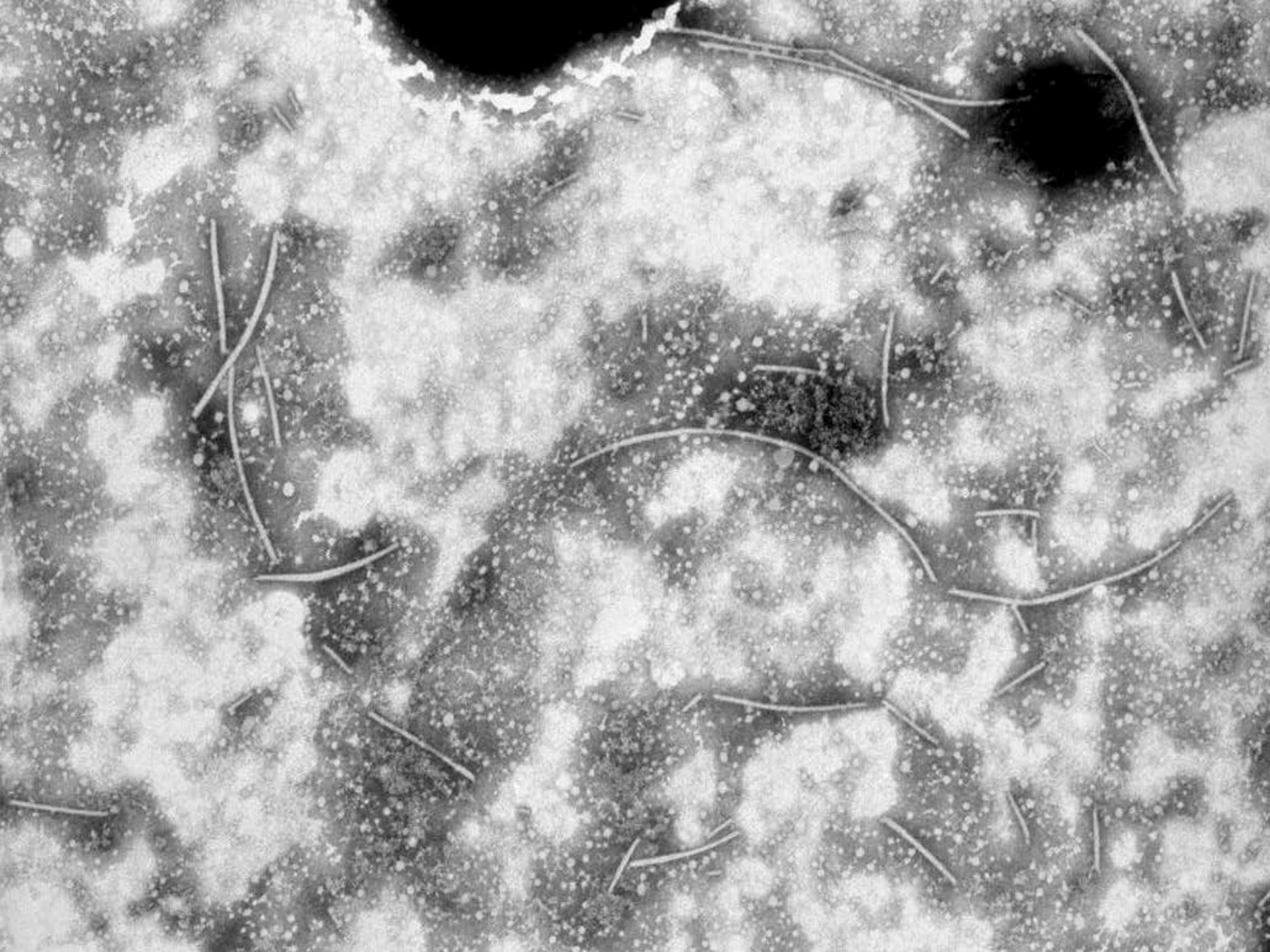
Diagnostic Efforts

- Flexuous rod particles observed in EM from initial samples collected from 2010 field but negative for SuMV with serological methods (ELISA) and DNA (RT-PCR) methods (A. Karasev, University of Idaho, Moscow, ID)
- Inoculated samples from 2011 field also tested negative for SuCMoV by collaborators in Argentina (S. Lenardon)
- Planted thousands of seeds from heads of infected plants – no resulting seedlings produced symptoms



Yield Reduction Potential - 2011

Unknown Virus Disease Summary

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

What We Know

- Infectious agent – transmissable with virus-like particles observed
- Fortunately was not economically damaging overall – small areas of fields affected
- Severe reductions were observed on affected plants – severe stunting and reduced seed head sizes
- Symptoms tended to fade over time – yet still remained infective

What We Do Not Know

- Identity of pathogen?
- Mechanism for spread-
  - Seedborne?
  - Insect vector?
- Virus complex – two (or more) different pathogens?
- Help with this in 2014

Thank you - Questions?