New Information on a Sunflower Virus Disease in Nebraska

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A New Sunflower Virus?


Box Butte Co. – Alliance - 2011

Greenhouse Inoculations

- Mechanical transmission was successfully performed multiple times from infected field plants to seedlings in the greenhouse in both 2010 and 2011
- 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

Greenhouse - Stunting

Yield Reduction Potential - 2011

Diagnostic Efforts

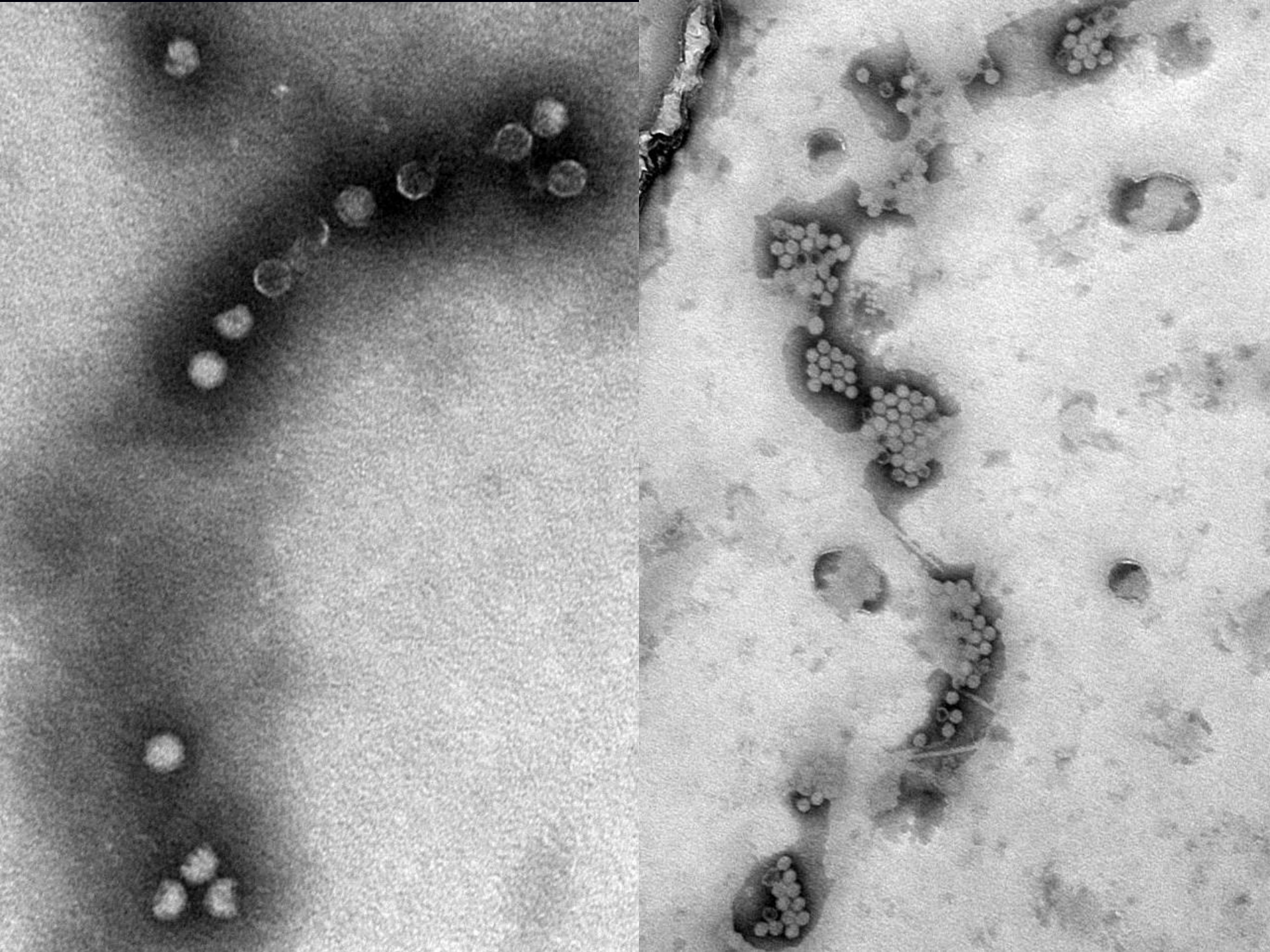
- Initial samples collected from 2010 field were negative for SuMV with serological methods (ELISA) and DNA (RT-PCR) methods (A. Karasev, University of Idaho, Moscow, ID)
- Inoculated samples from 2011 field also tested negative for SuCMoV by collaborators in Argentina (S. Lenardon)
- Planted thousands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

Virus Culture Maintenance

2014 Field Infection – Kimball Co.

Results as of 2014

- Polyhedral virus – (Tongyan Tian) - EM
- Next generation sequencing PCR – (Maher al Rwahnih) - the virus has been determined to be in the family tombusviridae
  - Soilborne viruses with no known vectors
- New virus never before reported
- Similar symptoms from alley with polyhedral particles



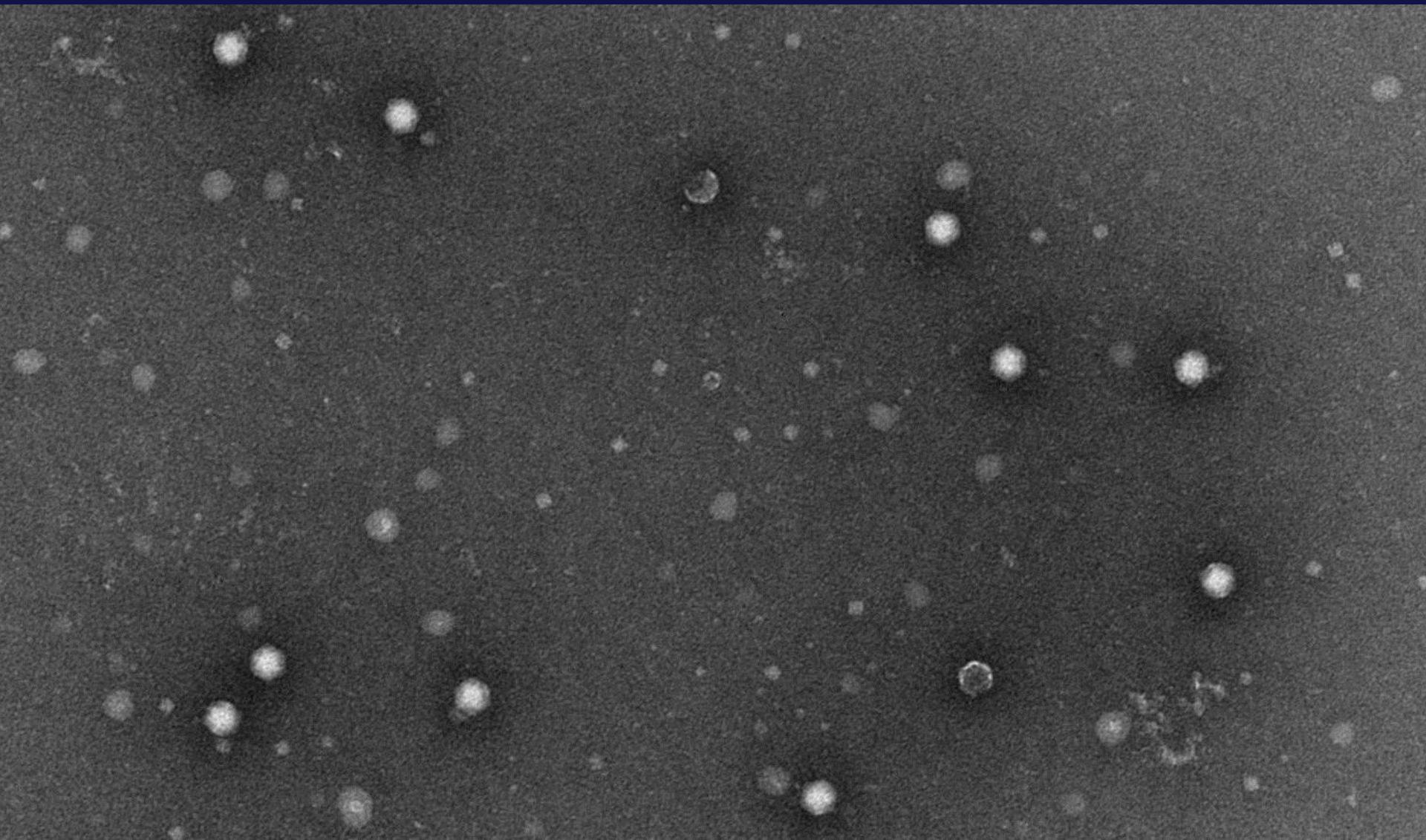
2015

2014


2016


2016

Virus Particles



June 2018

- Four plants found exhibiting similar field symptoms on sunflower volunteers
- Distribution suggested soilborne nature
- Each was successfully transferred to sunflower seedlings in greenhouse
- Each was identified as same tombusvirus as before from 2014 with similar polyhedral particles

June 2018

Greenhouse Inoculations

September 2018 - Ornamentals

2009 – Box Butte Co.

2012 – Kimball Co.

September 2018

Inoculations from frozen samples

What We Know Now

- The preliminary identification of a new tombusvirus makes sense biologically
- Symptoms occurred in small patches within fields with no pattern of distribution, suggesting a soilborne nature.
- Readily transferred mechanically in greenhouse, yielded polyhedral-shaped particles, and appears to be extremely stable

What We Know Now

- Has now been identified and/or suspected from multiple sites in three Panhandle counties - commercial production fields, research plots, alleys and bar ditches (2009-2018)
- Suggests that this virus is native and more common than previously assumed, but just not noticed due to low economic damage to sunflower crops.

198???

Thank You!
Questions?

2018