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
Symptoms faded
Stunted, infected plant with undeveloped seed head
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
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
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 – transmissible 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?