

Importance of seed as an inoculum source for High Plains Virus in sweet corn

Brooke Olson
Utah State University

Claudia Nischwitz
Utah State University

Introduction

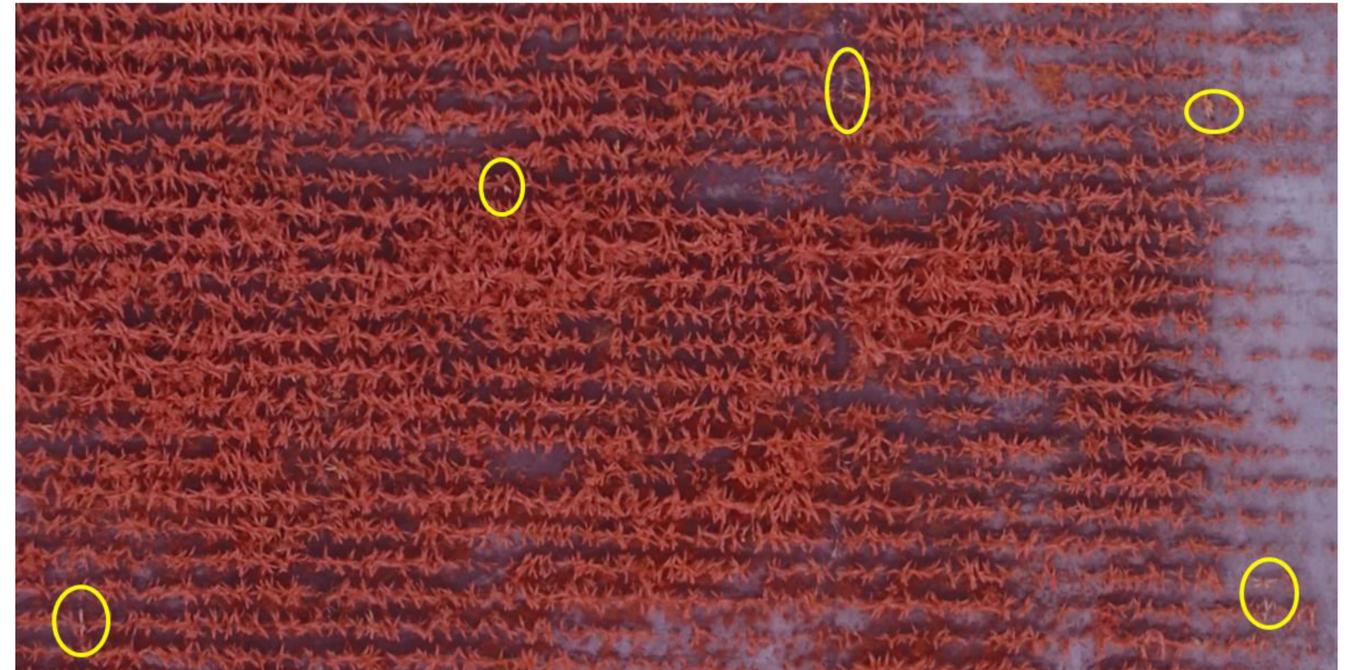
High Plains Virus (HPV) is found in small grains and corn and is commonly transmitted by the wheat curl mite. In 2016, a local farmer had a high incidence of HPV in all of his sweet corn in three different locations. However no mites were found. Drone imagery was taken of the field and showed a pattern of infected corn plants that indicated that the virus was seed borne. Yield loss was an estimated 50% for the field. Seed transmission of HPV in corn has been considered unimportant in the past due to low percentage of infection (Forster et al. 2001). The objective of this project was to determine the level of seed contamination with HPV and rate of seed transmission to corn plants.

Methods

1. Drone imagery taken of the field using N-IR camera at 80ft elevation
2. Left over seed obtained from grower was tested for HPV using ELISA (enzyme-linked immunosorbent assay). Leaf and seed tissue was extracted using general extraction buffer from Agdia and test conducted according to manufacturer's protocol.
3. Contamination of seed was confirmed using RT-PCR. Reverse transcription was done using the Enhanced First Strand Avian synthesis kit. Subsequent PCR was conducted using Phusion High Fidelity PCR Master Mix and virus specific primer (Lebas et al. 2005). The resulting PCR products were sequenced by EtonBioscience in San Diego, CA.
4. Additionally, leftover seed was placed in 72-cell trays in Miracle Gro potting mix in the greenhouse for grow out test.



Symptomatic sweet corn showing white to chlorotic streaks on leaves. Plants infected early on are stunted.



Drone image of corn field. Plants circled in yellow were infected with HPV.

Results

Virus testing using ELISA (enzyme-linked immunosorbent assay) of left over seed indicated a 70% seed contamination rate. It was verified using RT-PCR. In grow out tests, three percent of the plants showed symptoms early on but plants did not die.

Conclusions

The results show that seedborne HPV can be more important as an inoculum source than previously thought.

References

- Forster, R. L., Seifers, D. L., Strausbaugh, C. A., Jensen, S. G., Ball, E. M., and Harvey, T. L. 2001. Seed transmission of the High Plains virus in sweet corn. *Plant Dis.* 85:696-699.
- Lebas, B. S. M., Ochoa-Corona, F. M., Elliott, D. R., Tang, Z., and Alexander, B. J. R. 2005. Development of an RT-PCR for High Plains virus indexing scheme in New Zealand post-entry quarantine. *Plant Dis.* 89:1103-1108