Introduction

- Mycotoxins have significantly been an issue in corn (Zea mays L.) in the Great Lakes region due to the interaction between a new ear feeding insect Striccosta oblicosta (western bean cutworm, WBC), favorable environmental conditions for fungal growth, and susceptible hybrids.
- When ear rot infections occur, the risk of mycotoxins in corn grain increases.
- Growers need better information to manage the threat of ear rot and associated mycotoxins in their fields.

Objectives

- To quantify and correlate WBC damage with ear rot and mycotoxin levels.
- To determine the effect of foliar fungicide applications on ear rot, associated mycotoxins, and yield in corn hybrids with differing resistance to ear rot.

Materials and Methods

- Field experiments were conducted in 2017 at nine locations across Michigan.

Results and Discussion

Weather Patterns

- Weather conditions were dry during the time of silking in 2017 in Michigan (Figure 2).
- Sclerotinia graminum, the fungal pathogen that produces DON, requires high humidity for spore production.

Western Bean Cutworm and Ear Rot

- A positive correlation occurred between WBC incidence and ear rot incidence (Figure 3).
- This correlation demonstrates the importance that WBC control may have on ear rot incidence reduction and associated mycotoxins.

Ear Rot Index and Deoxynivalenol Levels

- A positive correlation was found between the ear rot index and DON levels (Figure 4).
- This correlation shows the importance of reducing ear rot damage to reduce mycotoxins in corn grain.

Hybrid Effect on Western Bean Cutworm

- Within ear rot resistance levels there was no difference in WBC damage between hybrids with the Cry1F Bt protein and hybrids without Cry1F (Figure 5).
- WBC has recently developed resistance to Cry1F making it no longer effective at controlling WBC in the Great Lakes region.
- Among resistance levels differences in WBC incidence and severity appeared to be related to maturity ratings.

Fungicide Impact on Ear Rot, Deoxynivalenol, and Yield

- Fungicides had no impact on ear rot incidence or severity, both within each location and across locations (data not shown).
- Previous research has shown inconsistencies with fungicides reducing ear rot and DON levels.
- Inconsistencies could be due to application method, fungicide movement, physical barrier of the husk, or the fact that WBC damage to ears allows the disease to bypass the silks, which the fungicide is designed to protect.
- Fungicide application resulted in 42.2% lower DON levels than non-treated plots across all sprayed locations (Figure 7).
- Fungicides increased yield at two of six sprayed locations (Cass and Branch), both of which were irrigated (Figure 8).

Conclusions

- The correlation between WBC damage and ear rot incidence demonstrates the importance of insect control to reduce ear rot and associated mycotoxins.
- Because of the failure of Cry1F Bt protein against WBC growers must take an integrated approach when controlling WBC, including scouting and timely spraying or using other insect proteins (such as Vip3a).
- Ear rot resistance ratings, provided by the company, did not match ear rot levels found in fields.
- Fungicide was found to reduce DON levels across all locations and increase yield in irrigated fields.
- An integrated approach must be used to control ear rot and associated mycotoxins including: WBC management, hybrid selection, and fungicide applications along with other management strategies not discussed here including residue reduction, harvest timing, and post harvest drying.
- Future research for 2018 and beyond will focus on using other insecticidal traits such as Vip3a to control WBC in the Great Lakes region.

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