## FORAGE RESEARCH UPDATES

## WISCONSIN– Disease Development & Deoxynivalenol Accumulation in Silage Corn Damon Smith, University of Wisconsin-Madison

orn silage is integral in a dairy cow's diet, often making up >50% of total DM intake during the winter months (Haerr et al. 2015). Dairy farmers need effective options to protect their corn crops from diseases which may decrease yield and/or decrease feed quality. Two such diseases are Gibberella ear rot and Gibberella stalk rot, both of which are caused by the fungus *Fusarium graminearum*. Gibberella ear rot occurs after corn silks, or kernels damaged by insect/bird feeding, are infected by *F. graminearum* spores. The presence of red to pink fungal growth on the ear is a characteristic sign of this disease (Photo). Gibberella stalk rot occurs after *F. graminearum* spores invade root tissue or infect leaf nodes and continue colonization to infect the stalk, causing a disintegration and pink-red coloration in the stalk pith. These diseases are concerning, because *F. graminearum* produces toxic secondary



Ears of corn displaying Gibberella ear rot with visible *F. graminearum* mycelia.

metabolites called mycotoxins. Two important mycotoxins produced are deoxynivalenol (DON, also called vomitoxin) and zearalenone (ZEN), with DON being the most commonly found in harvested grain (Wise et al. 2016). DON can cause vomiting, feed refusal, and compromised immune systems in livestock (Pestka 2010; Richard et al. 2003). These induced symptoms lead to decreased dairy cow well-being, lower milk production, and increased risk of DON contamination in milk leading to unacceptable levels for human consumption (>10 ppm; Becker-Algeri et al. 2016; Coffey et al. 2009). Foliar fungicide applications are effective tools to protect silage corn from diseases. The use of fungicides can also increase overall feed quality and improve the conversion efficiency of feed to milk within dairy cows (Cardoso 2020; Haerr et al. 2015; Hollis et al. 2019).

In 2018 and 2019, field trials using two brown midrib (BMR) silage corn hybrids were conducted at the Arlington Agricultural Research Station in Arlington, WI. The field trials were conducted to evaluate the effects of different foliar fungicide treatments (13 in 2018; 11 in 2019) and application timings on foliar disease and DON. Diseases such as northern corn leaf blight, tar spot, gray leaf spot, and southern rust were observed across these years and were rated in-season and at harvest. Additionally, freshly chopped silage samples were analyzed for quality, nutritional parameters, and DON levels.

- F. graminearum is a fungus that causes two diseases, Gibberella ear rot and Gibberella stalk rot, which can lower yield and feed quality of silage corn.
- This fungus produces a secondary metabolite called deoxynivalenol (DON; also known as vomitoxin) during development and colonization of the corn plant, which is toxic to both humans and livestock.
- Our research found that infection, colonization, and production of DON by *F. graminearum* in ears and stalks of corn plants can differ, and suggests the two diseases can occur independently of each other.
- Foliar fungicides reduced foliar diseases in both years, but the effects of fungicide on DON concentrations across entire plants were inconsistent during the years of the study.
- Scouting for Gibberella ear and stalk rots and testing for DON in silage corn is important even if visual ear symptoms are not present, as DON may still be accumulating in the stalks.

**Conclusion.** In these trials, fungicides were inconsistent in their ability to reduce infection of ears and stalks by *F. graminearum* and subsequent DON accumulation in BMR hybrids. Therefore, we recommend planting resistant hybrids (BMR or multi-purpose), integrating cultural control methods, and applying fungicide when or where the risk of foliar disease development is high. We confirmed that DON accumulation can occur in both the corn stalk and ear. However, DON accumulated at different levels in each plant part, and DON accumulation was not related, suggesting *F. graminearum* infects the ear and stalk independently. Therefore, it is important to perform DON testing on silage corn to determine DON levels in stalks even when there are no visible symptoms of Gibberella ear rot on ears.

For more details, go to: cropprotectionnetwork.org/resources/publications/disease-development-and-deoxynivalenol-accumulation-in-silage-corn

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