230-6 Mitigating the Continuous Corn Yield Penalty with Residue and Agronomic Management.

Poster Number 505

Tuesday, October 24, 2017
Tampa Convention Center, East Exhibit Hall
Alison M. Vogel and Frederick E. Below, University of Illinois-Urbana-Champaign, Urbana, IL

Abstract:

Accelerated residue degradation and nutrient cycling will be necessary to maximize yield potential in corn (*Zea mays* L.) grown continuously, in addition to other high volume residue situations such as increased planting density and crops that annually produce much greater than average yields. The objective of this study was to test if residue management and the level of agronomic inputs could lessen the continuous corn yield penalty (CCYP). Field experiments conducted during 2015-2017 at Urbana, Illinois assessed the yield penalty associated with 15th year continuous corn vs. long-term corn following soybean [*Glycine max* (L.) Merr.] grown in either a standard or an intensive management system, both with contrasting mechanical and chemical residue treatments. For the mechanical residue treatments, the previous year's corn crop was harvested with a combine head equipped with Calmer BT Chopper stalk rollers or with standard knife rollers, and both mechanical treatments were managed chemically with Extract Powered by Accomplish, or with ammonium sulfate, and compared to an untreated control. Across rotation and residue blocks, the standard management system was seeded to achieve a final stand of 79,000 plants ha^{-1} and received a base rate of nitrogen fertilizer, no additional fertility, and no fungicide application, while the intensive management system was seeded at 111,000 plants ha^{-1} and consisted of additional sidedressed nitrogen fertilizer, broadcast and banded fertility, and a foliar fungicide application. Overwinter residue decomposition improved with chopped vs. standard residue harvest (residue reduced by 52% vs. 45%). Continuous corn seedling emergence was delayed and reduced compared to rotated corn. Intensive inputs resulted in 2.4 times the early season biomass compared to standard inputs (598 kg ha^{-1} vs. 248 kg ha^{-1}), and lessened the CCYP by 56%. Inherent yield losses of continuous corn were alleviated by residue and agronomic management, demonstrating the potential to manage the CCYP.