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Applicant: Corteva Agriscience
Project Director/Principal Investigator(s): Dr. Sara Lira
Title: Feedstocks for Advanced Biofuels from Perennial Ground Cover Systems: FAB-PGCs

Project Objectives: In the US, corn stover is the largest potential source of biomass for bioenergy at ~90 million acres/year. However, maximizing use of corn stover for fuel is limited because the footprint of corn-stover-based biofuels needs to be decreased to make it a better environmental option from a global-warming and soil and water conservation perspective. Further, the cost and reliability of production and processing of low carbon intensity (CI) corn stover need to be improved. This project will develop a low-CI, scalable corn stover production system with a perennial groundcover (PGC) approach. In a PGC system, a perennial cover crop is planted between the crop rows, where it lives for many seasons, offering multiple ecosystem services and decreasing the CI of the resulting stover. However, current PGC approaches are not optimized for stover harvest. ***This project works to make PGC stover systems more reliable through better crop management, while also modeling and documenting reduced N_2O emissions and increased soil carbon storage, potentially unlocking tens or hundreds of millions of tons of low CI stover.***

Project Description: A synergistic combination of modeling and field experimentation are the core of this project. The modeling and field experiments inform one another over the 7 years of FAB-PGCs, ultimately resulting in well-documented CI evaluation of stover produced in KS, NE, IA, MO, and WI. Agronomic research, economic modeling, and testing on-farm are focused on enabling growers, promoting widespread adoption of corn stover PGC systems.

Project Overview & Methods: Modelling is aimed at estimating the CI of stover produced in perennial groundcover and ultimately estimating the quantity, cost and price of stover produced from PGC systems. Field experiments will validate model predictions, characterize stover quality, and develop best management practices for PGC systems. At the conclusion of the project, the PGC system will be tested at scale with Iowa farmers. Diversity, equity, and inclusion are addressed through strong recruiting and mentoring programming.

Impacts: PGC stover systems should 1) Allow production of greater quantities of cleaner (less erosion and nutrient export) and greener (lower CI) corn biomass feedstocks, 2) Help launch a self-incentivizing cover cropping approach requiring fewer inputs and field operations than annual cover cropping while maintaining or increasing grain and stover yields and profitability on farms, and 3) Potentially transform large parts of the US Corn Belt landscape to perennial cover, thus increasing carbon sequestration, reducing soil erosion, improving soil health, reducing N_2O emissions and nitrogen leaching, and potentially reducing pesticide inputs.

Major Participants: Corteva Agriscience, Iowa State University, C. Bartel Inc., The Land Institute, University of Missouri, University of Nebraska, University of Wisconsin, POET