

# Simulated Biomass Sorghum GHG Reduction Potential is Similar to Maize

## Objective

Policy support for cellulosic biofuels under the U.S. Renewable Fuel Standard 2 (RFS2) depends on their ability to achieve substantially reduced greenhouse gas (GHG) emissions compared to corn ethanol. Biomass sorghum has been suggested as a potential feedstock to augment cellulosic feedstock production. Here, researchers sought to answer the questions: Are biomass sorghum production systems less GHG-intensive than corn-based systems? If so, in what locations and under which management scenarios?

## Approach

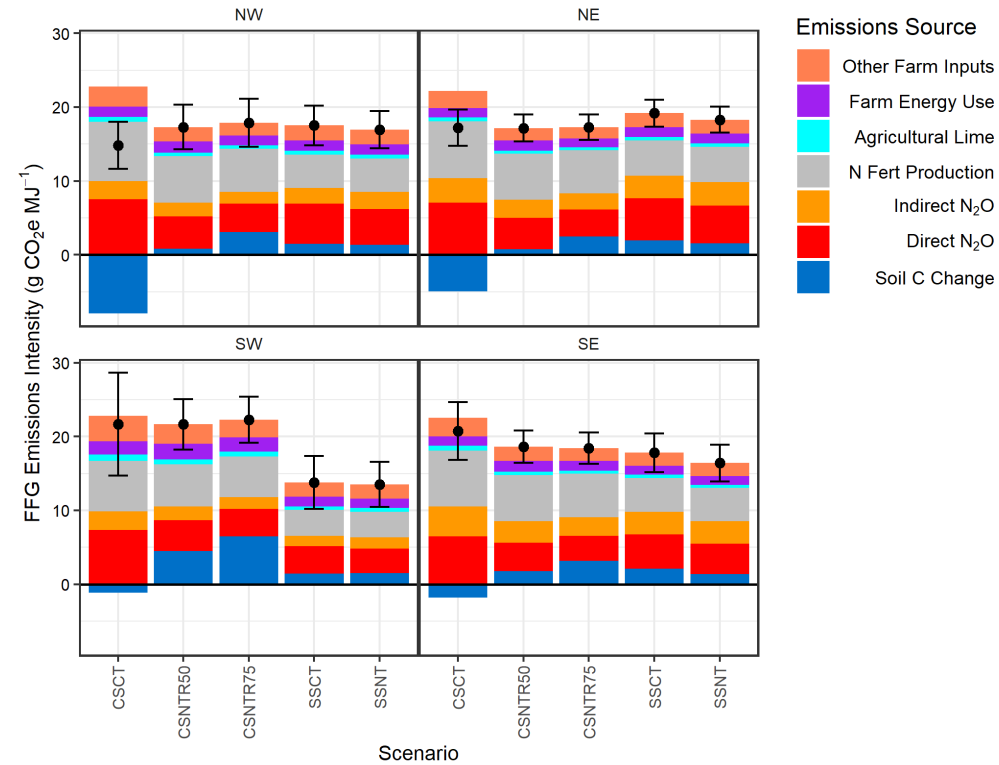
- ❖ Randomly sampled 3,265 sites classified as corn, soybean, or sorghum from the 2017 cropland data layer (CDL) remote sensing product
- ❖ Calibrated DayCent ecosystem model to simulate biomass sorghum, corn, and soybean growth using experimental and USDA data
- ❖ Ran 50-year simulations and calculated feedstock emissions budgets for each site for each of five crop and management scenarios (see figure)

## Results

- ❖ Biomass sorghum systems achieved similar field-to-farm-gate (FFG) emissions to corn systems except in dry southwestern sites (see figure, bottom-left panel).
- ❖ At current yield levels, ethanol made from biomass sorghum is unlikely to meet the 60% emissions reduction threshold (relative to gasoline) required by RFS2 for cellulosic biofuels.

## Significance

Without significant yield increases and/or new high-value coproduct credits, biomass sorghum is only slightly preferable to corn from an emissions standpoint, except in warm, drought-prone regions.



**Average estimated FFG emissions per MJ ethanol for each of the five management scenarios: CSCT (conventional corn-soy, 0% stover removal), CSNTR<sub>50</sub> (no-till corn-soy, 50% stover removal), CSNTR<sub>75</sub> (no-till corn-soy, 75% stover removal), SSCT (conventional sorghum-soybean), SSNT (no-till sorghum-soybean).**