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.

Kent et al., 2020. “Simulated Biomass Sorghum GHG Reduction Potential is Similar to Maize.” Environmental Science and Technology. DOI:10.1021/acs.est.0c01676