



National Center for Food and Agricultural Policy

NCFAP 2023 Annual Report

Projects Completed in 2023

“Farm-Level Implications of Climate-Smart Agriculture Practices and Policies”

Sponsor: FAPRI (the *Food and Agricultural Policy Research Institute* at the University of Missouri) as a subcontract to the FAPRI contract for the USDA OCE: “Analysis of Agricultural Markets and Policies 2021-2022,” USDA Project ID 58-0111-21-012.

Term: January 01, 2022 – September 29, 2023.

Investigators: Stan Johnson and Maureen Kilkenny

Summary:

In 2021, anticipating a 2023 Farm Bill focus on GHG emission reduction, we offered FAPRI/USDA OCE research and analysis on the farm-level implications of policy-incentivized working lands "climate-smart" farming practices, rates of adoption, effects on farmland use, crop supply, net farm income, and effects on GHG emissions.

The final deliverable **“Report on the farm-level and GHG implications of select climate-smart agriculture practices and policies for FAPRI modeling”** dated November 5, 2023, 99 pages; contains a summary analysis and critical review of the relevant surveys, data, policies, and tools. The scope of the study, determined in the first deliverable dated Feb. 2022, was applied:

1. geographic scope: the rain-fed Corn Belt -specifically Illinois, Indiana and Iowa;
2. farm type: corn and soy farms, the largest GHG emitters in the Corn Belt; and
3. policy focus- “working-land” type programs promoting:
 - i. no-till,
 - ii. cover-cropping, and
 - iii. efficient nitrogen use (4R fertilization)

The first section summarizes the GHG problem and outlines the expected effects of the three climate-smart farming practices (i-ii-iii above) on the GHG footprints of corn and soy, according to the scientific literature. It is noteworthy that the first two practices are being energetically promoted by USDA despite the lack of permanence -- despite the fact that carbon is sequestered by cover cropping and by no-till *only until the land is tilled again*.

The second section introduces and applies an analytical flowchart for modeling the policies promoting no-till, cover-cropping, and efficient nitrogen fertilizer use. We review the relevant “Working Lands” programs: the NRCS Conservation Stewardship Program (CSP) and Environmental Quality Incentive (EQIP) programs which have been used to promote the three practices for many years. We analyze the evidence about adoption. We critically review the findings of many existing farm-level case studies about the three practices’ implications for crop yields, costs, and net returns per acre. We also report the estimated public costs required to incentivize widespread adoption of each practice.

The final section discusses the additionality and permanence (or lacks thereof) of each practice as a GHG-mitigating tactic. Only true 4R offers additionality and permanence, but existing farm machinery and practices are not effective at true 4R. We introduce a low-cost innovative machinery and practice suite that has been shown on farms to yield more corn and soy per acre with permanent net zero (or better) GHG footprints. We critically review COMET-Plan, documenting needed improvements. And we summarize our suggestions for FAPRI.

END of 2023 REPORT