Carbon Farming: Stacking Payments from Private Initiatives and Federal Programs

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Carbon sequestration and greenhouse gas (GHG) emission avoidance in working croplands are being intensely promoted as the stepping-stones toward climate-smart agriculture. They are closely related to agricultural conservation practices (such as cover crops, no-till, reduced tillage, crop rotation, and nutrient management), but they are not the same.

Different conservation practices have different potentials to reduce or sequester GHG emissions (usually measured in carbon dioxide-equivalent units, CO_2e)) and store them in the plant biomass and the soil. For example, planting cereal rye as a winter cover crop in Iowa sequesters, on average, 0.19 metric tons of CO_2e per acre per year (tCO_2e/a/y), while switching from conventional tillage to no-till sequesters 0.51 tCO_2e/a/y (Swan et al. 2022).

Furthermore, the same conservation practice can sequester different amounts of CO_2e across counties, soil types, atmospheric conditions, and farm production histories. For example, adding cereal rye to a corn and soybean rotation under conventional tillage in Story County, Iowa, sequesters, on average, 0.13 tCO_2e/a/y, while adding cereal rye to a corn and soybean rotation under no-till in the same county sequesters 0.04 tCO_2e/a/y (Swan et al. 2022). Historically, farmers have been able to try out and implement conservation practices on working lands with technical and financial support from the USDA Natural Resource Conservation Service (NRCS). Farmers have also recently been able to contract with voluntary carbon farming initiatives that compensate their efforts to implement conservation practices to increase carbon sequestration or reduce GHG emissions.

This report discusses the interaction between government programs and private voluntary carbon initiatives, provides examples on how financial incentives can be "stacked," and offers two simplified decision trees to help agricultural stakeholders make informed decisions about carbon farming.

The Interaction between Federal Conservation Programs and Private Carbon Initiatives

The two largest government programs supporting conservation practices on working lands are the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP), administered by the USDA NRCS. Both programs provide financial and technical assistance to farmers toward the implementation of eligible conservation practices that address one or more of the resource concerns identified by the NRCS (such as degradation of the soil, water, air, plants, animals, or energy resource base). Wongpiyabovorn and Plastina (2023), https://go.iastate.edu/AGDMA139, describe both programs and provide numerical examples of alternative contract configurations. However, unlike voluntary carbon farming initiatives, EQIP and CSP were not designed to mitigate climate change, so while some of the conservation practices supported by those programs are effective at sequestering carbon, some others are not.

A number of private carbon initiatives offer payments to farmers in exchange for the adoption of farming practices that sequester or avoid emissions of CO_2e ("carbon farming practices"). Participation requirements, payment types, practice eligibility, contract length, and other details vary across private carbon initiatives. Plastina and Wongpiyabovorn (2023) and Plastina (2021) describe how carbon farming initiatives operate, and Plastina and Jo (2023) provide a decision tool to evaluate the net returns to carbon farming contracts for all counties in the United States.

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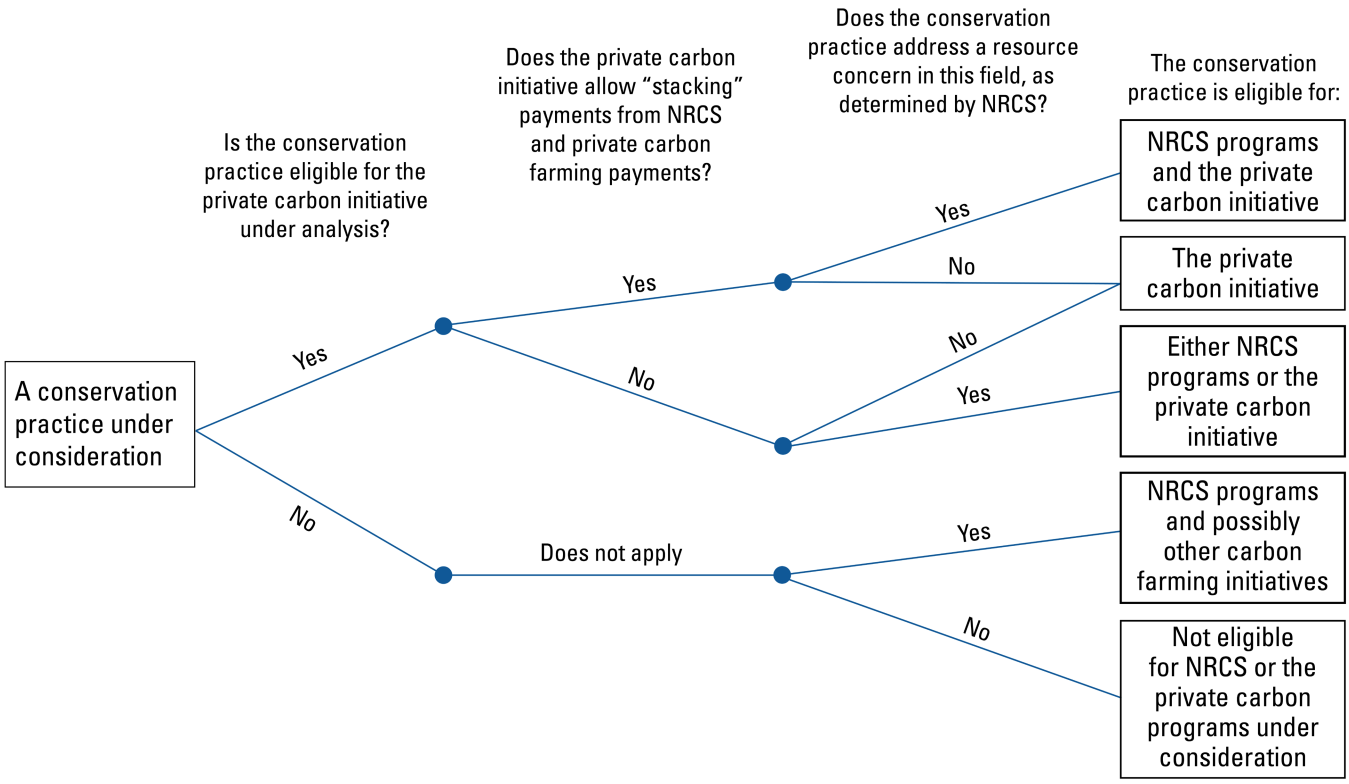
Importantly, some carbon initiatives (such as Bayer, Corteva, CIBO, Truterra, RegenConnect, Indigo, Nori, and Eco-Harvest) allow participating farmers to "stack" cost-share payments from EQIP and CSP on top of the carbon farming payments from the private initiative for the same practices on the same acres. Clearly, higher total ("stacked") payments to farmers are intended to induce higher participation rates in carbon initiatives and a more extensive use of conservation practices that sequester or avoid emissions of CO_2e.

Figure 1 illustrates a simplified decision tree linking one conservation practice to eligibility for a private carbon farming initiative and NRCS programs. The first two questions are specific to the carbon farming initiative under consideration and can be addressed by consulting with a representative from the initiative. The third question relates to the eligibility of the conservation practice on the selected field for NRCS programs, and can be addressed by visiting the local NRCS office. A critical requirement for conservation practices to be eligible for EQIP and CSP is that they address at least one resource concern in the field, as determined by a local NRCS agent (USDA 2019).

Figure 1. Decision path for eligibility of a conservation practice by private carbon farming initiatives and NRCS programs.



How are Agricultural Carbon Credits Likely to Be Used?

Carbon farming initiatives link the supply and the demand of carbon credits. On the demand side, there are consumers, companies, and other entities willing to buy carbon credits to offset their own GHG emissions (also called carbon offsets of "scope 1" emissions), and to apply the credits toward the carbon balance of a particular value chain (also called carbon insets of "scope 3" emissions). An example of the former is the purchase of forestry carbon credits by Microsoft to offset its GHG emissions around the world and claim in reports to shareholders to have reduced its net carbon footprint (although the carbon sequestration had taken place in the forestry sector). A growing number of corporations are pledging to become carbon-neutral over the next 10-30 years, and buying carbon offsets from other sectors is one way to move toward that goal. Prices recently paid to farmers for offsets generated through carbon farming practices range between $15 and $30 per tCO_2e.

An example of carbon insets used to reduce scope 3 emissions are the carbon credits generated by reducing the amount of GHG emissions in the production and transportation of grains to the elevator, so that the stored grains are certified low-carbon intensity grains. These grains can be used downstream to generate low-carbon intensity feed, food, and fuel, and would carry a premium over conventional grains. Prices recently paid to farmers for insets from carbon farming practices range between $5 and $15 per tCO_2e.

In order to generate credible carbon offsets that can be used in carbon accounting against scope 1 emissions to report lower net carbon emissions by an entity, carbon sequestration has to be **additional** and **permanent**.

Additionality means that the conservation practice would not have been implemented without the carbon farming payment. Defining the degree of additionality requires comparing an observed fact (implementation of a conservation practice in exchange for financial compensation) against a theoretical and unobservable counterfactual (would the practice have been implemented without the carbon farming payment?). Determining the minimum payment that would have been required to induce the adoption of a carbon farming practice is not straightforward and allows plenty of subjective interpretation. Then, the minimum enforceable additionality requirement becomes that the practice had not been implemented in the same field. However, even the interpretation of this minimum requirement is sometimes stretched to include those farms where the otherwise qualifying carbon farming practice had only been recently implemented (typically meaning that the practice was first implemented in the most recent 1-5 years). Some private carbon initiatives (such as Bayer, Eco-Harvest, Indigo, Nori, and Truterra) offer a one-time look-back payment (or signing bonus) based on the carbon farming practices implemented in the recent past, despite the lower degree of additionality of those carbon credits.

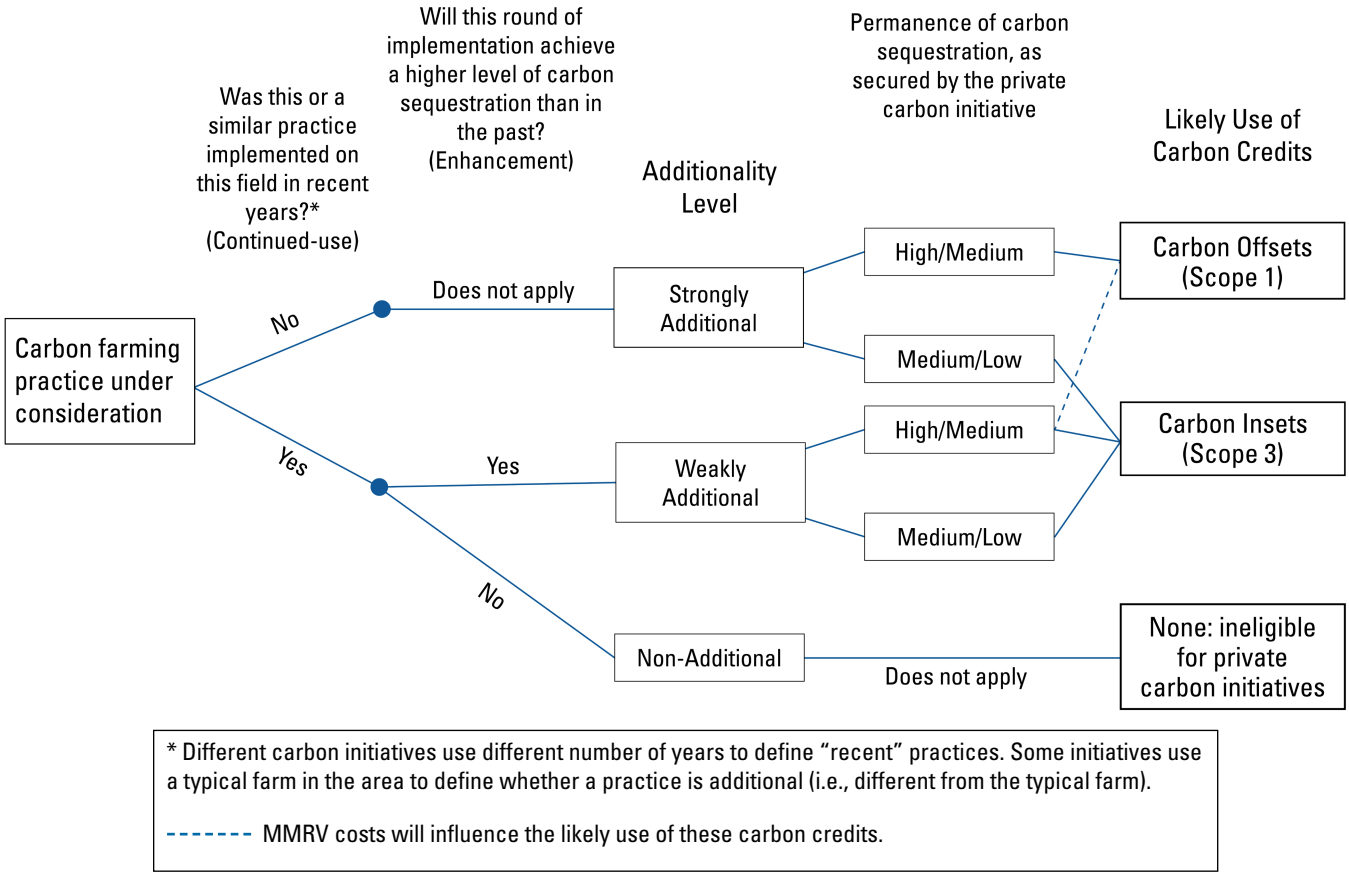
Permanence means that the carbon captured and stored through carbon farming will not be re-introduced to the atmosphere for a long period of time. Nature-based carbon credits, such as those from forestry and agriculture, have a high risk of carbon reversal due to natural disasters like fires, tornadoes, and hurricanes, as well as human-induced activities that result in dis-adoption of conservation practices (Sawadgo and Plastina 2022). Some private carbon initiatives have developed protocols to reserve parts of the carbon credits generated by participating farmers in a buffer pool and use them to offset any carbon reversal, securing the permanence of the carbon sequestration for the traded offsets.

The differences in requirements and eligibility across private carbon farming initiatives lead to variations in the qualities of agricultural carbon credits. The resulting carbon credits from the implementation of new carbon farming practices in exchange for monetary compensation from a voluntary carbon farming initiative are likely to be considered strongly

additional. If the carbon farming practice had recently been implemented before the start of the carbon farming contract, then the resulting carbon credits are likely to be considered weakly additional. If the same carbon farming practice has been implemented for many years on the same field, the resulting carbon sequestration is considered non-additional, and it is therefore ineligible as a "carbon farming" practice.

Depending on the combination of additionality and permanence attached to a carbon credit, as well as its measuring, monitoring, reporting, and verification (MMRV) costs, a carbon credit might be used for offsetting scope 1 emissions or insetting scope 3 emissions. Figure 2 describes a simplified pathway to understand the most likely uses of carbon credits generated through carbon farming practices.

Figure 2. Schematic representation of the likely uses of carbon credits from a carbon farming practice.



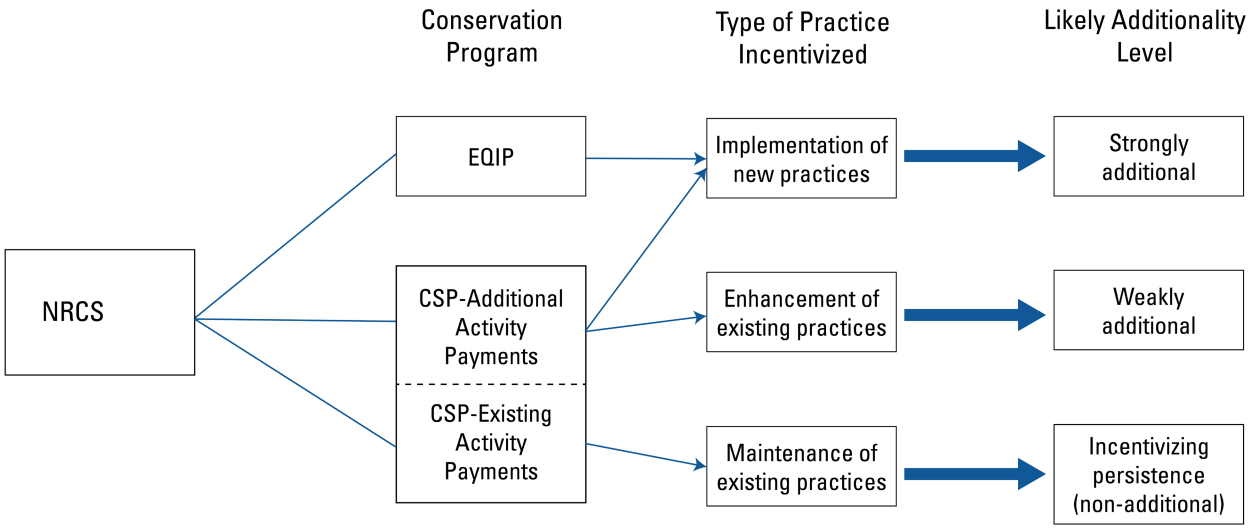
Additionality and Permanence under EQIP and CSP

Additionality is an essential quality of carbon credits. The requirements to participate in NRCS programs do not explicitly address additionality. Figure 3 explains the plausible additionality levels of carbon farming practices supported by EQIP and CSP (which also address one or more local resource concerns).

EQIP only offers payments for new conservation adoption; therefore, they are strongly additional. On the other hand, CSP provides financial incentives for additional activities (new practice adoption and enhancement of existing practices) and maintaining existing activities. As a result, CSP's additional activity payments (AAPs) can be associated with strong additionality for new conservation practices and weak additionality for enhancement activities. However, CSP's existing activity payments (EAPs) incentivize persistence and reduce the risk of dis-adoption, supporting non-additional practices.

The contract length of EQIP and CSP is typically five years. Agricultural producers receiving EQIP financial support for a particular conservation practice can apply for CSP to maintain the same practice on the same field once the current EQIP contract expires, as long as it addresses an active local resource concern. Moreover, existing CSP participants may be eligible to renew their contract for another five years. In total, financial incentives for implementing a conservation practice may be provided for fifteen years under EQIP and CSP. Hence, permanence can be conceived as being properly incentivized by these programs.

Figure 3. Suggested additionality levels of NRCS-funded conservation activities.



Examples of Stacked Financial Incentives

The following examples illustrate the potential financial incentives producers would receive under different circumstances from EQIP, CSP, and a private carbon initiative that allows "stacking." Eligibility requirements are assumed to be met for NRCS programs and the private carbon initiative.

Example 1: Farmer Glenn U. Adopter

Farmer Glenn operates an 80-acre farm in Iowa where cover crops have never been planted. Glenn wants to adopt cereal rye as a winter cover crop. Before implementing the new practice, he signs a 5-year EQIP contract to address water quality degradation (as the target NRCS resource concern), and a 10-year contract with a private voluntary carbon initiative. The private carbon initiative offers a fixed payment equivalent to $6 per acre per year (based on a carbon price of $24 per tCO_2e and a sequestration potential of 0.25 $tCO_2e/a/y$). At the end of the EQIP contract, Glenn applies for a 5-year CSP contract to establish a cover crop mix (including triticale, crimson clover, and tillage radish seeds) and address soil compaction (as the target NRCS resource concern). The carbon accounting method used by the private carbon initiative in this example assigns equal amounts of carbon sequestration to the single-species cover crop and the cover crop mix: 0.25 tCO_2e per acre per year.

In this example, Glenn receives an annual payment of $480 from the private carbon initiative over the 10-year period. Simultaneously, over the first five years, he receives annual EQIP payments for $3,268.80, followed by annual CSP payments for $1,179.20 over the second 5-year period. In total, Glenn obtains $3,748.80 (= $480 + $3,268.80) per year in years 1-5, and $1,659.20 (= $480 + $1,179.20) per year in years 6-10. Over the ten years of cover crop implementation (basic first and enhanced later), he collects total financial incentives for $27,040 from the private voluntary carbon initiative and government programs, equivalent to an average of $33.80 per acre per year.

Table 1. Example 1.

Contract	Practice (NRCS code)	Acres	Payment per acre[1]	Annual Payment
Private carbon farming contract (years 1-10)	Cover crop adoption	80	$6	Private: $6/acre × 80 acres = $480
EQIP (years 1-5)	Basic cover crop adoption (340)	80	$40.86	EQIP: $40.86/acre × 80 acres = $3,268.80
CSP (years 6-10)	Enhancement: Cover crop to minimize soil compaction (E340F)	80	$14.74	CSP-AAP: $14.74/acre × 80 acres = $1,179.20
Total payments over 10 years: $27,040 or $33.80 per acre per year.				

[1] Payment rates for EQIP and CSP correspond to fiscal year 2023. Source: USDA (2023).

Example 2: Farmer Ann S. Taggered

Farmer Ann also operates an 80-acre farm in Iowa. Unlike Farmer Glenn, Ann first adopts cereal rye as a cover crop and receives financial support from a 5-year EQIP contract, to address soil erosion (as the target NRCS resource concern). In the third year, she signs a 10-year carbon farming contract with a private voluntary carbon initiative to plant cover crops on the same field, that pays $6 per acre annually (based on a carbon price of $24 per tCO_2e and a sequestration potential of 0.25 $tCO_2e/a/y$). In addition, the private carbon initiative offers a one-time bonus for early adoption at a rate of $1 per acre (based on a carbon price of $4 per tCO_2e sequestered only in the previous year). When the EQIP contract expires, Ann signs a 5-year CSP contract to annually establish a winter cover crop mix (including triticale, crimson clover, and tillage radish seeds) and improve nearby water quality (as the target NRCS resource concern).

Years 1-2: Ann receives an annual payment of $3,268.80 from EQIP.

Year 3: Ann enters a private carbon initiative and gets $80 as the bonus for early adoption and $480 for cover crop use this year, totaling $560. She receives $3,268.80 from EQIP. Overall, Ann receives $3,828.80 from both contracts.

Years 4-5: Ann receives an annual payment from EQIP and the private carbon initiative for a total of $3,748.80 (= $3,268.80 + $480).

Years 6-10: EQIP contract expires in year 6. Ann signs a CSP contract for cover crop enhancement for years 6-10. She receives a total annual payment of $1,659.20 (= $480 + $1,179.20) from the private carbon initiative and CSP.

Years 11-12: CSP contract expires in year 11, so Ann only receives $480 per year from the private carbon initiative in years 11 and 12.

Overall, Ann receives $27,120 for cover crop use on 80 acres over the 12-year period from NRCS and private contracts, with an average of $28.25 per acre per year.

Table 2. Example 2.

Contract	Practice (NRCS code)	Acres	Payment per acre[1]	Annual Payment
EQIP (years 1-5)	Basic cover crop adoption (340)	80	$40.86	EQIP: $40.86/acre × 80 acres = $3,268.80
CSP (years 6-10)	Enhancement: Cover crop to reduce water quality degradation by utilizing excess soil nutrients (E340G)	80	$14.74	CSP-AAP: $14.74/acre × 80 acres = $1,179.20
Private carbon farming contract (year 3)	One-time bonus	80	$1	Private: $1/acre × 80 acres = $80
Private carbon farming contract (years 3-12)	Cover crop implementation	80	$6	Private: $6/acre × 80 acres = $480
Total payments over years 1-12: $27,120 or $28.25 per acre per year.				

[1] Payment rates for fiscal year 2023. Source: USDA (2023).

Disclosure

This publication is not intended to encourage or discourage enrollment in EQIP, CSP, or private carbon initiatives, but to inform agricultural stakeholders about those alternatives.

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References

Plastina, A. 2022. "How Do Data and Payments Flow Through Ag Carbon Programs?" Ag Decision Maker File A1-77. Iowa State University Extension and Outreach. www.extension.iastate.edu/agdm/crops/pdf/a1-77.pdf.

Plastina, A., and H. Jo. 2023. "Net Returns to Carbon Farming." Ag Decision Maker File A1-78. Iowa State University Extension and Outreach. www.extension.iastate.edu/agdm/crops/pdf/a1-78.pdf.

Plastina, A. and O. Wongpiyabovorn 2023. "How to Grow and Sell Carbon Credits in US Agriculture." Ag Decision Maker File A1-76. Iowa State University Extension and Outreach. www.extension.iastate.edu/agdm/crops/pdf/a1-76.pdf.

Sawadgo, W. and A. Plastina. 2022. "The Invisible Elephant: Disadoption of Conservation Practices in the United States" Choices Magazine. Volume 37. Quarter 1. www.choicesmagazine.org/choices-magazine/submitted-articles/the-invisible-elephant-disadoption-of-conservation-practices-in-the-united-states.

Swan, A., M. Easter, A. Chambers, K. Brown, S.A. Williams, J. Creque, J. Wick, K. Paustian. 2022. COMET-Planner Dataset, Version 3.0, Build 1, and COMET-Planner Report: Carbon and Greenhouse Gas Evaluation for NRCS Conservation Practice Planning. A companion report to www.comet-planner.com. Downloaded at www.comet-planner.com on 05/07/2023.

U.S. Department of Agriculture. 2019. "National Resource Concern List and Planting Criteria." Natural Resources Conservation Service. directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=44299.wba. Last accessed March 29, 2023.

U.S. Department of Agriculture. 2023. "Payment Schedules (Rates) by State." Natural Resources Conservation Service. www.nrcs.usda.gov/getting-assistance/payment-schedules.

Wongpiyabovorn, O. and A. Plastina. 2023. "Financial Support for Conservation Practices: EQIP and CSP." Ag Decision Maker File A1-39. Iowa State University Extension and Outreach. www.extension.iastate.edu/agdm/crops/pdf/a1-39.pdf.

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