Farm Bill Programs &

the Role of Crop Protection Tools

Aimpoint RESEARCH®

THE DIRECTIONS group

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Introduction

Pesticides are vital crop protection tools that support a robust farm economy in the United States. Of equal impact are Farm Bill programs, the success of which heavily relies on the availability of crop protection tools, especially glyphosate, the most widely used herbicide in the U.S.

The objective of the following analysis is to consider the impact of the Farm Bill's risk management, conservation, and nutrition programs under a scenario where access to crop protection products would be significantly restricted or lost. Specifically, state-by-state actions on product labeling that differ from the established conclusions of the Environmental Protection Agency (EPA) and ongoing court battles that could impact the future availability of crop protection tools, including glyphosate.[1]

Background

In July 2023, Aimpoint Research (now known as The Directions Group) produced the report **A Future Without Glyphosate.**[2] That report leveraged multiple research and analytical methods, including open-source research, economic modeling, subject-matter expert interviews, and military wargaming techniques to understand the complexities of glyphosate's impact on agriculture and outlined what the future could look like without it. The report concluded,

> *… if glyphosate were no longer available markets would adapt through substitution and adjusted practices,* ***but at a substantial cost to farmers and the environment****. U.S. farmers would bear the burden of increased input and operating costs with small farmers disproportionately affected. Further analysis reveals a cascading chain of likely higher-order effects and unintended consequences, the most impactful being the rapid release of additional greenhouse gases and the reversal of decades of conservation and sustainability gains****. The loss of glyphosate would not be trivial.***

While the original report did not focus on the means by which restrictions on, or a loss of, glyphosate could occur, it did identify the threat posed by ongoing court battles and a lack of legislative certainty in product labeling, noting that state actions on labeling regulations create a "serious practical threat to its manufacture and distribution." Those same actions applied not only to glyphosate but all crop protection tools, promise adverse impacts to the effectiveness and costs of the Farm Bill, as the following research and analysis confirms.

What is at Issue?

Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the EPA regulates pesticides, including how and when they can be used, and provides detailed information on the pesticide label. The EPA even specifically regulates the content of pesticide labels. Unlike virtually all other types of product labels, pesticide labels are legally enforceable. As the EPA notes, "… the label is the law."[3]

[1] This report was commissioned by Bayer. It was prepared independently by The Directions Group (formerly Aimpoint Research), and the conclusions contained in this report are its own.

[2] Report - Aimpoint Research

[3] Introduction to Pesticide Labels | US EPA

While states have the authority to regulate the sale and use of pesticides within their jurisdiction, they cannot impose labeling or packaging requirements in addition to, or different from, the scientific conclusions of the EPA for a registered pesticide. Yet some states have attempted to challenge that proposition.

Ultimately, allowing states to contradict EPA's scientific findings risks creating a **complex, inconsistent, and potentially unworkable collage of pesticide label rules.**

The result: such a patchwork of labeling requirements **would quickly disrupt commerce from availability, upstream in the supply chain, to distribution and manufacturing – leading many to question, as outlined in our original report, what a world without glyphosate could look like for farmers and the federal Farm Bill.**

This paper, by building on the farm-level economic and conservation analysis in our original work, evaluates the impacts a lack of legislative certainty in product labeling could have on critical Farm Bill programs and their long-term viability.

Role of Crop Protection

As the EPA notes in *Why We Use Pesticides,*[4] "Pesticides are used in agriculture to control weeds, insect infestation, and diseases." These pests harm crops' health and steal necessary nutrients, reducing productivity. Pest control products are used to reduce the competition from these pests and U.S. farmers make a substantial investment in crop protection to maintain their livelihoods. USDA's Economic Research Service (ERS) estimates that in 2024, on-farm use of these products will total $20.89 billion.[5]

Crops produced for food and feed face about 3,000 species of nematodes, 10,000 species of plant-eating insects, and 30,000 species of weeds.[6] Crops also face the threat of harmful micro-organisms, including fungi, many of which survive through weed hosts, underscoring the fundamental role of weed control. Further, changing climate patterns have the potential to bring new weeds, new insects, and new diseases into various regions of the U.S., posing even greater threats in the future.

New crop protection products are thoroughly evaluated by the EPA. To register a pesticide, the law requires manufacturers to provide the EPA with data from studies on the product's potential impact on human health and the environment. These required studies are listed in the Code of Federal Regulations (40 CFR Part 158) and the EPA may require manufacturers to submit additional data during the registration process. The EPA also works with other global regulatory bodies, including the E.U. and Canada, to incorporate the best and most rigorous scientific data available to evaluate pesticides when forming its regulations. In all, it takes an average of 12 years to move from the laboratory through research, testing, and regulatory review before these new products can be applied on farms. Consider, a new product discovery today would not be available in the market until 2036.

[4] Why We Use Pesticides | US EPA

[5] Value added by U.S. agriculture (includes net farm income) (usda.gov)

[6] CropLife International annual report

Additionally, it takes enormous financial investment, not only for research and business development costs, but in regulatory costs during the registration process. For example, the EPA maintains a list of cost estimates for required studies to support a pesticide's registration. The latest edition was published in April 2024,[7] showing costs for more than 425 potential studies ranging in cost from tens of thousands, to hundreds of thousands, to more than $2 million per test.

Finally, under Section 3(g) of FIFRA, the EPA also provides periodic reviews of registered pesticides. This science-based and comprehensive process approves products that are effective and safe for farmers, consumers, and the environment.

State efforts to counter national uniformity in pesticide labeling under this regulatory structure represent a significant disincentive for crop protection companies to develop new products.

Herbicide Use

While a state-by-state patchwork for pesticide labeling would prove adverse for all crop protection products, it is worth considering specifically the impact on herbicides. Weeds are the most pervasive pest that U.S. agriculture faces.

Weeds compete with crops for sunlight, water, and nutrients from the soil, and alter crop yields. Additionally, as noted above, they harbor insects and other disease-causing pests. Moreover, weeds can spread to native habitats threatening to destroy native plants and animals. Not surprisingly, therefore, herbicides make up about 76 percent of total pesticide use in the U.S. [8]

To put the threat of weeds into context, consider the field study research by the Weed Science Society of America, Potential yield loss in corn, soybean, dry bean, and sugar beet due to weed interference in North America.[9] This study measured the effect of not employing weed management tactics, showing that weed interference caused catastrophic losses.

50.3 percent yield loss in corn

Averaged across a 2007-2013 corn price of $4.94 per bushel, farm gate value would be reduced by $25.7 billion. Assuming a two-pass weed control program at herbicide plus application costs, there is a $7.25 return for every $1 invested in weed management.

52.1 percent yield loss in soybeans

Averaged across a 2007-2013 soybean price of $10.61 per bushel, farm gate value would be reduced by $16.2 billion. Assuming a two-pass weed control program at herbicide plus application costs, there is a $5.67 return for every $1 invested in weed management.

[7] Studies-cost-estimates-2024.pdf (epa.gov)

[8] 46734_eib124.pdf (usda.gov)

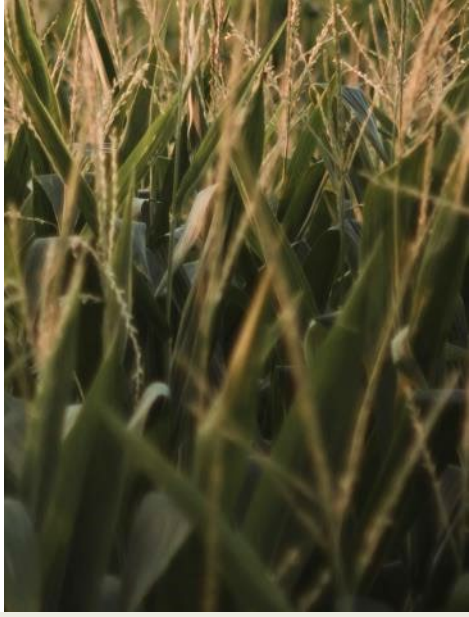
[9] Corn-soybean-drybean-and-sugarbeet.pdf (wssa.net)

70 percent yield loss in sugar beets

Averaged across 2002-2017, the value of this loss is $1.25 billion. Assuming a two-pass weed control program at herbicide plus application costs, there is a $23 return for every $1 invested in weed management.

71.4 percent yield loss in dry beans

Averaged across 2007-2016, assuming a two-pass weed control program at herbicide plus application costs, there is a $10.39 return for every $1 invested in weed management.



Herbicides are foundational to minimizing crop losses and essential for enabling farmers to use land, water, and other resources efficiently. That efficiency also helps reduce the carbon and energy footprint of agriculture, which provides meaningful environmental benefits. Finally, herbicides benefit consumers and federal feeding programs by ensuring access to a more diverse, high-quality, and affordable food supply.

Given that context on the importance of herbicides, glyphosate, which was first registered by the EPA in 1974, is the most widely used herbicide in the United States. Glyphosate's role is substantial: it simplifies weed control, allows more flexibility in the timing of application, and reduces or eliminates the need for other means of weed control, which could include more complex alternative chemistries or increased soil tillage. Further, glyphosate production practices provide added economic and environmental benefits, discussed in more detail in the following analysis.

Given glyphosate's essential role in U.S. crop production, any specific restriction on its availability or use poses especially serious risks to U.S. agricultural production and invites a host of unintended consequences, as outlined in our initial analysis.

Implications for the Farm Bill

Challenges to uniform labeling could be expected to catalyze a rapid succession of additional state-by-state label requirements. Such a situation would leave some crop protection companies facing a situation where it becomes financially unviable to navigate the regulatory landscape. Ultimately the entire production, supply, and distribution chain for crop protection products would be burdened and the costs of crop protection products would increase.

The following analysis considers the ramifications of such disruptions to pesticide use – specifically herbicides – on four pillar titles of the Farm Bill: commodity programs, conservation programs, nutrition programs, and crop insurance coverage.

Title I – Commodities

According to the USDA's National Agriculture Statistics Service's (NASS) *Agricultural Chemical Use Program*[10] survey, the use of herbicides for weed control overall, and glyphosate specifically, on key commodities covered under Title I is as follows:

Total Herbicide and Glyphosate Use by Key Crops under Title I		
Commodity	**% Acres Using Herbicides**	**% Acres Using Glyphosate**
Corn	96%	80%
Soybeans	96%	92%
Cotton	96%	89%
Wheat, Spring & Durum	95%	58%
Wheat, Winter	60%	24%
Barley	84%	33%
Sorghum	89%	71%
Oats	39%	20%
Rice	96%	37%
Peanuts	95%	21%

Source: USDA NASS, Aimpoint Research

In addition to the crops included in the NASS survey data, the EPA[11] also conducted research and analysis in 2019 to identify the use of glyphosate on a number of other crops covered under Title I of the Farm Bill. Those are listed in the table below:

Glyphosate Use by Other Field Crops under Title I	
Commodity	**% Acres using Glyphosate**
Canola	57%
Dry Beans/Peas	44%
Sunflowers	74%
Sugar Beets	98%
Sugar Cane	54%

Source: *EPA, Aimpoint Research*

A loss of herbicide availability and the resulting impact on supply, cost, and use, logically would provide farmers with some basic management choices:

- Employ less weed management on farmland resulting in lower yields;
- Absorb any increased cost for weed management practices resulting in reduced margins;
- Some combination of the two.

Two strong assumptions can be made about this dilemma:

First, as detailed above by the WSSA study of four crops covered under Title I support programs – corn, soybeans, dry beans, and sugar beets – **foregoing weed control is not an option for farmers**. That analysis showed the crop revenue losses from weed interference totaled $53.54 billion over the life of the study.

[10] USDA - National Agricultural Statistics Service - Surveys - Agricultural Chemical Use Program

[11] https://www.epa.gov/sites/default/files/2019-04/documents/glyphosate-response-comments-usage-benefits-final.pdf

Moreover, it can be inferred from those field study results that there is a correlation between incremental increased crop loss to weed interference and marginal reductions in weed management. Rationally, farmers would seek to minimize any reduction in weed control tactics to the extent that remains economically feasible. Therefore, understanding the economics of weed control options is fundamental.

As noted previously, the predictable impact on the commerce (production, supply, distribution, and regulatory compliance costs) of herbicides under a loss of certainty in product labeling would lead affected farmers to face an increasingly constrained supply of herbicides, ill-positioned inventories, and other disruptions in the supply chain. This would lead to higher costs for available herbicides still in use, impacting farm profitability. Farmers would have to:

1) absorb these higher costs;

Notably, in the case of glyphosate, this is particularly impactful. As detailed in our original report, alternative chemistries range from 109 percent to 158 percent more costly per acre than glyphosate.[12]

2) adopt other weed management practices, such as increased tillage, which comes with its own cost structure to be considered.

Regardless of a farmer's management decision for weed control, ***higher on-farm costs of production from a disruption to herbicide availability would reduce net farm income***.

First, a look at crop protection costs. As noted above, per our original report, the cost of five alternatives to glyphosate would all add to crop protection costs. The average among the alternative chemistries was 133 percent of the cost of glyphosate on a per acre basis. This finding is near the midpoint of the range found in the 2018 paper Assessing the Economic Impacts of Pesticide Regulations[13] which modeled the economic costs resulting from the loss of atrazine[14] for corn and pendimethalin[15] for soybeans due to regulatory action. A loss of atrazine was found to increase crop protection costs by 182 percent on a weighted average while a loss of pendimethalin for soybeans was found to result in an increase in crop protection costs by 73 percent on a weighted average. The analysis below quantifies the economic costs of the loss of glyphosate.

Table 1 below shows as a baseline the estimated cost of crop protection inputs and expected margins for a select nine Title I program crops. The crop protection costs, and total operating costs are from the USDA Economic Research Service's (ERS) semi-annual Commodity Cost and Returns[16] estimates for 2024. Note that total variable operating costs includes seed, fertilizer, fuel, interest on loans, repairs, custom technical services, and other variable expenses; it does not include allocated capital and fixed costs. The season average price forecast and yields are taken from the July 2024 World Agricultural Supply and Demand Estimates (WASDE) report[17] and are used to calculate the expected margin per acre.

[12] Report - Aimpoint Research @ p. 7.

[13] Schneider, U.A.; Rasche, L.; McCarl, B.A. Assessing the Economic Impacts of Pesticide Regulations. Agriculture 2018, 8, 53. https://doi.org/10.3390/agriculture8040053

[14] EPA latest action, July 8, 2024

[15] EPA latest action, July 31, 2024

[16] USDA ERS - Commodity Costs and Returns

[17] https://www.usda.gov/oce/commodity/wasde/wasde0724.pdf

Note some of the data for peanuts not included in the USDA data were taken from the University of Georgia Extension Service 2024 peanut outlook.[18]

Table 1: Estimated Operating Costs and Gross Margins in $USD per Acre

Crop	2024 Crop Protection Cost	Crop Protection % of Total Operating Costs	Total Operating Costs	2024/25 WASDE Season Average Price	WASDE Yield per acre	Unit	2024/25 Expected Gross Margin per Acre
Corn	$51.92	12%	$448.41	$4.30	181	bu	$329.89
Soybeans	$45.11	19%	$239.83	$11.10	52	bu	$337.37
Wheat, all*	$19.44	11%	$173.94	$5.70	51.8	bu	$121.32
Cotton	$91.07	17%	$547.33	$0.68	844	lbs	$26.59
Rice, total	$134.00	17%	$783.99	$15.60	76.54	cwt	$410.03
Peanuts	$151.55	24%	$634.48	$0.28	3,740	lbs	$394.02
Sorghum	$35.49	19%	$182.50	$4.30	69.2	bu	$115.06
Oats	$8.48	5%	$169.14	$3.60	74.2	bu	$97.98
Barley	$26.71	14%	$187.40	$6.30	70.9	bu	$259.27

70% winter, 25% spring, 5% durum* ***Source:* *USDA ERS, USDA WASDE, Aimpoint Research*

Table 2 shows the impact to crop protection costs and its expected impact on total operating costs and returns per acre from a potential loss of glyphosate and the resulting use of higher cost alternative chemistries. These estimates are based on a weighted average, factoring the percent of acres by crop treated with glyphosate per the NASS survey data (see table: Total Herbicide and Glyphosate Use by Key Crops under Title I). The final column calculates the impact on net farm income.

Table 2: Impact on Gross Margins and Net Farm Income from loss of Glyphosate

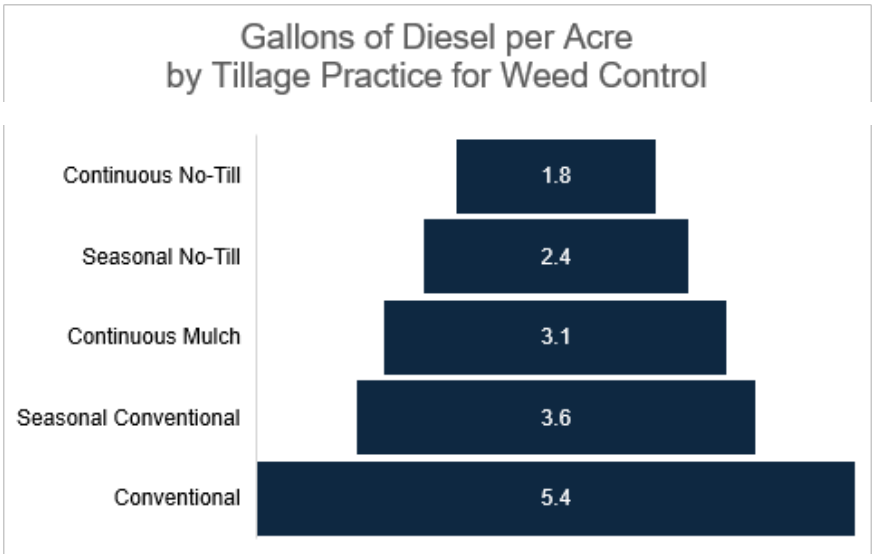
Crop	Adjusted Total Operating Cost with Crop Protection Cost Increase	Calculated Margin from Higher Crop Protection Cost	Table 1 Data Calculated Gross Margin per Acre	Change in Gross Margin	WASDE Acres (mlns) Planted 2024/25	Net Farm Income Lost from Increase in Crop Protection Costs
Corn	$461.70	$316.60	$329.89	-$13.29	91.5	-$1,216,174,080
Soybeans	$253.11	$324.09	$337.37	-$13.28	86.1	-$1,143,441,062
Wheat, all	$176.06	$119.20	$121.32	-$2.12	47.2	-$99,831,398
Cotton	$573.27	$0.65	$26.59	-$25.94	11.67	-$302,681,709
Rice, total	$799.86	$394.17	$410.03	-$15.87	2.94	-$46,644,864
Peanuts	$644.66	$383.84	$394.02	-$10.18	1.65	-$16,803,864
Sorghum	$190.56	$107.00	$115.06	-$8.06	6.4	-$51,605,299
Oats	$169.68	$97.44	$97.98	-$0.54	2.3	-$1,248,256
Barley	$190.22	$256.45	$259.27	-$2.82	2.6	-$7,333,498

Source: *Aimpoint Research calculations from USDA ERS, USDA WASDE data*

[18] Peanut 2024 Outlook | UGA Cooperative Extension

For these nine program crops, the added crop protection costs from a loss of glyphosate would total $2.89 billion in lost net farm revenue based on these 2024 cost estimates from USDA.

Second, a look at tillage costs. Farmers who adopt more intensive tillage practices for weed control in lieu of herbicide-enabled (especially glyphosate) practices would also see significant increases in their cost of production from higher on-farm fuel costs due to more field passes and greater horsepower needed for pulling heavy tillage equipment. For example, switching from glyphosate-enabled no-till for corn, soybeans, wheat, cotton, and other herbicide-tolerant crops to seasonal or continuous conventional tillage can increase per-acre fuel use between 100 and 200 percent.

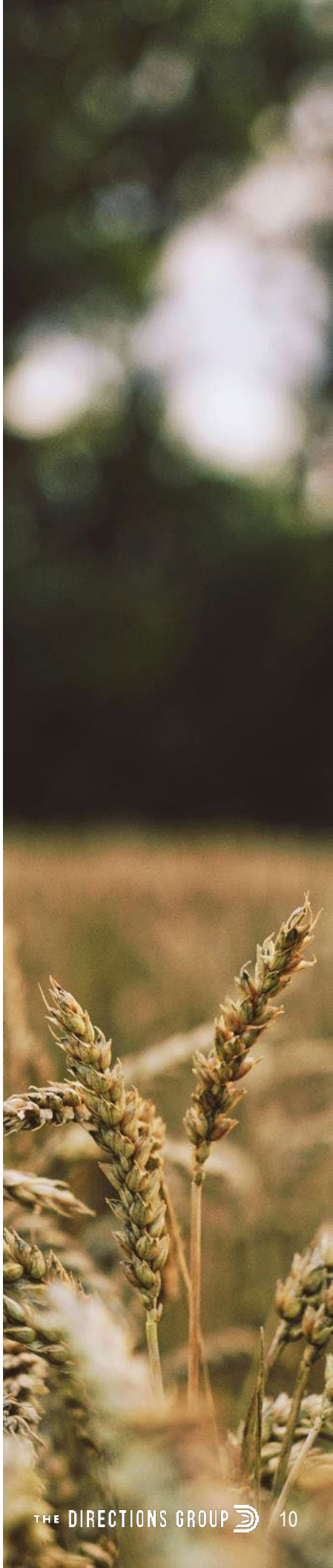


Source: *USDA Natural Resource Conservation Service*

The table below shows the scope of potentially losing glyphosate-enabled practices for six glyphosate-tolerant crops and reverting from glyphosate use to conventional tillage. This includes fallow land coming out of, and/or going into production. The calculations are based on 2018 to 2022 acres planted to these crops and the EPA's glyphosate usage data from 2019 referenced above. Further, an off-road diesel price of $4.01 per gallon[19] is used to calculate both application costs and tillage costs.

Cumulatively, for these six crops under Title I programs, and the addition of fallow land, weed control costs would increase by 103 percent if reverted to conventional tillage, more than doubling costs.

[19] Calculated with the 2023 average on-road diesel price of $4.60 per gallon, less $0.24 federal tax and average of $0.3474 in state taxes gallon, according to the U.S. Energy Information Agency (EIA)



Change in Costs From Replacing Glyphosate Practice with Tillage			
Commodity	**Glyphosate Practice Cost**	**Substitute Tillage Cost**	**Added Costs**
Corn	$771,878,431	$1,428,022,296	$656,143,865
Soybeans	$915,128,585	$1,766,016,986	$850,888,401
Cotton	$158,667,865	$181,418,406	$22,750,541
Wheat	$114,449,679	$826,590,106	$712,140,426
Canola	$21,466,073	$34,807,221	$13,341,148
Sugar Beets	$47,151,780	$82,374,984	$35,223,204
Fallow Land*	$295,693,020	$418,918,487	$123,225,467
TOTAL	$2,324,435,433	$4,738,148,485	$2,413,713,052

Source: *EPA, Watts and Associates, Aimpoint Research*

Labor costs – both direct hired labor and the opportunity costs of farmer operators' unpaid labor and overhead – would increase with more tillage. For example, a farmer who plows 15 acres per hour would add more than 33 hours per single field pass over 500 acres by adopting additional tillage practices. Conventional tillage can require between four to eight field passes compared to one or two for no-till practices.

Per USDA's Farm Labor survey,[20] the average hourly wage for hired equipment operators is $19.05. The farm management/off-farm income opportunity cost of unpaid labor for a farm owner is estimated at $37. **Increasing field passes from two for no-till to a maximum of eight for conventional tillage would result in $3,772 in added hired labor costs ($7.54 per acre) and $7,326 in farm management opportunity costs ($14.65 per acre).**

Necessary investments in equipment, implements, and technology could lead to higher capital costs and more borrowing as farmers adopt more intensive tillage practices, with expected impacts on farm debt-to-equity ratios.

These added operating expenses increase farmers' breakeven costs, reducing expected net farm income. This would result in a lower effective safety net under the Title I commodity support programs which are based on a statutorily set commodity price or average gross revenue.

This disconnect between the rising production costs and the Title I program safety net was explained concisely by the University of Georgia Extension Service in its Peanut 2024 Outlook,

The peanut market remained strong in 2023, but high input costs remained a major challenge. However, production costs rose once again to a level such that farmers struggled to make a profit even with decade-high peanut prices.

> *Peanut prices are expected to remain elevated and set a 10-year high for a second consecutive year. … Despite this, peanut profitability remains a challenge.* ***… The farm bill safety net provisions in Title I also have not provided relief for rising peanut input costs*** *(emphasis added).*

[20] Publication | Farm Labor | ID: x920fw89s | USDA Economics, Statistics and Market Information System (cornell.edu)

Since 2002, Title I has provided counter-cyclical mechanisms to deliver safety net assistance to farmers. The primary safety net features for the past decade, implemented with the 2014 Farm Bill, are the Price Loss Coverage (PLC) program and the Agricultural Risk Coverage (ARC) program. While the current debate over the Farm Bill reauthorization is ongoing, there have been no proposals to remove, replace, or fundamentally restructure these programs.

- **PLC covers price risk when prices fall below a statutorily set reference price.**
- **ARC provides support based on a gross revenue benchmark.**

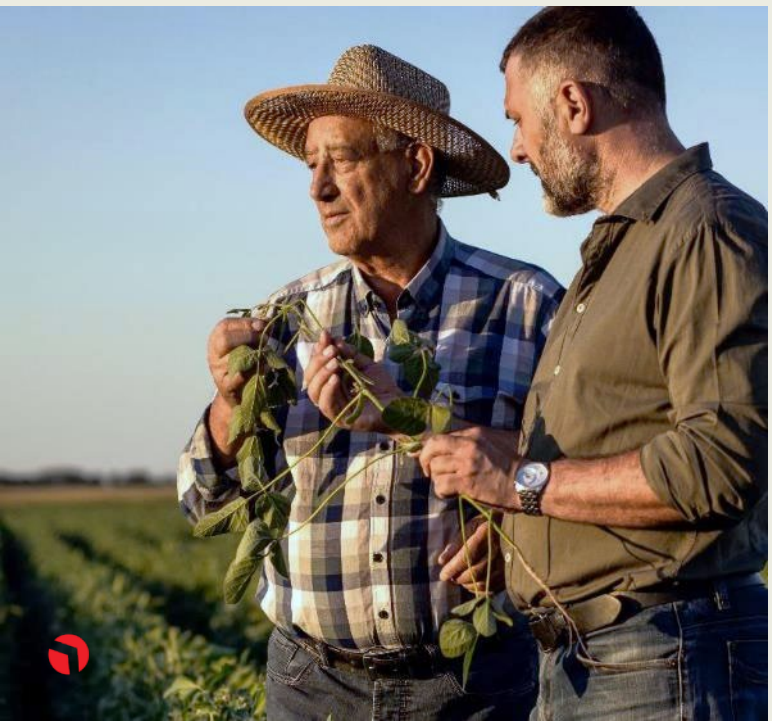
The ARC benchmark is calculated as a five-year Olympic average (eliminating the high and low) of national average commodity prices and county crop yields. Crop yields would potentially decrease in certain areas affected by herbicide constraints.

The threshold to trigger a safety net payment is when the average price multiplied by the average county yield for the crop falls below 86 percent of the calculated benchmark. ARC is referred to as a shallow loss plan because losses are capped at 10 percent of the benchmark, i.e., covering only 86 percent to 76 percent of the benchmark.

Ultimately, the combined effect of production, financial, and economic shifts from a loss of crop protection tools, especially critical herbicides such as glyphosate, would adversely impact net farm income notwithstanding reference prices or historic gross revenue averages under PLC and ARC making these two programs less effective.

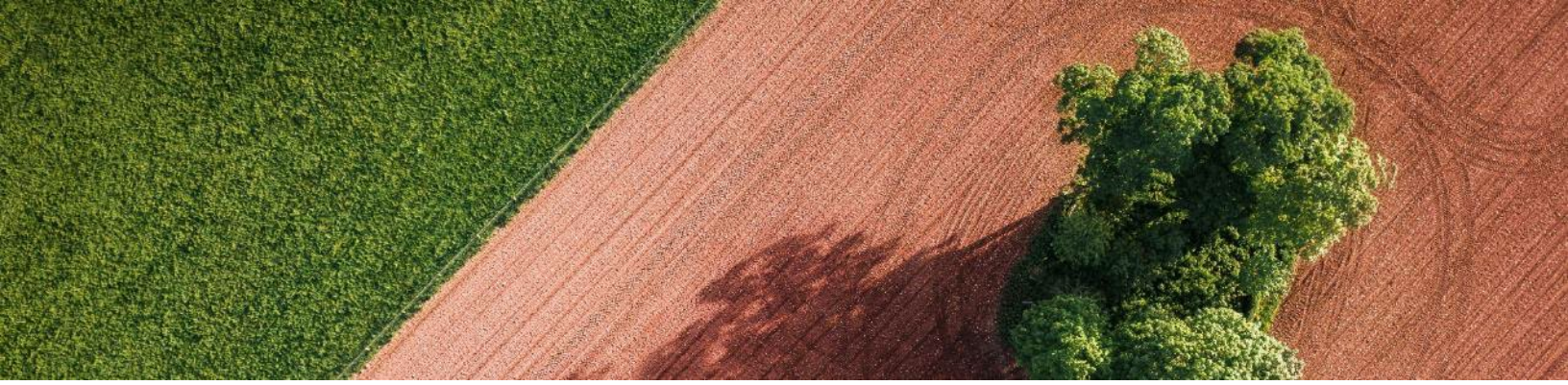
Under the scenarios modeled above:

- For these nine program crops of corn, soybeans, wheat, rice, peanuts, sorghum, oats, and barley, the added crop protection costs from a loss of glyphosate would total $2.89 billion in lost net farm revenue based on these 2024 cost estimates from USDA.
- Cumulatively, for the six crops corn, soybeans, cotton, wheat, canola, and sugar beets, as well as fallow land, reverting to conventional tillage for weed control would add $2.414 billion in costs, more than doubling the costs from glyphosate practices.
- Increasing field passes from two for no-till to a maximum of eight for conventional tillage on a 500-acre farm would result in $3,772 in added hired labor costs ($7.54 per acre) and/or $7,326 in farm management opportunity costs ($14.65 per acre).
- The Farm Bill safety net provisions in Title I do not provide relief for rising input costs.



These estimates correlate to the results of the wargaming exercise in our original report, which leveraged the insights of outside expert advisors:

- Smaller producers operating at higher costs and lower scale experience a lack of sustainable profitability and are more likely to exit crop production. Chapter 12 bankruptcy filings increase. Costly ad hoc relief payments from Congress increase.
- The combined effect of financial and economic shifts creates new political pressures for the next iteration of the Farm Bill, leading to proposals for a fundamental restructuring of programs under Title I.
- The farm policy debate becomes more contentious.

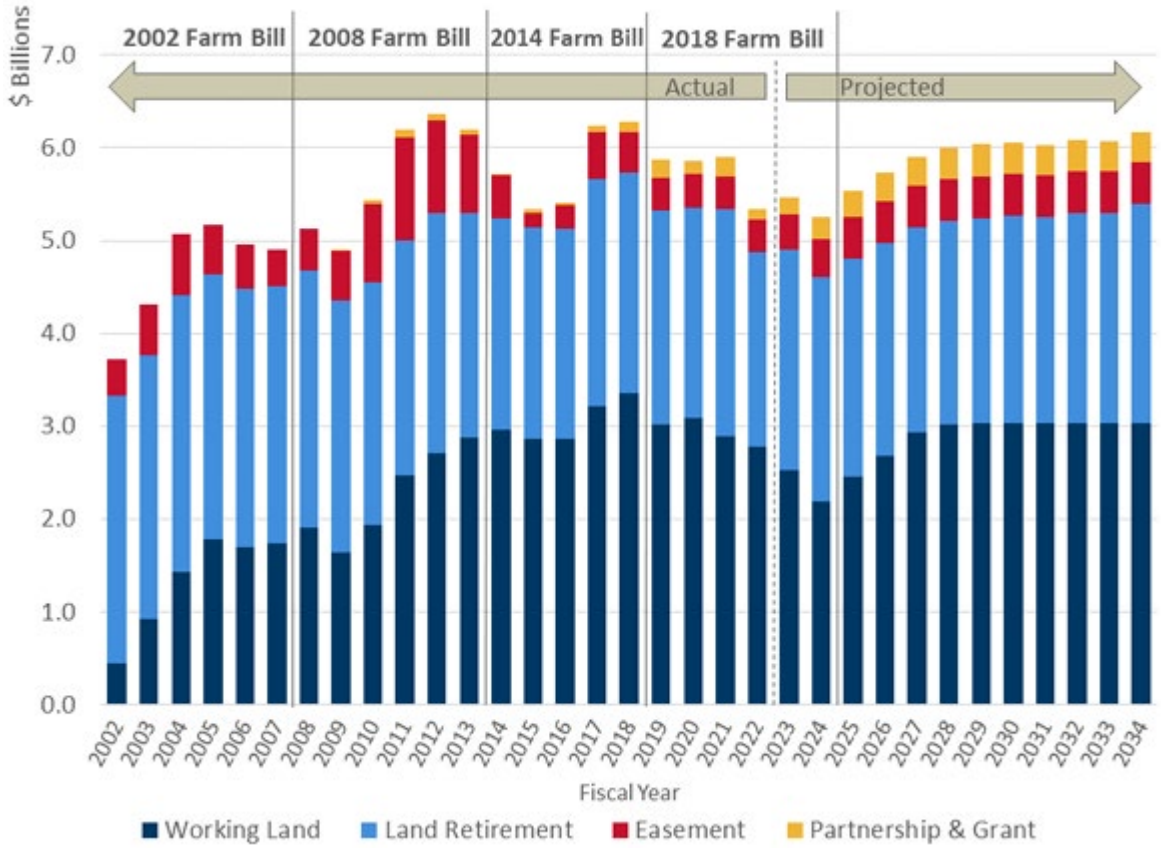


Title I – Conservation

Conservation programs can generally be grouped into the following categories:

- Land retirement provides payments for idling production;
- Easements provides payments for long-term or permanent land use restrictions;
- Partnerships and grants employ agreements to leverage federal grants with non-federal funds, often on a regional basis;
- Working land programs

Working land programs allow farmers to continue production while implementing conservation practices that address natural resource concerns. These programs, on average, are about half of conservation program spending, having grown significantly since the 2002 Farm Bill. Much of this growth reflects the evolution of new conservation technologies such as precision agriculture and herbicide-resistant crop varieties. Others support more on-farm conservation practices, such as reduced tillage and cover cropping.



Source: *Congressional Research Service*

The two largest working land programs are the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP). Both programs provide technical assistance to guide decisions on the most appropriate and effective practices to apply to a farm. Further, both provide financial assistance on a cost-share basis for implementing various conservation practices.

EQIP is designed to support farmers who adopt or transition to conservation practices, while CSP is primarily for producers who have already implemented significant conservation practices and are looking to maintain, improve, or expand their conservation efforts.

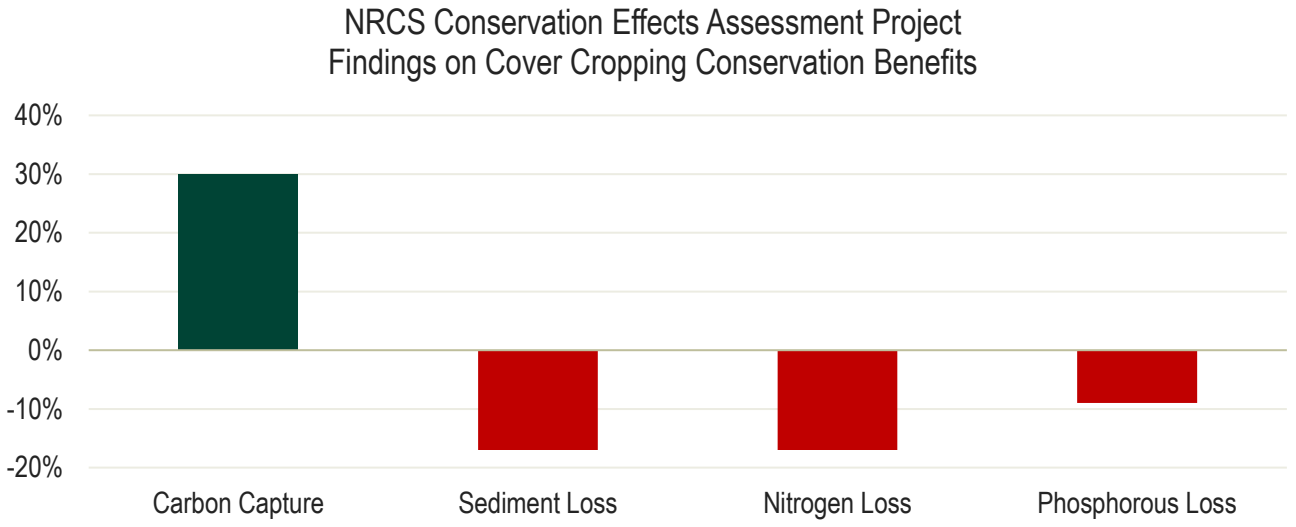
Below is a summary of the financial assistance provided directly to farmers (i.e., excluding technical assistance costs) specifically for cover cropping, conservation tillage, and no-till practices. Funding for fiscal years 2017-2022 reflects the underlying baseline Title II program policies provided by the 2018 Farm Bill still in effect. Both cover cropping and reduced tillage are currently considered Climate Smart practices by the USDA's Natural Resource Conservation Service (NRCS).

FY 2017 – 2022 Conservation Payments by Program and Practice		
	Cover Cropping	**Tillage Practices**
EQIP	$540,812,892	$65,163,481
CSP	$14,017,220	$11,863,155
Total	$554,830,112	$77,026,636

Source: *EWG Conservation Database || the United States II USDA Conservation Programs*

Of the hundreds of conservation practices supported by EQIP, transitioning to cover cropping is the single largest practice category funded under the program. Notably, this is despite a statutory program requirement that 50 percent of all funding must be dedicated to livestock production practices. According to the Census of Agriculture[21] published by NASS over the same 2017-2022 period, cover cropping increased by 2.595 million acres, an increase of nearly 17 percent.

The conservation benefits of cover cropping include suppressing weeds, slowing the evolution of herbicide resistance in weeds, protecting soil from erosion and runoff, and enhancing soil fertility. According to the Conservation Effects Assessment Project (CEAP)[22] of the NRCS, where cover crops were part of the rotation, gains in soil carbon capture were nearly 30 percent higher than where cover cropping was not used. Likewise, sediment and nitrogen losses were reduced by 17 percent, and total phosphorus loss by nine percent.



Farmers' adoption of cover cropping practices is closely aligned with their costs of production and returns per acre, making conservation program cost-sharing critical. As reported by the Iowa Farm Bureau Federation, researchers led by the Agroecosystems Sustainability Center of the Institute for Sustainability, Energy, and Environment at the University of Illinois have found,

> *… the increase in cover crop adoption is highly correlated to the funding from federal and state conservation programs. These and similar incentive programs could play an important role in promoting the expanded adoption of cover crops.*[23]

[21] USDA - National Agricultural Statistics Service - 2022 Census of Agriculture - Volume 1, Chapter 1: U.S. National Level Data

[22] Natural Resource Conservation Service, USDA, *Conservation Practices on Cultivated Cropland: A Comparison of CEAP I and CEAP II Survey Data and Modeling*, March 2022, https://www.nrcs.usda.gov/sites/default/files/2022-09/CEAP-Croplands-ConservationPracticesonCultivatedCroplands-Report-March2022.pdf

[23] *Zhou, Q., Guan, K., Wang, S., Jiang, C., Huang, Y., Peng, B., et al. (2022). Recent rapid increase of cover crop adoption across the U.S. Midwest detected by fusing multi-source satellite data. Geophysical Research Letters, 49, e2022GL100249. https://doi.org/10.1029/2022GL100249*

Even with conservation program technical assistance and cost-sharing incentives, herbicides remain a foundational tool to transition a field from cover crop to cash crop without the need for seed bed tillage. Terminating the cover crop is often done with a combination of herbicides, but the most widely used herbicide in the mix is glyphosate. It is an integral part of terminating both rye and wheat as well as legume cover crops, due to its broad-spectrum effectiveness that is lacking in other alternatives.

Disruptions to the access of herbicides as a weed management tool would undermine the Farm Bill's investment in cover cropping and the conservation benefits it generates.

Finally, as detailed above, conservation practices such as conservation tillage and no-till, provide their own inherent economic incentives in lower fuel and labor costs. Moreover, it is important to note that these practices come with vast conservation benefits, as described in our original report, highlighted below.

Again, per NRCS' CEAP data, measured over a decade, from a 2003-2006 benchmark assessment and then again in a 2013-2016 follow-up assessment, conservation tillage systems yielded quantifiable soil, water, and air quality benefits.

Overview of Resource Benefits from Conservation Tillage and No-Till *from CEAP I to CEAP II*

Resource Concern	Per Acre % Change	Total Volume Change	Unit
Sediment	-21%	-73,695,526	tons
Irrigation Water	-19%	-6,977,438	acre/feet
Water Erosion	-12%	-69,966,098	tons
Wind Erosion	-15%	-93,753,394	tons
Fuel Use (diesel equiv)	-10%	-110,000,000	gallons
CO_2 equivalent emissions		-1,221,000	CO_2e
Soil Carbon	39%	+8,862,346	tons
CO_2 equivalent sequestration		+32,495,269	CO_2e

Source: *USDA Natural Resource Conservation Service CEAP II Cropland Assessment 2013-2016, EPA, Aimpoint Research*

Without working land programs there would be increased policy pressure to expand land retirement under Title II, such as the Conservation Reserve Program (CRP). CRP provides payments to farmland owners to convert cropland to long-term grass, tree, and wetland covers, which all provide significant conservation value.

However, the land retired is based on an Environmental Benefits Index (EBI) score to ensure that land enrolled in CRP provides the most environmentally beneficial results. Though, with increasing weed pressure, reduced yields, and lower crop production margins resulting from restrictive labeling regulations for herbicides, there would be increased economic - not conservation - incentives for farmers to offer land to be idled under the CRP. Such a shift in incentives would undermine the environmental benefits per enrolled acre of the CRP and take otherwise productive land out of production.

This shift would be counter to the current trend toward working land conservation. Land under conservation tillage and no-till is still producing food, fiber, and renewable energy feedstocks, while improving rainfall infiltration rates and soil water-holding capacity, increasing drought resilience by reducing the impact of drought on crop yields, and providing carbon capture and reduction, per the table above. These can be considered the gains made through working land conservation programs.

Note that combining the soil carbon capture and reduced on-farm fuel emissions from the CEAP data is equivalent to 33.72 million tons of CO2; compare that to USDA's assessment[24] that nearly 21 million acres in the CRP prevent approximately 12 million tons of CO2 emissions.

The metrics from NRCS' CEAP data are equal to the emissions from 6.8 million gasoline-powered passenger cars driven for a year, or the electricity use of 5.95 million homes.[25]

These conservation gains would start to unravel if the availability of herbicides, especially glyphosate, which enables conservation practices, were to become restricted through a loss of federal labeling certainty.

The analysis conducted above shows that a disruption to the access to herbicides would:

- Threaten the long-term trend toward working land conservation potentially leading to more idled U.S. farmland.
- Undermine the Farm Bill's $632 million investment in cover cropping through EQIP and CSP.
- Negate the massive gains made in carbon capture, sediment loss, nitrogen loss, and phosphorus loss.

Title IV – Nutrition

Title IV includes domestic food programs administered by the USDA. Nutrition programs account for approximately 80 percent of total Farm Bill spending. To provide a scope of these programs, consider the following overview:

- According to the Department's Food and Nutrition Assistance Landscape, Fiscal Year 2023: Approximately 42.1 million people participated each month in the Supplemental Nutrition Assistance Program (SNAP) – which was the highest participation since 2017. Average monthly SNAP benefits in 2023 were $211.93.
- On average, 6.6 million people participated monthly in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). 22.4 percent of recipients were infants, marking the first increase in participation since 2009, while children (aged 1 to 4 years) made up 55 percent, and women made up 22.6 percent. Monthly benefits range from $25 to $49.

[24] USDA Announces New Initiative to Quantify Climate Benefits of Conservation Reserve Program

[25] Environmental Protection Agency, Greenhouse Gas Equivalencies Calculator, updated April, 2023, Greenhouse Gas Equivalencies Calculator | US EPA Greenhouse Gas Equivalencies Calculator | US EPA, accessed May 2023.

- A total of 8.8 billion meals were served across the National School Lunch Program (NSLP). Of which, 4.6 billion meals with federal reimbursement rates ranging from $0.40 for paid meals to $4.25 for free meals. The School Breakfast Program (SBP), Child and Adult Care Feed Program (CACFP), and Summer Food Service Program (SFSP) served 2.4 billion, 1.7 billion, and 136 million meals, respectively.

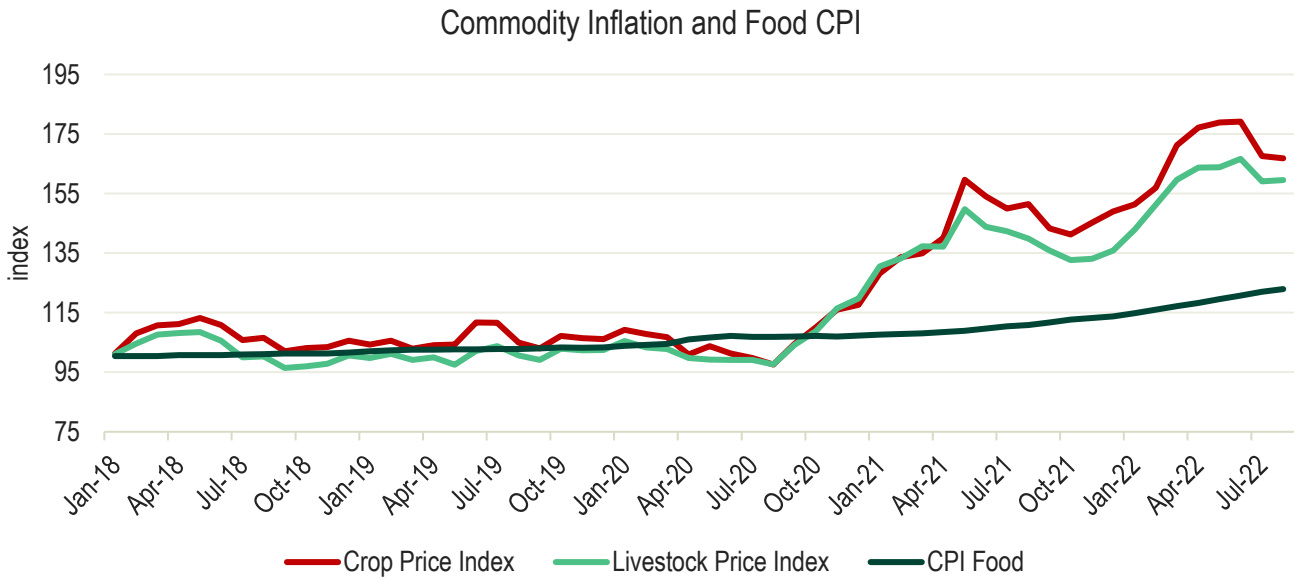
SNAP purchasing power is affected not only by program outlays, but also by food inflation. Short-term inflation erodes the value of program benefits, resulting in less individual purchasing power. Over the medium to longer term, food inflation and inflation adjustment mechanisms built into the program increase the budgetary outlays. Thus, it is useful to consider the effect that a loss of crop protection products, and the added cost of production as demonstrated in the analysis above in the Title I section, could have on food inflation and the Nutrition Title.

Food inflation reflects many variables. Demand-side dynamics, such as consumer preferences and income, as well as macro factors, such as monetary policy, the general rate of inflation across the economy, as well as the value of the U.S. dollar are drivers of what is known as "demand-pull" inflation. On the commodity cost contribution to food inflation, as noted in a paper from Purdue University's Center for Commercial Agriculture[26] "When production costs increase prices, we have cost-push inflation." Cost-push inflation includes commodity prices and on-farm expenses.

That paper explains that technology changes are often incorporated into the cost-push side of inflation, typically reducing inflationary pressures. As the authors note, "technological change tends to reduce prices." In the case of weed control, improvements in technology over the past 25 years include herbicide-tolerant crops that allow the over-the-top application of herbicides, such as glyphosate, for effective weed control and substantial cost savings. However, a loss of effective weed control and efficient production technology would have the opposite effect over the longer-run.

While the cost-push impact of higher commodity prices on food inflation is intuitive, isolating the commodity price impact among the many and interrelated variables that lead to final consumer food inflation is highly complex. Commodity markets are inherently volatile, and processors and manufacturers typically resist passing through increased commodity costs when those costs are in the general range of expected price volatility, or when those costs are expected to be shorter term. This principle, known as "price maintenance," happens at the wholesale and retail level. Also, notably, reductions in commodity costs are not always passed through to retail prices as quickly as increased costs. Larger or longer-term cost increases are more likely to be passed through the value chain. The following chart from Bureau of Labor Statistics (BLS) data illustrates this dynamic.

[26] Trends in General Inflation and Farm Input Prices - Center for Commercial Agriculture (purdue.edu)



Source: *BLS, Aimpoint Research*

This chart shows how post pandemic increases in commodity prices impacted consumer food inflation. The commodity index reflects supply and demand fundamentals in the commodity markets, but also increased production costs. Based on USDA data for input costs – including fuel, fertilizer, as well as pesticides – the average cost of production in 2022, in dollars per acre, grew significantly from both 2020 and 2021. The 2022 estimated total cost of production, and the two-year growth, was: corn $911/per acre at 34 percent; cotton $876 per acre at 28 percent, soybeans $621 per acre at 26 percent; wheat $431 at 34 percent. Annual food at home inflation for 2021 grew 6.5 percent and 11.8 percent in 2022 – the highest rate since 1979. It is important to note, however, other demand side factors also played into food inflation over this period.

To the extent that commodity production costs increase commodity prices that are passed through to retail prices, the effect typically diminishes in amplitude at each stage of processing and production due to price maintenance. Final food prices include other costs through 11 different segments of the supply chain, all of which impact final retail prices. USDA's ERS estimates that the farm share of the retail food dollar has averaged 16.6 cents over 1993 to 2022, which includes an average of 2.7 cents contribution from inputs over that same period. The remainder goes to processing, packaging, distribution, financing, advertising and marketing.

Based on the calculations in the section on Title I impacts, a loss of glyphosate can be considered to increase total operating costs on the nine program crops listed in Table 1 and Table 2 by an average of 2.7 percent, which could be passed through to commodity prices. This includes three percent for corn and 5.5 percent for soybeans, the most affected commodities. Less than 100 percent of commodity price increases are passed through to retail prices due to price maintenance. To estimate the likely impact of commodity prices on food inflation, the analysis relies on the following chart.

20-Year Inflation Index Averages - *2004 to 2023*

Source: *USDA ERS, Aimpoint Research*

The chart shows the long-term 20-year average of the producer price index (PPI) from commodity level to finished consumer food products and the retail food at home consumer price index. From this data, some basic observations can be made to illustrate the potential impact of commodity prices on food inflation. Over the long term shown above, which includes periods of commodity price increases and decreases, the food-at-home CPI is about 63 percent of the commodity PPI.

Assuming the above 20-year averages for benchmarking purposes – although not an econometric model, which would include too many unknown variables – this means that the loss of glyphosate, resulting in a 2.7 percent increase in commodity prices, could be reasonably expected to result in up to a 1.7 percent commodity cost pass through to the food-at-home CPI. This would be 100 basis points higher than USDA's baseline CPI forecast of 0.7 percent for 2025, representing an additional 1.0 percent increase in the CPI. That would add directly to the cost of SNAP.

CBO SNAP Spending Baseline and Impact of Additional 1% CPI

Year	SNAP Spending	Cost of Additional Inflation
2025	$103,948,000,000	$1,039,480,000
2026	$103,951,000,000	$1,039,510,000
2027	$106,687,000,000	$1,066,870,000
2028	$107,472,000,000	$1,074,720,000
2029	$108,378,000,000	$1,083,780,000

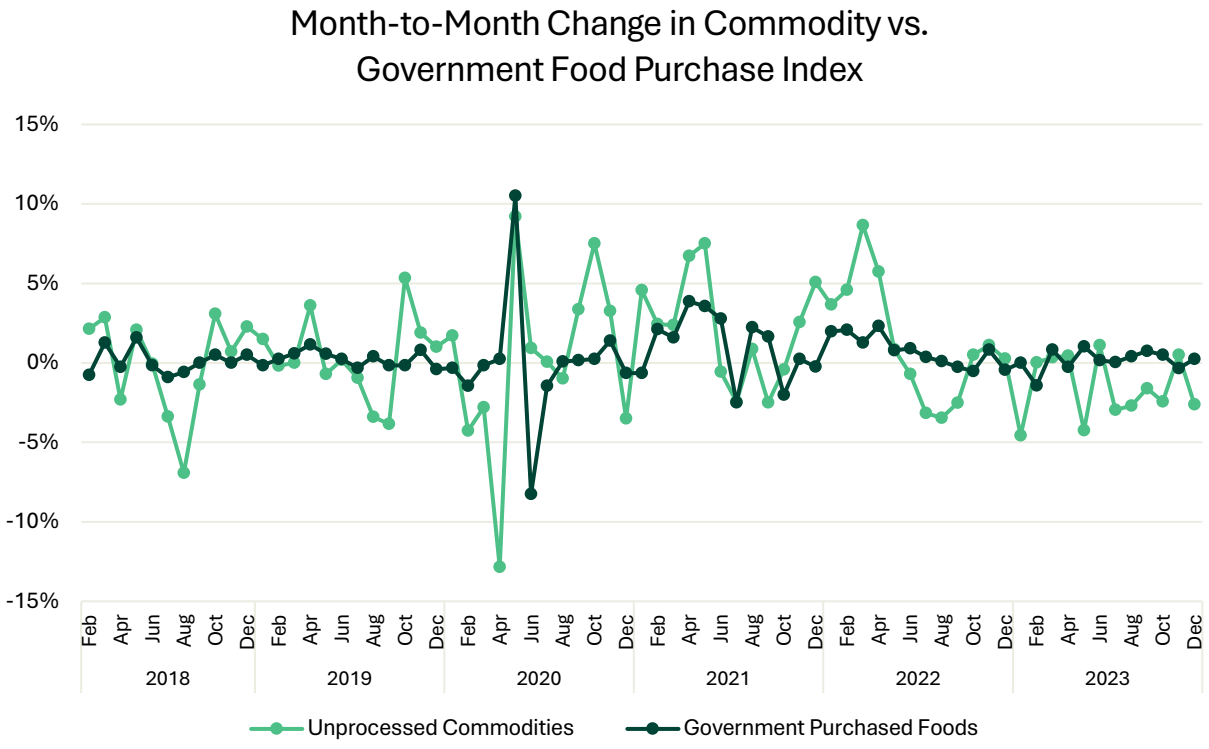
Source: *Details About Baseline Projections for Selected Programs | Congressional Budget Office (cbo.gov), Aimpoint Research*

The above spending estimates are from the June 2024 Congressional Budget Office (CBO) baseline forecasts for SNAP benefits excluding administrative coasts.

- An additional one percent increase in CPI food inflation resulting from cost-push factors and higher commodity production costs from a loss of glyphosate could average an additional $1.06 billion to the costs of SNAP per year.
- Over the life of the 2025 to 2029 Farm Bill, the total cost of a one percent increase in food inflation would add $5.3 billion to the cost of SNAP.

Commodity price inflation also impacts other USDA nutrition programs. While SNAP expenditures reflect program benefits spent on food at the retail sector, other nutrition programs include USDA commodity and food procurement costs. As explained above, the pass through of commodity costs typically diminishes in amplitude at each stage of processing and production. Thus, the pass through to wholesale food prices is typically higher than to final retail prices. Based on the long-term averages, the final wholesale price index is about 70 percent of the commodity PPI.

Indeed, the BLS maintains an index for government purchased foods; that index correlates more closely to the commodity-based unprocessed foodstuff and feedstuffs index than does the CPI.



Source: *USDA ERS, Aimpoint Research*

Based on a scenario of higher production costs and commodity prices from a loss of glyphosate, commodity procurement costs could increase up to 2.7 percent and a pass through of commodity costs to child nutrition programs could be expected to be up to 1.9 percent.

CBO Childhood Nutrition Program Spending Baseline and Impact of Commodity Inflation Pass through					
Year	Commodity Procurement	Effect of 2.7% Cost Increase	Total Outlays for Child Nutrition (excl commodity purchases)	Effect of 1.9% Increase in Cost of Food	Total Increase in Costs
2025	$1,972,000,000	$53,244,000	$14,952,000,000	$284,088,000	$337,332,000
2026	$2,120,000,000	$57,240,000	$15,816,000,000	$300,504,000	$357,744,000
2027	$2,248,900,000	$60,720,300	$15,687,100,000	$298,054,900	$358,775,200
2028	$2,331,000,000	$62,937,000	$16,467,000,000	$312,873,000	$375,810,000
2029	$2,403,000,000	$64,881,000	$16,914,000,000	$321,366,000	$386,247,000

Source: *Details About Baseline Projections for Selected Programs | Congressional Budget Office (cbo.gov), Aimpoint Research*

The additional costs to USDA commodity procurement resulting from cost-push factors and higher commodity production costs from a loss of glyphosate could average more than an additional $386 million to the costs of childhood nutrition annually.

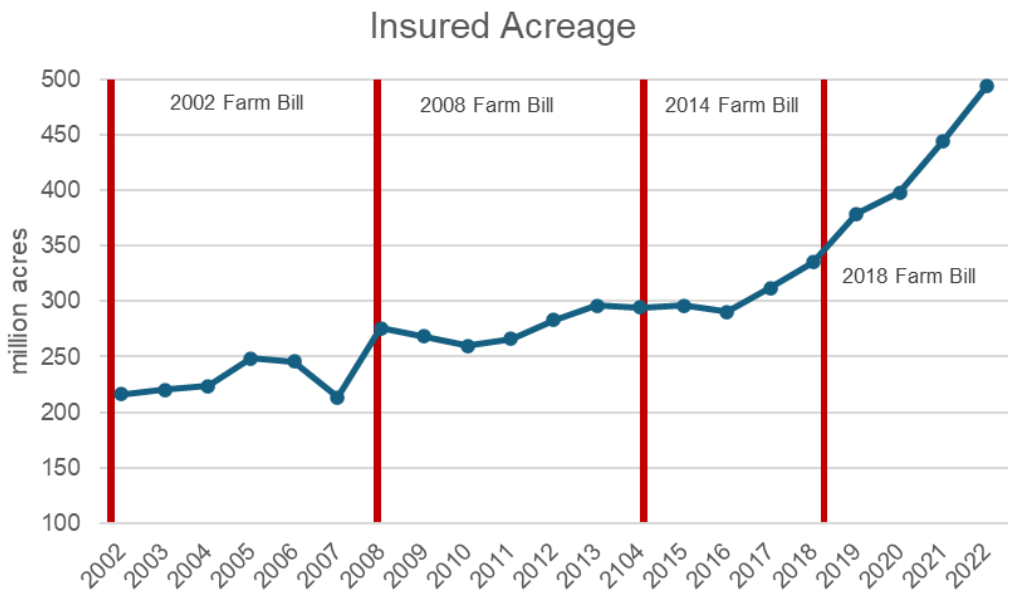
Over the life of the 2025 to 2029 Farm Bill, 1.9 percent in cost of commodity procurement cost could add more than $1.8 billion to the cost of childhood nutrition programs.

The analysis conducted above shows that the impact of a loss of glyphosate could

- Increase the cost to nutrition programs outlays by $7.1 billion over the life of the 2025 to 2029 Farm Bill.

Title XI – Crop Insurance

In recent years, U.S. farmers have purchased more than 2.3 million federal crop insurance policies. Crop insurance, along with the Title I commodity support programs, is a central part of the federal farm safety net. Indeed, many producers and policymakers consider crop insurance to be the cornerstone of risk management. Over the last three Farm Bills, Congress has expanded crop insurance to cover more commodities and more types of risks, with increasingly sophisticated and effective policies benefiting producers.



Source: *USDA Economic Research Service, Risk Management Agency, Aimpoint Research*

The largest growth of insured acres has come in pasture, hay, and forage crops, which are important to livestock and dairy production and reliant on herbicide production practices, including glyphosate. Weed pressures lead to lower yields, lower quality of forage, lower cattle weight gain, livestock illness from toxic weeds, and ultimately reduced land values.

Under the federal crop insurance program, pesticide use is addressed by the "Good Farming Practices" (GFP) requirements which must be followed in order for a crop insurance policy to be valid. GFPs are defined as:

> *The production methods utilized to produce the insured crop and allow it to make normal progress toward maturity and produce at least the yield used to determine the production guarantee or amount of insurance, including any adjustments for late planted acreage, which are: (1) for conventional and sustainable farming practices, those generally recognized by agricultural experts for the area; …*

A practical example would be whether adequate herbicides were applied on insured corn and soybean crops in a timely manner to control weeds, which would allow those crops to make normal progress toward maturity and produce at least the yield on which the production guarantee is based.

- If there were any losses of crop protection tools, GFPs would have to be adjusted accordingly, adding confusion and complexity to crop insurance decisions and coverage.
- **If GFPs were to be adjusted, there would be a considerable risk of additional losses and a corresponding increase in indemnities paid out under the crop insurance program, raising its costs.**

Such a situation would also lead to a lower actual production history (APH) for affected farmers with APH crop insurance policies. APH policies insure against yield losses, with a producer selecting the percent of average yields (starting at 55 percent and going up to 85 percent in some cases) and the percent of the crop price established annually by USDA's Risk Management Agency (RMA). **Under this scenario, farmers would face lower coverage guarantees via crop insurance.**

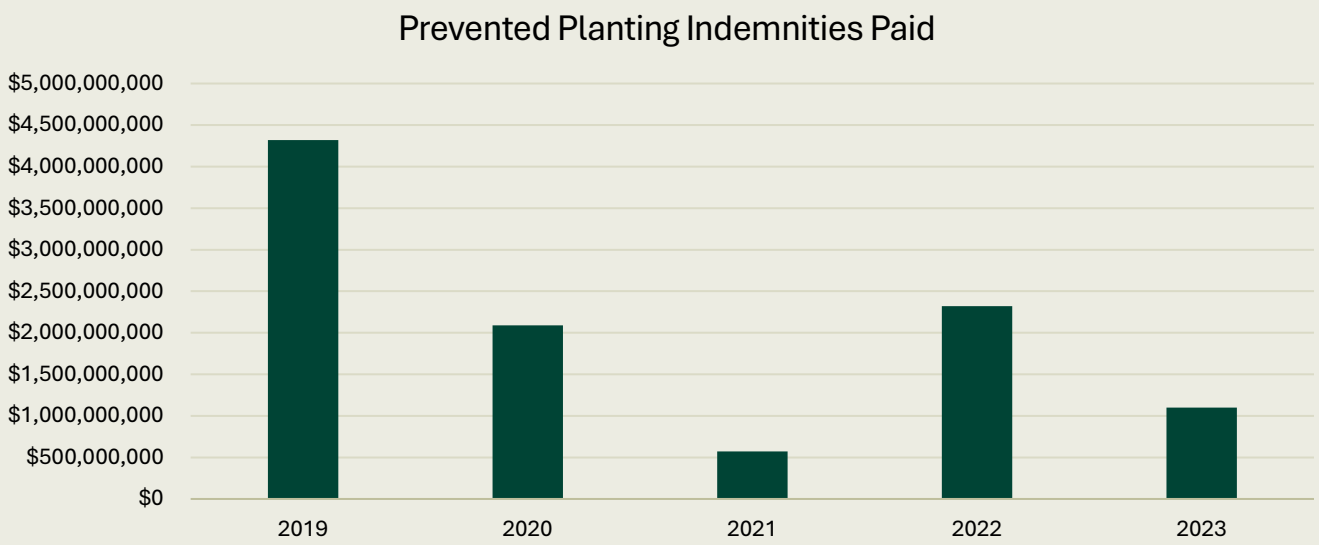
Since 2016, NRCS conservation practices have increasingly been designated as GFPs because of the benefits for both conservation and production. These practices, most of which are enabled by herbicides, such as glyphosate, have positive implications for crop insurance, especially in reducing prevented planting insurance claims.

A recent article in the American Journal of Agricultural Economics[27] found that

> *… counties with higher cover crop adoption rates tend to have lower levels of crop insurance losses due to prevented planting. The resulting reduction in prevented planting risk also becomes larger with longer-term, multi-year cover crop use.*

The U.S. federal crop insurance program offers "prevented planting" coverage, which pays indemnities if insured growers are unable to plant their crops due to adverse weather.

[27] Won, Sunjae, Roderick M. Rejesus, Barry K. Goodwin, and Serkan Aglasan. 2024. "Understanding the Effect of Cover Crop Use on Prevented Planting Losses." American Journal of Agricultural Economics 106(2): 659–683.



Source: *USDA Risk Management Agency Summary of Business, Aimpoint Research*

However, a significant percentage of farmers in the Midwest using cover crops and no-till practices reported less water on their fields, allowing them to plant.

A cooperative agreement with the USDA and partnership with the University of Illinois, AGree, a research initiative of the Meridian Institute, developed the Conservation and Crop Insurance Research Pilot to analyze data from six states – Indiana, Illinois, Iowa, Missouri, Minnesota, and South Dakota – to better understand how the use of cover crops and tillage practices affected corn and soybean planting dates, the number of prevent plant acres, and crop yields in 2019. Their analysis[28] found:

- Fields with consistent use of cover crops and conservation tillage and no-till practices were 24 percent less likely than conventional fields to be declared "prevent plant" for insurance payments.
- Cover crops and no-till are more frequently used on less productive fields that are more likely to have crop insurance claims. This suggests that these practices reduce crop insurance claims despite disproportionately being used on riskier fields.

As discussed in the sections on Title I and Title II, conservation tillage, no-till, and cover cropping practices rely on herbicides – predominantly the most used herbicide, glyphosate – for weed management. Therefore, a disruption of access to herbicides could be expected to increase crop insurance program outlays – especially indemnities for prevented planting.

Based on insurance payments made for prevented planting and the findings of the Conservation and Crop Insurance Research Pilot,

A conservative estimate (including only prevented planting indemnities) of the impact of herbicide-enabled conservation practices was a savings of $2.946 billion to the federal crop insurance program, from 2019 to 2023, and a savings of $1.04 billion in 2019 alone.

[28] Conservation-Crop-Insurance-Data-Pilot-Results-1.pdf (foodandagpolicy.org)

Conclusion & Key Takeaways

Ongoing court battles and state attempts to regulate pesticides in a manner contrary to decades of scientific guidance from the EPA pose a threat to the necessary supply and use of important crop protection tools upon which farmers rely.

Ultimately, allowing states to contradict EPA's scientific findings risks creating a **complex, inconsistent, and potentially unworkable collage of pesticide label rules.**

Such a patchwork of labeling requirements **would quickly disrupt commerce from availability, upstream in the supply chain, to distribution and manufacturing.**

It would **especially threaten herbicides, which make up 76 percent of all pesticide use**, and glyphosate specifically, which is the nation's most used herbicide.

Herbicides, particularly glyphosate, are critical for weed management, protecting crop yields, and supporting **sustainable farming practices like no-till and cover cropping that yield enormous sustainability benefits, including soil health, reduced erosion, drought resilience, and carbon sequestration.**

Inconsistent labeling regulations **would result in billions of increased production costs, reduced net farm income, and lead to marginally higher food prices.**

Implications for the Farm Bill

A lack of legislative certainty in pesticide labeling poses several adverse consequences for the Farm Bill's commodity, conservation, crop insurance, and nutrition programs. Consider the following:

The Title I Farm Bill safety net provisions do not provide relief for rising input costs, however,

- Of the nine program crops corn, soybeans, wheat, rice, peanuts, sorghum, oats, and barley absorbing a 133 percent increase in crop protection costs would total $2.8 billion in lost farm revenue based on 2024 cost estimates from USDA.
- Cumulatively, for the six crops – corn, soybeans, cotton, wheat, canola, and sugar beets – as well as fallow land, reverting to conventional tillage for weed control would add $2.414 billion in costs, more than doubling the costs from glyphosate-enabled practices.
- Increasing the number of passes a farmer needs to take across their field from two under no-till methods to a maximum of eight for conventional tillage on a 500- acre Farm would result in $3,772 in added hired labor costs ($7.54 per acre) and $7,326 in farm management opportunity costs ($14.65 per acre).

The long-term trend in Title II conservation programs is toward working land programs, however, a patchwork of state labeling regulations would threaten that, potentially leading to more idled U.S. farmland.

- The Farm Bill's $632 million investment in cover cropping through EQIP and CSP would be undermined.
- Gains in carbon capture, sediment loss, nitrogen loss, and phosphorus loss would be negated.

Title IV nutrition programs could see higher costs from commodity price cost-push inflationary pressures, especially for meat, milk, cheese, fruits and vegetables, and vegetable oils.

- An additional one percent increase in CPI food inflation resulting from cost-push factors and higher commodity production costs from a loss of glyphosate could average $1.06 billion per year in added cost to SNAP.
- Over the life of the 2025 to 2029 Farm Bill, the impact of a loss of glyphosate could increase the cost to nutrition programs outlays by $7.1 billion.

Crop insurance under Title XI would face administrative burdens and higher payouts.

- Any loss of crop protection tools would require the federal crop insurance program's GFPs to be adjusted accordingly, adding confusion and complexity to crop insurance decisions and coverage.
- Were GFPs to be adjusted, there would be considerable risk of additional losses and a corresponding increase in indemnities paid out under the crop insurance program, raising its costs.
- Such a situation would also lead to a lower actual production history (APH) for affected farmers with APH crop insurance policies.
- Fields with consistent use of cover crops, conservation tillage, and no-till practices enabled by herbicides, particularly glyphosate, were 24 percent less likely than conventional fields to be declared "prevent plant" for insurance payments. The impact of these practices was an estimated savings of $2.946 billion to the federal crop insurance program, from 2019 to 2023, and a savings of $1.04 billion in 2019 alone.

Legislation has been introduced in Congress, the Agricultural Labeling Uniformity Act, which would reassert that the EPA is the preeminent authority on pesticide labeling and prevent states from imposing any labeling or packaging requirements that differ from, or are in addition to, those approved by the EPA in accordance with its scientific findings. This legislation could help address many of the detailed threats above to farmers and key provisions of the Farm Bill. Notably, this proposal has gained the support of 360 farm groups representing all 50 states.[29]

[29] Agricultural Labeling Uniformity Act support letter