HEALTHY SOILS AND INNOVATION

Cultivating Economic Security on America’s Farms

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INTRODUCTION: THE RISING OPPORTUNITY FOR RESILIENCE IN RURAL AMERICA

Innovation is at the heart of America’s farm tradition. Having proven over more than two centuries that they can thrive while dealing with uncertainty and unforeseen challenges, adapt to new circumstances often out of their control, and innovate practical solutions to ongoing change, America’s farmers are proven entrepreneurs. Whether it’s rising input costs, fluctuating commodity prices and tariffs, or market disruptions based on events thousands of miles away, farmers are skilled at seizing the opportunities in adversity.

Now the agriculture industry increasingly faces unprecedented challenges from severe and unseasonable weather, putting practices that were effective in past decades in question. Out of necessity, farmers and ranchers are experimenting with and adopting forward-thinking methods to ensure that their operations, both large and small, survive and thrive in the face of these swiftly evolving circumstances.

More than ever, American farmers need the support and freedom to innovate. But U.S. federal farm policies do not sufficiently incentivize, and in many cases hinder, this farmer-led entrepreneurial activity. The 2023 Farm Bill represents a timely and strategic opportunity to greatly increase investment and innovation in new practices and technologies that:

- restore and increase soil health
- reduce farm input costs
- boost crop resilience to extreme weather events while reducing crop loss risk and insurance costs
- store atmospheric carbon and mitigate climate change
- enhance additional ecosystem benefits such as reduced soil erosion and input runoff, improved water and air quality, and increased biodiversity
- bolster economies of hard-hit communities in rural America

These economic and environmental benefits can be achieved through three policies in the 2023 Farm Bill that will incentivize and promote the freedom to innovate that so many farmers are demanding to manage their operations for maximum health and productivity.

FARM BILL POLICY OPPORTUNITIES

The Farm Bill is a suite of policies that together create a five-year framework for taxpayer investments in the food and agriculture sectors. The 2023 Farm Bill should:

- **Include the Healthy Soils Healthy Climate Act.** This will build on the success of the Soil Health Demonstration Trial first enacted in the 2018 Farm Bill, to create a permanent and better-funded voluntary program to support farmers and ranchers who implement practices to improve soil health and increase levels of soil carbon.

- **Create and fund an advanced research and innovation hub within USDA,** to aggregate and expand cross-agency collaboration promoting technologies and systems for increased agricultural resilience, climate performance, and profitability.

- **Include the COVER Act** to establish insurance premium reductions for cover crops and other resilience-enhancing practices that produce soil and climate benefits while reducing crop loss risk.
The next decade represents a critical window to enact policies that address the climate challenge. It’s imperative that the next Farm Bill helps transform U.S. agriculture to meet 21st century challenges with a framework that robustly incentivizes innovation—and actively partners with the producers, Ag tech, equipment and input companies, consumer product companies and consumers, and other stakeholders who are leading the Ag sector to a new, innovative, and economically sustainable future.

**FIGURE 1 // U.S. 2022 BILLION-DOLLAR CLIMATE DISASTERS**

This map denotes the approximate location for each of the **18 separate billion-dollar weather and climate disasters that impacted the United States in 2022**.

Source: American Farm Bureau Federation

**BUSINESS AS USUAL—THE PATH WE’RE ON**

On multiple fronts, the past decade has been among the most challenging periods for U.S. agriculture. The 2022 Russian invasion of Ukraine, combined with the lingering effects of the deadliest global pandemic in a century, have created dramatic disruptions in domestic and global supply chains, causing substantial cost increases in equipment and critical inputs like fertilizer. But the worst economic impacts have come from extreme weather events—drought, wildfires, floods, tornados, and hurricanes—that are becoming both more frequent and more severe. As costs have increased, productivity (and therefore profitability) has been diminished by soil degradation, water scarcity and/or flooding, and disrupted growing seasons. The numbers tell the story:

// **In 2022, extreme weather caused a record $21.5 billion in U.S. crop losses**, 95% of it ($20.4 billion) from drought and wildfires across 20 states in the West and Midwest (see Figure 1 above). Nearly half of the losses, $10.5 billion, were not covered by Risk Management Agency (RMA) insurance, according to the American Farm Bureau Federation. And these dollars don’t even include losses of livestock, infrastructure, timber, and other Ag-related essentials.
Texas alone suffered $6.4 billion in farming and ranching losses (mainly in cotton, wheat, and forage), mostly from drought.¹ In Florida, the devastating impact of Hurricanes Ian and Nicole, on top of other market factors, pushed the state’s iconic citrus crop output to its lowest level since 1935.² For Florida’s entire agricultural sector, Hurricane Ian caused nearly $2 billion in damages.³

The path we’re on is a fossil fuel and petrochemical-driven process, subject to the pricing vagaries of global oil and natural gas markets. Costs of synthetic fertilizers, herbicides, and pesticides are increasingly volatile and particularly soared in 2022 due to spikes in natural gas prices after the Ukraine invasion and other factors. The National Corn Growers Association predicted that its members would spend a staggering 80% more for fertilizer than in 2021—an additional average cost of $128,000 per farm.⁴ Fertilizer accounts for an average 15% of a farm’s total expenses.

The Federal Crop Insurance Program is the largest farm subsidy program in the U.S., and many farmers are required to use it to rent land and finance their operations. As weather-related losses due to climate change increase, the program costs taxpayers billions and includes no incentives for farmers to shift to regenerative practices that would improve farm resilience.

Private venture capital investment in farming-related tech is rising dramatically—from $1 billion globally in 2012 to $10.2 billion last year, according to AgFunder. But to amplify a nationwide transition to more climate-resilient practices, the Farm Bill should catalyze public/private partnerships for innovation. It’s a model that has succeeded admirably through the Department of Energy’s ARPA-E program, which has helped U.S. clean-energy companies accelerate the transition to a more sustainable, economically competitive, and lower-carbon economy.

ANOTHER COURSE IS POSSIBLE

U.S. federal agriculture policy, with the Farm Bill front and center, has a unique opportunity to chart a new and better course for the way American agricultural and natural lands are managed. Forward-looking appropriations funding, and significant realignment of existing policies and economic incentives, can create a new framework that:

- Improves soil health and fertility, and enhances crop resilience.
- Focuses on reduced input costs and reduced economic and environmental impacts, and increased revenue stability and opportunity for farmers and ranchers.
- Creates increased opportunities for innovation, autonomy, and bottom-line improvements at the individual farm level—accruing economic benefits for rural economies and consumers of all Ag products.
- Incentivizes the private sector to invest and innovate in the burgeoning Ag Tech industry that will spur the transition to a more regenerative, climate-smart, and profitable future for U.S. agriculture.
- Accelerates the progress of current soil health improvement technologies and practices to enable large-scale amplification.
- Helps develop soil health measurement, reporting, and verification (MRV) systems to pay farmers for carbon removal and other ecosystem services.
- Elevates USDA as the key innovation hub where research taking place in-house and across multiple federal agencies can be aggregated to support vibrant public/private partnerships for a resilient American agricultural system.

The 2023 Farm Bill should promote on-farm entrepreneurship, invest in strategic research to support agricultural innovation, and level the playing field for risk-reducing cultivation practices.
POLICY OPPORTUNITY NO. 1: INCLUDE THE HEALTHY SOILS HEALTHY CLIMATE ACT

HEALTHY SOILS: THE BUILDING BLOCK OF EVERYTHING

The 2018 Farm Bill introduced a new program, On-Farm Conservation Innovation Trials, under the USDA’s Natural Resources Conservation Service (NRCS). The program included the Soil Health Demonstration Trial (SHDT) program with a specific focus on practices and innovations to improve soil health. Hundreds of farmers and ranchers in nearly all 50 states are now participating in SHDT trials, and many more would like to. As called for in the Healthy Soils Healthy Climate Act introduced in Congress\(^6\), the 2023 Farm Bill should greatly expand the SHDT program and make it permanent.

The SHDT is part of NRCS’s Conservation Innovation Grants (CIG) program; successful applicants receive federal funding and technical expertise from relevant partners, usually local colleges and universities. Grantees commit to institute practices and track results of increasing soil carbon and improving soil health through four soil health management principles: minimizing disturbance, maximizing soil cover, maximizing biodiversity, and maximizing the presence of living roots.\(^7\)

Within these parameters, the SHDT gives farmers wide autonomy to choose which strategies to pilot. “The money is nice, but it’s not the driver of what I’m trying to accomplish,” says Brad Haynes, an SHDT participant who dry-farms millet, white wheat, and other crops in northeastern Colorado. “The program is customizable, rather than the government throwing the same blanket over everything; what I’m doing probably won’t work in California or ice states like Michigan.” Haynes has seen positive results in soil nutrient composition, microbial activity, and water retention from using cover crops on part of his 1,000 acres.

### TABLE 1 // LEADING SOIL HEALTH AND REGENERATIVE AG PRACTICES AND BENEFITS

<table>
<thead>
<tr>
<th>Practice</th>
<th>Strategy</th>
<th>Key Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover Crops</td>
<td>Plants used for the specific purpose of improving soil health.</td>
<td>Carbon removal; erosion protection; crop, flood, and drought resilience; water quality</td>
</tr>
<tr>
<td>Diversified cropping systems, including livestock and native crops</td>
<td>Rotating multiple crops and grazing animals across the land, rather than planting just the same one or two crops year after year.</td>
<td>Water quality; carbon removal; reduced synthetic inputs; weed, pest, and disease prevention; additional revenue from rental grazing</td>
</tr>
<tr>
<td>Avoiding synthetic inputs</td>
<td>Using natural fertilizers and weed and pest control methods, rather than relying on fossil fuel-derived chemicals</td>
<td>Cost reductions; reduced emissions; water quality; biodiversity</td>
</tr>
<tr>
<td>Low- and No-Till</td>
<td>Reducing or eliminating mechanical disturbance of the soil (e.g., plowing)</td>
<td>Reduced emissions; carbon storage</td>
</tr>
<tr>
<td>Composting</td>
<td>Turning waste (from manure or food) into a product that can improve soil health</td>
<td>Resilience; carbon removal; reduced emissions</td>
</tr>
<tr>
<td>Agroforestry</td>
<td>Planting trees, shrubs, or other perennial vegetation alongside planted crops, particularly native species that are better adapted to the local landscape and climate</td>
<td>Carbon removal; resilience; water quality; downstream flood control; wildlife habitat; potential new income stream</td>
</tr>
</tbody>
</table>
Through 2022, the SHDT component of the CIG program has funded 34 projects covering virtually every state in the Lower 48, plus Hawaii, Puerto Rico, and American Samoa. Examples include 120 Ag producers in four Great Lakes states working with the Water Resources Monitoring Group, an NGO, on innovative cover crop practices; the National and Illinois Corn Growers Associations working with Illinois farmers on side-by-side comparisons of different nutrient management, cover crop, and tillage practices; and the University of California-Davis measuring the impacts of vermicompost (worm composting) on soil health at 12 farms growing annual and perennial crops in California and Washington State. It’s a good start. But to truly begin scaling up meaningful trial results to make widespread positive impacts on soil health, farm resilience, climate mitigation, and local farm economies, the SHDT program needs to be made permanent and better-funded to support larger-scale demonstrations across more acreage on farms and ranches.

The benefits of healthier soils at scale include:

// **Lower input costs** for fertilizer, fuel, pesticides, herbicides, water, and equipment and the associated reduction in greenhouse gas emissions

// **Greater resilience/decreased crop loss risk** from pests, weeds, drought, flooding, storms, and other severe weather events

// **Lower crop insurance costs** (see detailed discussion in Federal Crop Insurance as an Innovation Incentive section on page 13)

// **Additional ecosystem benefits** including reduced runoff and water/air contamination; increased biodiversity of pollinators and other key species

// **Potential revenue from the (still nascent) new commodity of carbon credits** for nature-based carbon removal

// **Improved farm profits leading to stabilized/revitalized local economies** in hard-hit rural areas throughout the U.S.

// **Improved national and food security** and stabilized prices for U.S. consumers

// **Preserving farmland from being sold/converted** to other uses. Since 2000, U.S. farmland acreage has decreased by some 50 million acres (5%—4.3 acres every minute). Nearly 90% of all U.S. farms are small family operations (less than $350,000 gross annual income).

// **Enhanced autonomy and entrepreneurial freedom** for individual farmers to deploy the best practices for their soil type, cropping system, and region.

Farmers who enhance their soil health are increasingly proving the economic case for doing so, particularly in reduced costs for inputs. In early 2023, Cargill partnered with the non-profit Soil Health Institute (SHI) to interview 100 row crop farmers in nine of the top corn and soybean-producing states who have implemented soil health practices (such as no or low tillage and/or cover crops) for at least five years. The results were dramatic: 88% of soybean growers and 85% of corn farmers reported increased net income. Reduced spending on fertilizer, pesticides, and equipment-related expenses lowered the average production cost of corn by $24 per acre and of soybeans by $17 per acre. Two-thirds (67%) of the farmers interviewed reported higher yields, and 97% reported greater crop resilience to extreme weather, particularly in recent years of drought.

“We believe our analyses have answered that question (of profitability). Yes, it does make economic sense to adopt a soil health system.” – SHI agricultural economist Archie Flanders in Successful Farming magazine.
Like thousands of growers across the U.S., Lucinda Stuenkel has been using regenerative farming practices for far longer than the term has been popular. Raising crops such as oats, wheat, grain sorghum, soybeans, and alfalfa on 1,000 acres in north central Kansas, Stuenkel and her family have used no-till and a wide variety of cover crops for the better part of two decades. So, it made sense for her to join a USDA Soil Health Demonstration Trial (SHDT) project in 2021. This project provides technical expertise, financial incentives, and a formalized opportunity to learn from and share best practices with other participating farmers in the region.

Stuenkel is one of six long-term soil health practitioners who joined 18 other transitional growers in the Farmers for Advancing Regenerative Management Systems (FARMS) project of the Colorado Conservation Tillage Association. This FARMS project won a $1.7 million SHDT grant to deploy soil health management practices on 24 farms and demonstrate the profitability of soil health management for three years on the High Plains.

“We were already on this journey, says Stuenkel, “but the support and encouragement from FARMS helped me have the courage to do more.” Stuenkel has already seen improvements to her farm’s bottom line, cutting input costs and increasing revenue. “I’m not breaking yield records, but I’m breaking even or showing a profit, which is more than many (conventional growers) can do.”

One example on the cost side: saving on insecticide she would have needed against invasive pests like army worms and sugarcane aphids. “The army worms stopped their advance before devouring my field, thanks to a multi-species cover crop which brought beneficial insects and birds who consumed the worms before they could do economic damage,” says Stuenkel. “So I did not have to spray insecticide.”

For a revenue bump, Stuenkel custom grazes for seven different cattle owners so that their herds can dine on her cover crops. Time is saved by not having to bale and haul thousands of bales of hay. For Stuenkel, not only does grazing contribute to her bottom line, but the cow manure is evenly dispersed and fertilizes her fields.

These practices contribute to her much-improved soil health, allowing a gradual weaning off of chemical fertilizers and providing dramatic improvements in drought resilience. Stuenkel’s region has endured a three-year drought during the trial timeframe. “Thanks to cover crops, our grain crop roots go deeper and live weeks longer,” she says. “The soil is better aggregated and that makes all the difference in this area where droughts are quite frequent.” In fact, water infiltration has increased fivefold on the land that she farms, increasing absorption rates to as much as five inches of rain an hour. This results in less erosion and sedimentation, while reducing flooding downstream.

Stuenkel is very positive about the SHDT and thinks the trials should be longer-term, as the full soil health benefits are not often realized in only three years. “We should be able to see a significant difference to soil health in 7 to 15 years (depending upon available rainfall),” she says. Her eventual goal is to restore her soil to the 7 to 12% organic matter content that it had before the first settlers arrived in Kansas. Organic matter has been reduced to 1-2% in many areas by decades of conventional farming, but Stuenkel’s practices have restored hers to 3-3.5% so far. She hopes to see more relevant research from land grant universities and more technical support through USDA’s NRCS.

Sometimes the beneficial results are pretty clear, “Seeing is believing,” Stuenkel says. “To observe the difference in fertility and organic matter, I drive by other farms where the soil looks like cheap powdered cake mix. Mine looks like a moist dark chocolate brownie. We are building healthy soil while sequestering carbon into the soil from the air. This is healing the land and cleaning our air at the same time. Win-win.”
POLICY OPPORTUNITY NO. 2: CREATE AND FUND AN ADVANCED RESEARCH AND INNOVATION HUB WITHIN USDA

AG TECH: SUPPORTING A VIBRANT ECOSYSTEM OF INNOVATION

In 2009, the U.S. Department of Energy launched the Advanced Research Projects Agency-Energy (ARPA-E), a bipartisan initiative to provide government research and development (R&D) support for private sector efforts to develop transformational energy technologies and projects. ARPA-E has played an important role in the U.S. transition toward a clean energy economy, a transition that has built a $269 billion (and growing) renewable energy industry representing 3.2 million jobs. ARPA-E provides a potential template for USDA in leveraging public money to catalyze massive private investment.

With the emergence of Ag Tech as a potentially transformational and fast-growing investment sector in recent years—akin to the clean-energy sector in 2009—Congress should create and fund an entity comparable to ARPA-E within USDA to support and accelerate private and academic R&D in future-focused Ag areas such as soil health data collection and measurement; farm robotics; precision Ag management software; and bio-based fertilizers, herbicides, and pesticides. The new entity should create partnerships with other relevant agencies such as EPA, DOE, DOD and National Labs, as well as land grant universities across the U.S. These federally funded research hubs will bring high-quality jobs, both directly and indirectly through private sector technology uptake, to rural communities that have had challenges in attracting young, skilled workers.

The Advanced Cutting Edge (ACE) Agriculture Act introduced in March 2023, is an example of legislation that would significantly expand federal support and funding for innovative Ag Tech R&D in both the public and private sectors. Congress first attempted this in the 2018 Farm Bill—establishing an Agriculture Advanced Research and Development Authority (AgARDA) under USDA. But that program never received adequate funding—only $1M was appropriated out of the original $50M that had been authorized.

ARPA-E, in the decade and a half since its founding, has provided $3.43 billion in R&D funding for more than 1,500 projects in the advanced energy sector. This has resulted in the formation of 135 new companies, 291 partnerships with other federal agencies, more than 1,000 U.S. patents, and perhaps most notably, $11.4 billion in private sector follow-on investment to advance these technologies to market. As of February 2023, 27 of the 135 companies have made exits (via IPOs, mergers, or acquisitions) with a total reported value of $21.8 billion.

FIGURE 2 // VENTURE INVESTMENT IN FARM-RELATED AG TECH CONTINUES TO GROW

Annual worldwide venture capital investment in upstream farm-related Ag Tech has shown steady growth since 2018, bucking the trend of downstream food production and services falling significantly in 2022.

Source: AgFunder Global AgriFoodtech Investment Report 2023.
Without question, Ag tech has become a hotbed for private investors who see the innovation in agriculture as having growth potential similar to the energy sector. Annual venture capital investment in farm-related tech has soared more than tenfold from $1 billion in 2012 to $10.2 billion in 2022, according to AgFunder’s 2023 Global AgriFoodTech Investment Report (which also tracks consumer-facing food tech). While 2022 saw a 44% drop in overall AgriFoodTech investment, sectors related to on-farm innovation and climate tech bucked the trend and continued their annual growth. Investments in the categories of Farm Management Technologies (software, sensing, and IoT), Ag Biotech, and Novel Farming Systems all increased significantly (see Figure 2).

Like ARPA-E, a strengthened USDA research and innovation hub focused on emerging technologies and practices, including addressing and mitigating the challenges of climate change, can encourage, fund, and help incubate early-stage startups as well as relevant university and lab-based technologies seeking commercialization. It can also be a vehicle for USDA to partner with the Departments of Energy and Defense and the Environmental Protection Agency, all of which have carbon reduction and climate-related research relevant to agriculture.

One good example is DOE’s Lawrence Livermore National Lab in Livermore, California, where veteran scientist Roger Aines and his team are researching large-scale carbon removal techniques and results, with soil carbon as a key component. “The USDA research today has great breadth and depth, but it’s generally very localized,” says Aines, LLNL’s energy program chief scientist and carbon fuel cycle program leader. “The challenge is larger-scale research efforts; there aren’t many government-funded demos at scale, like 10,000 acres of row crops in Nebraska. Expanded demonstration programs at this scale would give USDA researchers more leverage and speed the adoption of good practices.”

Many of the nation’s largest food and Ag companies are encouraging their suppliers to deploy regenerative practices.

On the private sector side, many of the nation’s largest food and Ag companies are encouraging their suppliers to deploy regenerative practices (see Table 2), and a strong USDA commitment to public/private partnerships would leverage those activities for even greater impact.

Among the U.S. food producers with commitments to help expand regenerative practices is Land O’ Lakes, one of the largest Ag co-ops in the U.S. with some 2,800 member-owners. The company’s Truterra business offers consultation, tools and solutions for Ag, food and consumer packaged goods companies to ultimately create new market opportunities for farmers and Ag retailers. Truterra offers soil health assessment reports and plans and other tools to guide farmers with technical assistance on soil health measurement; facilitates sharing of sustainability best practices and outcomes with other customers; and helps farmers generate carbon offsets that Truterra in turn sells to companies looking to meet various sustainability goals. According to the company, its goal is to spur innovation, in large measure by helping farmers manage risk, and bolstering profit potential and the value of their acreage.

“From an operations standpoint, farmers are willing to try to find ways to have healthier soils,” says Karen Boyd, Truterra’s carbon services senior manager. “But there can be plenty of risk that farmers take on by implementing any of these practices. Any help in managing that risk is very valuable.”
While Truterra is a private company, it is also an example of how the federal government plays a key role in the scaling of corporate regenerative Ag efforts. In collaboration with American Farmland Trust and others, Truterra was awarded a grant in 2022 for $90 million through the USDA Partnerships for Climate-Smart Commodities program for a pilot to scale its services to 20,000 farmers over some 7 million acres, including a focus on historically underserved farmers. In May 2023, Truterra was recognized by Fast Company magazine’s 2023 World Changing Ideas Awards (honorable mention) in the energy and sustainability category for the project.

**TABLE 2 // EXAMPLES OF NOTABLE CORPORATE REGENERATIVE AG INITIATIVES**

<table>
<thead>
<tr>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danone North America</td>
<td>Since launching its regenerative program in 2017, the company says it sources 2.4 billion pounds of its dairy (animal-based) milk from nearly 145,000 acres within the regen ag program, representing 75% of its milk sourcing. Farmers have also planted cover crops on more than half (69%) of the acreage.</td>
</tr>
<tr>
<td>Cargill</td>
<td>Cargill’s RegenConnect voluntary carbon credit marketplace offers credits to corn, soy, wheat, and cotton growers in 15 states. A partnership with Nestle and National Fish and Wildlife Foundation offers $15 million (matched by $15 million in federal funds) in grants to support regenerative grazing practices by cattle ranchers’ operations on 1.7 million acres.</td>
</tr>
<tr>
<td>Land O’Lakes</td>
<td>One of the nation’s largest agricultural co-ops launched its Truterra division in 2018 to educate/support its member farms, and others, in regenerative and sustainable practices. More than 2,000 members farming 2 million acres across 22 states participate. Truterra’s TruCarbon program also connects Land O’Lakes suppliers to carbon credit buyers such as Microsoft, which in 2021 agreed to purchase up to $2 million worth of credits at $20 per ton.</td>
</tr>
<tr>
<td>General Mills</td>
<td>The company has converted more than 235,000 of its producers’ acres (row crops and dairy farms) to regenerative practices and outcomes, with a goal of 1 million acres by 2030. The company calls regenerative ag “the biggest lever” in reaching its GHG emissions goals. General Mills is a founding member of the Ecosystem Services Market Consortium, whose Eco-Harvest program awards credits for reduced emissions, increased soil health, and improved water quality.</td>
</tr>
</tbody>
</table>

The 21st century challenges facing American farmers will require a significant commitment to advanced Ag research. Congress should bolster farm security and agricultural resilience by leveraging public and private investment in innovation on America’s farms and ranches.
INNOVATORS IN THE FIELD:
MITCHELL HORA, WASHINGTON, IOWA

For seven generations spanning 150 years, Mitchell Hora’s family has been farming corn and soybeans on the plains just west of the Mississippi River in southeastern Iowa. His parents started adopting no-till practices 17 years before he was born, and planted their first cover crops when he was 18. Hora, now an enthusiastic and outspoken 28-year-old champion of soil health and regenerative ag, brings his experience to bear for farmers across the U.S. and the world with Continuum Ag, the company he founded in 2015 while still a student at Iowa State.

Continuum Ag began as a consultancy, then developed data collection, analytics, and other tech tools to help farmers implement and measure the outcomes of regenerative growing practices. For Hora, healthy topsoil is the objective. Continuum’s flagship product is TopSoil Tool, a soil health data program that helps farmers customize and measure the outcomes of their regenerative growing practices at the individual field level. Continuum culls info from sources like satellites, drones, and lab testing, but every farmer owns their own data. Continuum’s TopSoil Network connects farmers to food companies, input providers, ecosystem services providers, and 260 consultants around the world to share knowledge and best practices.

And Hora’s soil health advocacy doesn’t stop there. He hosts a TopSoil podcast and monthly webinars, writes blogs, and convenes a TopSoil Summit conference every summer. It’s all part of inspiring and enabling new ways of thinking about soil and crops.

“For many years,” says Hora, “farming seemed to be about playing defense—things like avoiding erosion or saving fuel, time, and labor. Of course, those are all important. But now we have the data and management tools to go on offense, to really be proactive about measuring and improving organic content, nutrient levels, carbon intensity. And we’re always looking to improve the accuracy of our models.”

Continuum Ag’s innovations haven’t gone unnoticed. Hora made the fabled Forbes 30 Under 30 list in 2022 in the social impact category. And in April 2023, Continuum was one of five global Ag tech startups (from a pool of 500 applicants) picked to join the THRIVE Global AgTech Accelerator program of Silicon Valley-based SVG Ventures, one of the world’s most active Ag tech venture capital investors. Continuum Ag joins Ag tech startups from France, Spain, Italy, and Israel in a 12-week curriculum to prepare early-stage companies for funding rounds and future growth.29

Hora feels strongly that current government ag policies like crop insurance restrictions, as well as a lot of traditional academic R&D, need a significant reset to unshackle American Ag innovation for the 21st century. “We need to get the researchers out of the labs and listen to the farmers’ stories,” he says. “And too many policies, like crop insurance restrictions, are all about doing it ‘by the book.’ Well, the book is old, and not innovative. Reward the outcomes, not the practices. Let farmers be innovators.”
POLICY OPPORTUNITY NO. 3:
INCLUDE THE COVER ACT

REWARDING RISK REDUCTION THROUGH CROP INSURANCE POLICY

Crop insurance has been a cornerstone of U.S. federal agriculture policy and an essential economic safety net for America’s farmers for nearly a century. Under policies administered by the USDA’s Risk Management Agency (RMA), some 90% of all farmed acres in the U.S. are covered by federal crop insurance. However, some crop insurance policies have become a barrier to best practices and have reduced producers’ ability to innovate for crop resilience in their specific regions and on their individual farms.

And the current system costs U.S. taxpayers billions of dollars every year. In the 14-year period from 2008 to 2021, average annual crop insurance payouts nearly quadrupled when compared with the previous 16-year period, from $740 million to $2.85 billion (See Figure 3). The ever-increasing frequency and severity of extreme weather events—among them drought, flooding, major storms and hurricanes, and extreme cold and heat—has exacerbated crop failures and disrupted growing seasons throughout the U.S.


Average annual indemnity losses (1991-2007)
$741 Million

Average annual indemnity losses (2008-2021)
$2.85 Billion

Source: USDA Economic Research Service

Greater flexibility in choices that farmers can make to achieve crop resilience should be a primary target of the crop insurance system. Offering insurance premium discounts for farmers who voluntarily deploy practices that reduce crop loss risk is key to incentivizing those practices. Such federal policy was enacted temporarily when the RMA instituted the Pandemic Cover Crop Program (PCCP) in 2021, which authorized a $5 per acre premium discount to farmers who plant cover crops, but the program expired. To remedy this, the proposed Conservation Opportunity and Voluntary Environment Resilience Program, or COVER Act, should be included in the 2023 Farm Bill. The COVER Act establishes a Good Steward Cover Crop program which will mirror the PCCP and make the $5 per acre premium discount permanent, while authorizing $5 million in funding for technical assistance. For farmers who don’t plant cover crops, it creates a pilot project within RMA to study other soil health practices, such as crop rotation, that contribute to crop resilience. Positive results from the pilot could make these practices also eligible for insurance premium discounts.
Voluntary crop insurance premium discounts for planting cover crops are immensely popular in the American Ag community. In a March 2023 National Wildlife Federation survey of row crop farmers, an overwhelming 78% supported this option, and 66% (with just 19% opposed) said it should be made permanent. Of farmers who have participated in the program, 63% say it was a positive experience while just 7% reported a negative one.\(^{31}\)

Four key Midwestern agricultural states—Iowa, Illinois, Indiana, and Wisconsin—have insurance discount policies in place for cover crops, and Pennsylvania is considering similar policy. Iowa led the way with a program that took effect in 2017, with a $5 per acre discount, and it has proven to be a model for other states as well as for the federal PCCP. As of September 2022, some 1,800 Iowa farmers had enrolled nearly 1 million acres of cover crops in the program.\(^{32}\) These crop insurance discount policies passed with wide bipartisan support in each state.

“This is not just another conservation program. Research is now beginning to establish how conservation farming practices offer real risk mitigation,” says Tommy Hexter, rural organizer and educator at the Iowa Farmers Union. “Cover crops can help farmers get out earlier in the spring by increasing the ability of the soil to regulate moisture. If you have bare ground all winter, come April it can be a muddy mess out there, and if you can’t plant until the end of May that’s risky; you never know how dry the summer will be or when the first frost will hit in the fall.”

“Research is now beginning to establish how conservation farming practices offer real risk mitigation.”
—Tommy Hexter, Iowa Farmers Union

Research studies have shown the effectiveness of cover crops in enhancing soil resilience in extreme weather. Farmers who used cover crops were less likely to have crop losses due to wet spring weather in six Midwestern states in 2019,\(^{33}\) while a North Carolina State University study released in 2023 found that a 1% increase in cover crops across 12 states translated to a $40 million reduction in insurance payouts over a 12-year period.\(^{34}\)

**Crop insurance incentives for planting cover crops and other risk-reducing practices are a key policy lever to lower the risks of weather-related crop loss and planting season disruptions. These policies improve the efficiency of taxpayer dollars and provide greater financial security to both farmers and consumers.**
FOOD SECURITY IS NATIONAL SECURITY

In a global food production system increasingly stressed by climate change, supply chain disruptions, and famine-induced mass migrations and conflicts, the resilience of American agriculture is a critical international security issue. “Climate change and extreme weather events are challenging the stability of the global food supply in ways we are only beginning to address in our domestic agriculture and national security policies,” says U.S. Air Force Lt. Gen. (Ret) Norman Seip, president of the American Security Project, a nonpartisan organization working to educate the American public and the world about the changing nature of national security in the 21st century. “The 2023 Farm Bill offers a strategic and timely chance to do that.”

Seip has observed firsthand a domino effect: more frequent extreme weather events around the world cause famines that create waves of mass migration and social unrest, resulting in security threats and military deployments that strain U.S. capacity and resources. Many leading agricultural countries including the U.S. are seeing decreases in their production capacities due to soil depletion, drought, and other extreme weather events.

Examples of food insecurity abound throughout the world. In 2022, wheat production in India’s top grain region of Punjab fell up to 30% from 2021 due to drought and extreme heat, while extreme weather events cut crop production throughout China to 20% below average, Brazil, a top producer of corn and soybeans, has lost 28% of its arable land due to drought.36 Corn production in the American Midwest, the world’s #1 corn-growing region, is projected to fall 20% by 2050.36 On top of that, supply chain interruptions from events like the war in Ukraine have caused prices for fossil fuel-derived farm inputs like fertilizer to soar, putting pressure on the already thin margins for many family farms.

“In an increasingly resource-constrained and climate-challenged environment,” says Seip, “U.S. farmers help to keep the rest of the world stable. Militaries around the world are responding to natural disasters and the fallout from food insecurity. To ensure our continued capacity to both feed ourselves and export our agricultural products, American research and development in food production is a national security imperative.”

Lieutenant General Norman Seip, USAF (Ret.) is President of the American Security Project, a nonpartisan organization created to educate the American public and the world about the changing nature of national security in the 21st Century.
CONCLUSION: THE FREEDOM TO FARM

The 2023 Farm Bill should underpin innovation and entrepreneurship in the U.S. farm sector, incentivizing practices like cover cropping that will improve productivity and profit, while lowering financial risk by reducing crop losses. Spurring innovation on America’s crop and ranch lands will help preserve the nation’s foundational heritage of multi-generation family farms, making farming an attractive career option for young people entering the workforce today. Providing young farmers with the opportunity to stay in or return to their home communities will help revitalize rural economies.

For many multi-generational growers, the “freedom to farm” is the reason their ancestors came to the U.S. in the first place. Fifth-generation corn and soybean farmer Graham Christensen in Oakland, Nebraska, whose great-great-grandfather left Denmark to homestead in Nebraska in 1867 (its first year of statehood), is one such example. “He came here to have an independent business, which he couldn’t do as a subject of the King of Denmark,” says Christensen, who founded and runs a communications and consulting firm dedicated to building regenerative and resilient rural communities called GC Resolve. “We’ve felt that way for 155 years, and my father fought for fair prices in the American Ag movement of the 1970s. But with some government policies, we’re restricted from being our own land managers. We’ve gotten a little detached from who we really are in the process.”

Our federal Ag policies need to incentivize and support individual farmers’ autonomy—the freedom to try and test new crop mixes or field practices without restrictive “one size fits all” regulations or undue financial risk. Those opportunities, and the rapidly advancing technologies supporting them, will attract young people interested in careers in farming and Ag tech as well as climate action. “There’s a big opportunity to lead on climate, and young people get very excited about that,” says Christensen. “They’re thinking about the big picture and want to be part of the solution.” For farmers, unpredictable challenges are business as usual, whether they’re facing rising input costs, commodity price swings, or market disruptions based on events thousands of miles away. Add to those the increasing challenge of more frequent and unseasonable extreme weather events, and you have an industry at growing risk of financial failure.

But farmers are expert at recognizing opportunity in uncertainty, and they adapt with continuous innovation. Building soil health is a way to take back more control and ensure the viability of their operations while reviving farming as a viable choice for the next generation of farmers.

To achieve a resilient 21st century American agricultural system, Congress must revise the policies that discourage on-farm experimentation and suppress the entrepreneurial tradition of our farmers, large and small. The 2023 Farm Bill should provide incentives and safety nets for on-farm innovation, support it with targeted research and technical assistance, and reward the reduction of crop loss risk. By doing this, American farm policy will promote the freedom for farmers to improve their outcomes, provide the agricultural products consumers depend on, and protect the climate—now and in the future.
ABOUT E2

E2 is a national, nonpartisan group of business leaders, investors, and professionals from every sector of the economy who advocate for smart policies that are good for the economy and good for the environment. E2 members have founded or funded more than 2,500 companies, created more than 600,000 jobs, and manage more than $100 billion in venture and private equity capital.

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ENDNOTES

8. https://cig.sc.egov.usda.gov/cig-projects?search_api_fulltext=&sort_by=field_award_year&field_awardee_name=&conservation-practices-list-change=all&cp-text-input-search=&field_grant_type=OFT-SHDT&field Does_project_address_benef=All&list-change=all&text-input-search=.
10. Ibid.
15. Ibid.