



November 9, 2020

Office of the Deputy Secretary  
Deputy Secretary  
U.S. Department of Agriculture  
Washington, DC 20250

**Re: Solicitation of Input from Stakeholders on Agricultural Innovations, USDA-2020-0008  
(Fed. Reg. Vol. 85, No. 173, Sep. 10, 2020, page 55812)**

Dear Deputy Secretary,

The National Sustainable Agriculture Coalition (NSAC) welcomes the opportunity to provide recommendations on the most innovative technologies and practices that can be readily deployed across U.S. agriculture to support the goals of the U.S. Department of Agriculture's (USDA) Agriculture Innovation Agenda (AIA). NSAC is a national alliance of over 130 family farm, rural, and conservation organizations that together take common positions on federal agriculture, food policies, and agriculture research to advance sustainable agriculture, including the 48 represented member organizations<sup>1</sup> listed at the end of this letter.

Farmers and ranchers are on the frontlines of the climate crisis, and there is no doubt that agriculture will face future challenges as a result of rising average temperatures and increasingly erratic fluctuations in growing seasons, temperature extremes, rainfall patterns, and pest and disease pressures. NSAC's 2019 publication, [\*Agriculture and Climate Change: Policy Imperatives and Opportunities to Help Producers Meet the Challenge\*](#), outlines the need for expansive research to help U.S. agriculture systems adapt and maintain economic, ecological, and community health as the climate crisis becomes more extreme. The research findings and policy recommendations in the publication highlight many ready to deploy actions that USDA can take to optimize agricultural production and resilience, while greatly reducing the environmental footprint of U.S. agriculture, including achieving a climate-neutral or climate positive (net carbon sequestration) impact by 2050.

NSAC's goal is to equip farmers and ranchers with the tools they need to meet the challenges of the climate crisis head-on, while optimizing productivity and increasing profitability. It's imperative that USDA concentrate on supporting systems that meet the needs of U.S. consumers for high-quality food while helping farmers maintain resilient and profitable operations and protect the health of our shared natural resources. Protecting land in existing conservation programs and expanding enrollment in these programs are among the most effective strategies USDA can employ to reduce the environmental footprint of U.S. agriculture. USDA can also promote biological innovations that

maximize plant biomass and optimize biodiversity in cropping systems, including resource-conserving crop rotations, advanced grazing, agroforestry, silvopasture, and cover crops. Additionally, the agency can increase research investment in organic agriculture and public cultivar development to improve productivity and realize multiple environmental benefits.

It is critical to focus available conservation and research funding on practices, systems, and projects that lead to positive climate and conservation outcomes, while reducing funding for ineffective practices. We appreciate your serious consideration of our recommendations.

Sincerely,



Cristel Zoebisch  
Climate Policy Associate



Nichelle Harriott  
Policy Specialist



Eric Deeble  
Policy Director

cc:

Dr. Scott Hutchins, Deputy Under Secretary, Research, Education, and Economics

Dr. Chavonda Jacobs-Young, Administrator, Agricultural Research Service

Dr. Parag Chitnis, Acting Director, National Institute of Food and Agriculture

Dr. John Dyer, Research Leader and Research Molecular Biologist

---

<sup>1</sup> Agriculture and Land Based Training Association - Salinas, CA  
CCOF (California Certified Organic Farmers) - Santa Cruz, CA  
California FarmLink – Santa Cruz, CA  
C.A.S.A. del Llano (Communities Assuring a Sustainable Agriculture) – Hereford, TX  
Catholic Rural Life – St. Paul, MN  
Center for Rural Affairs – Lyons, NE  
Clagett Farm/Chesapeake Bay Foundation – Upper Marlboro, MD  
Community Alliance with Family Farmers – Davis, CA  
CISA: Communities Involved in Sustaining Agriculture – South Deerfield, MA  
Dakota Rural Action – Brookings, SD  
Delta Land and Community, Inc. – Almyra, AR  
Ecological Farming Association – Soquel, CA  
Farmer-Veteran Coalition – Davis, CA  
Florida Organic Growers – Gainesville, FL  
FoodCorps – Portland, OR  
Grassworks – New Holstein, WI  
Hmong National Development, Inc. – St. Paul, MN  
Illinois Stewardship Alliance – Springfield, IL  
Institute for Agriculture and Trade Policy – Minneapolis, MN  
Interfaith Sustainable Food Collaborative – Sebastopol, CA  
Iowa Natural Heritage Foundation – Des Moines, IA

---

Izaak Walton League of America – Gaithersburg, MD  
Kansas Rural Center – Topeka, KS  
The Kerr Center for Sustainable Agriculture – Poteau, OK  
Land Stewardship Project – Minneapolis, MN  
LiveWell Colorado – Denver, CO  
MAFO – St. Cloud, MN  
Michael Fields Agricultural Institute – East Troy, WI  
Michigan Integrated Food & Farming Systems – MIFFS – East Lansing, MI  
Michigan Organic Food and Farm Alliance – Lansing, MI  
Midwest Organic and Sustainable Education Service – Spring Valley, WI  
Missouri Coalition for the Environment – St. Louis, MO  
Montana Organic Association – Eureka, MT  
The National Center for Appropriate Technology – Butte, MT  
National Center for Frontier Communities – Silver City, NM  
National Hmong American Farmers – Fresno, CA  
Nebraska Sustainable Agriculture Society - Ceresco, NE  
Northeast Organic Dairy Producers Alliance – Deerfield, MA  
Northern Plains Sustainable Agriculture Society – LaMoure, ND  
Northwest Center for Alternatives to Pesticides – Eugene, OR  
Ohio Ecological Food and Farm Association – Columbus, OH  
Oregon Tilth – Corvallis, OR  
Organic Farming Research Foundation – Santa Cruz, CA  
Organic Seed Alliance – Port Townsend, WA  
Rural Advancement Foundation International – USA – Pittsboro, NC  
Union of Concerned Scientists Food and Environment Program – Washington, DC  
Virginia Association for Biological Farming – Lexington, VA  
Wild Farm Alliance – Watsonville, CA  
Women, Food, and Agriculture Network – Ames, IA

## Recommendations on the Agricultural Innovation Agenda

### ***1. Promote biological innovations that maximize plant biomass and optimize biodiversity in cropping systems, including resource-conserving crop rotations and cover crops.***

The benefits of resource-conserving crop rotations (RCCR) and cover cropping are well documented and include building healthy soil, sequestering carbon, increasing soil organic matter, and protecting vulnerable water resources. However, many obstacles to RCCR and cover crop adoption still remain – including start-up costs, lack of strong markets and economic uses, and the amount of time before benefits are seen. More assistance is needed to promote widespread adoption and can include RCCR and cover crop transition financial incentives, field demonstrations, improved guidance, dedicated outreach, and market development.

The USDA Sustainable Agriculture Research and Education (SARE) program's cover crop report, "*Cover Crop Economics: Opportunities to Improve Your Bottom Line in Row Crops*," not only describes a holistic approach to adopting cover crops but also shows that doing so increases the overall resilience of the farm. Conservation agriculture cropping systems that integrate cover crops, diversified crop rotations, organic amendments, no-till, and limited use of synthetic fertilizers and herbicides show significant carbon sequestration potential, estimated at 600 to 1,000 lb. soil organic carbon/ac-year in (Lal, 2016).

RCCRs are promoted via the Conservation Stewardship Program (CSP), but even with the 2018 Farm Bill directive that increases RCCR payment rates, the payments remain low relative to the climate and environmental benefits to be reaped. For instance, in Iowa, the CSP rate for the basic conservation crop rotation practice is less than \$2 an acre, while the RCCR enhancement is \$20 an acre, improving an RCCR by adding another RC crop is just \$7 an acre, and the Department's special soil health crop rotation enhancement is less than \$5 an acre. Adoption of these practices would represent a major change for many farms and these payment rates, even at the higher levels authorized by Congress in the recent farm bill, are inadequate. Increasing the adoption of RCCRs should be a primary objective of the Department's AIA agenda. This will require rethinking how we pay for major farming systems change within CSP and other conservation programs.

The initial investment farmers must make to adopt cover crops and other practices is another major barrier. To address this, USDA must make available more cost-share incentives and technical assistance to further cover crop adoption. While the Environmental Quality Incentives Program (EQIP) and CSP both provide some assistance, improving the payment rate for cover crop activities would accelerate the uptake of these practices.

EQIP payments for cover crops are approximately \$50 per acre per year for three years. SARE's national economic report on cover crops showed that the net cost for cover cropping starts at \$30 -

\$40 in year one but declines as net profit improves. If EQIP payments used a step-down approach over three or four years, EQIP could incentivize 50 percent more acres.

Decreasing EQIP payment rates for cover crops beyond the first year or two may also encourage participants using cover crops or conservation crop rotation practices to graduate to CSP where they would continue to be recognized for their active management of this critical conservation activity for years into the future, albeit at a lower payment rate, while also being incentivized to adopt more comprehensive conservation approaches. However, CSP cover crop payments are again too low. Currently, CSP payments for the basic cover crop practice is approximately \$5 an acre, and the payment for cover crop enhancements is roughly \$12 an acre. While the structure and purposes of CSP and EQIP are different, and hence different payment rates should apply, the importance of cover cropping dictates that the CSP payment rates should be set considerably higher.

The Natural Resources Conservation Service (NRCS) should also prioritize, promote, and expedite the delivery of the supplemental CSP contract payments for comprehensive conservation planning to defray producer costs, thereby encouraging more producers to do whole farm, comprehensive conservation planning to spur innovation and the adoption of regenerative practices and enhancements.

Furthermore, several federal programs can be utilized to spur the development of new markets for small grains, forages, and cover crops to create stronger market incentives for adoption of RCCRs and cover cropping. Programs like the Local Agriculture Marketing Program (LAMP), an umbrella program created under the 2018 Farm Bill that combined the Value-Added Producer Grant Program (VAPG) and the Farmers Market and Local Food Promotion Program (FMLFPP), and Conservation Innovation Grants (CIG) are already being used to support projects and initiatives to create markets for small grains. For instance:

- FMLFPP funded a project to expand regional value chains and cultivate resources for Upper Midwest grain growers. The project, led by the University of Wisconsin-Madison's Center for Integrated Agricultural Systems, aims to improve farm to institution supply chains for a variety of grains, including corn, oats, rye, and wheat. This project will create multiple opportunities for Upper Midwest farmers to increase resilience, profitability, and establish consistent sales, while bolstering the grain requirements on local cafeteria menus and educating eaters about local grains.
- Practical Farmers of Iowa will use their CIG grant to increase the adoption of fertilizer and manure management practices that result in lower greenhouse gas emissions from small grains production by piloting innovative cost-share and market-based mechanisms with grain and animal protein supply chain partners.

To promote further adoption of cover cropping and RCCRs, USDA should continue to grant awards through FMLFPP, VAPG, CIG, the Regional Conservation Partnership Program (RCPP)

and other programs to projects that seek to develop and expand market opportunities for small grains, cover crops, and forages. The agency should also allow small grain crops to be sold as cover crop seed if they fail to make food grade specifications in order to provide multiple markets for some cover crops, such as oats.

***2. Allow for greater economic use for the cover crop conservation practice and all of the cover crop conservation enhancements under federal conservation programs.***

Currently, restrictions apply on whether a producer can hay or graze cover crops under the cover crop conservation practice standard (CPS 340) and multiple cover crop enhancements. We urge the Natural Resources Conservation Service (NRCS) to reconsider these restrictions and modify the practice standard and enhancements to allow for haying and especially the grazing of cover crops in a way that preserves the conservation benefits of cover crops but allows for their economic use as well.<sup>1</sup> Doing so will encourage adoption across farming operations and reintegrate livestock into cropping systems, enhancing the carbon sequestration potential of agricultural soils.

***3. Update cover crop termination guidance for clarity and flexibility.***

One of the biggest barriers to planting cover crops is the fear that putting in a cover crop will cause a loss in crop insurance coverage, and farmers have been denied indemnity payments precisely for that reason in the past. The 2018 Farm Bill eliminated one of the biggest barriers to cover crop adoption by clarifying the definition of cover crop termination.

NSAC applauds USDA for quickly moving forward to ensure changes to address this issue in the 2018 Farm Bill were in place for the 2020 crop year and for incorporating NSAC's feedback in the updated guidelines. Based on the changes that USDA made, the updated guidelines now clarify that rather than having to go through the approval process in advance, the cash crop can be insured at the time of planting, and cover crop management practices will be reviewed under the normal Risk Management Agency (RMA) rules for Good Farming Practice (GFP) determinations, similar to how other management decisions are reviewed for crop insurance purposes (e.g. fertilizer application, seeding rates, pest management, etc.).

The updated cover crop termination guidelines make clear that they are not intended to function as a substitute for locally adaptive management for cover crop termination timing, but rather serve as but one option available to producers. It is essential cover crop termination decisions can be flexible and site-specific in order to optimize water use efficiency, erosion control, soil health improvement, weed and pest control, habitat for beneficial organisms, nutrient cycling, and water quality improvement. We hope USDA will continue to move quickly to make several further improvements on the cover crop rules, such as including intercropping, planting green, and other

---

<sup>1</sup> "Baling off" residues of annual cash or cover crops can cause erosion and destroy some soil organic carbon, so some restrictions may still apply, while careful grazing of residues does much less damage (Blanco-Canqui et al., 2016a, 2016b).

emerging cover crop practices in the guidelines, and informing producers that they may rely on published materials from agricultural experts.

Specifically, USDA should add a new provision to the cover crop termination guidance that clarifies that intercropping, including interseeding, overseeding, relay planting, and strip intercropping, and planting green do not affect the insurability of crops. Inter-seeding cover crops, for example, is helpful to producers because they can use the cover crop for grazing immediately after harvesting their cash crop.

Additionally, we strongly encourage USDA to revise the cover crop termination guidance document, in time to be effective for the next crop insurance year, to improve its readability and make it more farmer friendly. Cover crop termination guidance needs to be presented in a clear and comprehensive manner in order to reduce the number of individual Good Farming Practices determinations that must be made and reduce farmer perception of insurance problems with cover cropping. The guidance needs to be presented in a clear, comprehensive, farmer-friendly manner.

Finally, we also encourage USDA to conduct a scientific review of the June 1 termination deadline, which many Northern tier farmers say is neither realistic nor helpful for their conservation efforts and goals. Once these and other improvements are made, USDA will be able to proceed to address the larger issue of making all conservation practices acceptable within the federal crop insurance program.

***4. Modify the Good Farming Practices handbook to clarify that all Natural Resources Conservation Service (NRCS) conservation practices and standards are Good Farming Practices (GFP) without exception or caveat.***

Farmers who implement conservation practices and enhancements in line with NRCS standards should not run afoul of Risk Management Agency (RMA) rules as a result. Conservation is a key element of risk management and RMA rules and policies should reflect this understanding. The fact that RMA and NRCS, two Farm Production and Conservation (FPAC) agencies, often give farmers contrary recommendations should not be tolerated.

RMA's current policy goes part way there, recognizing that conservation activities can be GFP, but then makes an exception any time a company or adjuster believes the conservation practice inhibited yield. The net result is farmers are liable when caught between guidance they are trying to follow in good faith, and the perception spreads throughout farm country that conservation standards may negatively impact one's indemnity payments.

Instead of putting the onus on the farmer, the agencies must be responsible for resolving such conflicts. RMA should take advantage of the opportunity to file interagency comments each and every time conservation practice and enhancements standards are open for review, and once those

standards are adopted, the determination should be made that the practice is a GFP at that point. GFP determinations should not go against farmer adoption of conservation practices and enhancements.

***5. Support advanced grazing management systems, including management intensive grazing (MIG), through federal working lands conservation programs.***

A tremendous opportunity exists for transdisciplinary research and innovations to help livestock producers transition their operations to the best MIG or advanced grazing management for their locales, climates, soils, and markets. MIG and other advanced grazing management systems adapted to locale have been shown to restore soil and forage health, improve livestock health and production, sequester carbon, and achieve a lower net greenhouse gas footprint for livestock production. Farmers indicate that hurdles to more widespread adoption of MIG practices include initial costs of infrastructure, acquiring new management skills, lack of educational and technical assistance resources, and other socioeconomic factors.

To deploy innovative practices that have been proven to improve the resilience and carbon sequestration potential of livestock production systems, we urge the Natural Resources Conservation Service (NRCS) to modify various grazing conservation practice standards to reflect that MIG systems can dramatically improve soil health, carbon sequestration, and water quality. MIG can help improve forage availability as well as forage quality, while simultaneously achieving important conservation benefits.

NRCS should encourage further adoption of advanced grazing management systems, including MIG, through robust ranking consideration, increased payment rates, technical assistance and training for implementation, and bundled payment options under the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP).

We also strongly encourage the Farm Service Agency (FSA) to expand the role of the Conservation Reserve Program (CRP), including the Grasslands Initiative, to explicitly support carbon sequestration goals. FSA could support highly effective carbon-sequestering and climate-mitigating practices such as forested riparian buffers and improved range and pasture by using the Clean Lakes, Estuaries, and Rivers (CLEAR) initiative, Conservation Reserve Enhancement Programs (CREP), and the Grasslands Initiative to their full and complete potential. CLEAR bonus and practice incentive payments (PIPs) should be restored to their full amount, CREP negotiations with the states should allow for adoption of the 2018 Farm Bill's improved management options without any payment rate reductions, and all landowners who entered through a general sign-up should be contacted well in advance of contract expiration of their options for continuing in the future under CLEAR, CREP, and Grasslands. The Department should also encourage Congress to promote agroforestry and other permanent vegetative covers through CRP by creating a permanent easement component within the program, and by further expanding the Grasslands Initiative.



The Department should also dedicate funding to support research, demonstration, education, workforce development, and planning and outreach projects on advanced grazing. A grazing apprenticeship support program to provide the training that ranchers need to transition to advanced grazing management systems would also greatly improve adoption across the country.

***6. Revise procedures and ranking tools (CART) to score Conservation Stewardship Program (CSP) applications based on the overall benefits of existing and additional conservation activities and the number of resource concerns addressed.***

CSP is the largest working lands conservation program in the country, and it is unique because it rewards ongoing conservation efforts. Applications are supposed to be ranked based on existing conservation and planned additional conservation activities, however, the new ranking tool, the Conservation Assessment Ranking Tool (CART), does not give the appropriate weight to ongoing annual management of conservation, diminishing the chances that good land stewards can secure a CSP contract to further advance their conservation efforts. This unfair weighting in the ranking template of CART needs to be corrected if the AIA aim of rewarding innovation is to bear fruit.

***7. Stop offering payments to new or expanding concentrated animal feeding operations (CAFOs).***

The increasing use of liquid manure storage facilities has been the major driver of increased total U.S. agricultural greenhouse gas emissions between 1990 and 2018. The Natural Resources Conservation Service (NRCS) has a responsibility to protect natural resources and the environment, so it is extremely problematic that the agency has continuously supported and subsidized CAFO expansion in areas already at high environmental risk and disproportionately impacting communities of color. We urge NRCS limit eligibility of CPS 359 (Waste Treatment Lagoon) and other related livestock waste standards to existing confinement livestock operations only. NRCS should not offer financial assistance under CPS 359 or other standards for new or expanding CAFOs. Additionally, NRCS should strengthen requirements such that liquid manure be applied at ecologically acceptable rates and times of year.

Additionally, the 50 percent of the Environmental Quality Incentives Program (EQIP) funding for livestock production should be reallocated to support more sustainable pasture-based livestock, dairy, and poultry operations, including technical assistance, outreach, and more robust payments for producers seeking to initiate, improve, or transition to grass-based operations.

Finally, USDA should also require that existing CAFOs that receive EQIP funding implement, not just develop comprehensive nutrient management plans. Without stronger safeguards, conservation funding further entrenches CAFOs and their harmful environmental and public health externalities and allows them to persist at the expense of climate-friendly alternatives.

***8. Increase agency-wide USDA agricultural data integration and analysis.***

Key research insights needed to advance innovation can be uncovered by increasing integration and analysis of USDA's agency-wide agricultural data. Several opportunities exist to immediately improve data innovation and research at USDA, both internally and externally, by partnering with researchers at land grant institutions or other agricultural colleges and universities.

We encourage USDA to continue working on creating an internal data dashboards system for USDA Mission Areas and to extend it to all Mission Areas. This shared, internal platform makes data available across office leadership to inform decision-making and increase the agency's ability to generate robust data insights. Furthermore, we encourage USDA to incorporate more types of data into these dashboards to advance research and organizational decision-making efforts.

Section 1619 of the 2008 Farm Bill allows USDA to share its agricultural data with land grant institutions for the purposes of technical assistance. To promote new and innovative research by land-grant universities, USDA can establish agreements with trusted researchers to answer key research questions related to the agency's production and environmental goals. Expanding research capacity will help create a strong scientific basis to drive innovation forward.

***9. Increase research investment in organic agriculture to improve productivity and realize multiple environmental benefits and incentivize transition to organic production systems.***

Recent research indicated that organic systems enhance soil health, agricultural resilience, and yield stability, indicating the carbon sequestration and climate mitigation potential of organic practices and systems. Farmers and ranchers have identified transitioning to organic from conventional systems as a significant opportunity for innovation. Organic programs like the National Organic Certification Cost Share Program (NOCCSP) and the Organic Agriculture Research and Extension Initiative (OREI) deserve sizable investment in order to keep pace with the accelerated growth of the organic market.

Continued investment in research and development of practical solutions to challenges organic producers face, such as improved methods for weed control and nutrient management, will help organic producers to increase production levels to match conventional agriculture production systems, while further reducing the environmental and greenhouse gas footprint of organic production systems. Increasing emphasis and investment in organic research through the Sustainable Agriculture Research and Education Program (SARE) and the Agriculture and Food Research Initiative (AFRI) programs, as well as expanding Organic Transitions Program (ORG) and OREI, are immediate steps USDA can take to advance organic production systems.

Furthermore, the Natural Resources Conservation Service (NRCS) should have dedicated staff to guide and enroll organic producers in working lands conservation programs, such as the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP), and conservation practices and enhancements should be aligned with the requirements producers need to meet under the Organic System Plan (OSP) to encourage transition to organic farming. USDA can also increase support for organic and organic-transitioning producers by taking concrete steps to implement the “new or expected resource concerns related to organic production” EQIP program purpose and maintaining the separate ranking and funding pool for organic producers, while encouraging Congress to increase the contract payment limit from \$140,000 to \$450,000, mirroring the general EQIP funding pool.

Organic production systems have great potential to sequester carbon and reduce greenhouse gas emissions, to protect water quality by reducing nutrient losses by 50 percent or more, and to recycle food waste to the land via a composting process to convert the waste into a valuable soil amendment. Organic farming systems are complex and successful organic management is highly knowledge-intensive; however, this innovation area is highly compatible with the needs and values of a growing percentage of farmers and consumers as awareness of the urgent need for effective land stewardship continues to grow. This innovation is readily transferable due to the work of Organic Farming Research Foundation (OFRF) and other NGOs, and the ongoing research advances and practical applications delivered through OREI, ORG, and SARE.

While organic systems offer a distinct relative advantage through the emphasis on soil and environmental health and abstinence from synthetic chemicals, both successes and challenges are readily observable, including the fact that weed pressure and nutrient management challenges can become barriers to both production and soil health. Innovative approaches to these challenges continue to emerge through USDA-funded organic research currently underway, including innovative use of cover crops and minimum tillage systems, and elucidation of microbial dynamics in organic systems. Organic agriculture remains an innovative approach that is both “ready to go” and high priority for continued research and innovation.

#### ***10. Fund the development of farmer-ready cultivars and breeding networks for a changing climate***

A tremendous opportunity exists for development of farmer-ready cultivars to meet the challenges of climate disruption through cost-efficient development of crop cultivars through classical breeding amplified by modern genomic analysis. Recent advances in understanding the role of plant-soil microbiomes and plant genetic traits in crop nutrient and water use efficiency, resilience to diseases, weeds, and abiotic stresses (drought and other weather extremes brought on by a changing climate), overall vigor and capacity to increase yield in organic and other sustainable production systems demonstrate the need to make this a priority with the AIA.

Additionally, farmer participation in plant breeding networks can hasten development of regionally adapted, resilient, farmer-ready public crop cultivars. Plant breeding networks that include farmer researchers, funded through the Organic Agriculture Research and Extension Initiative (OREI), for instance, have achieved the development of several dozen new cultivars and several hundred advanced breeding lines with valuable agronomic, resilience, and market traits which compare favorably with that for genetically modified crops at less than half the R&D cost.

USDA can expand support for public cultivar development (distinct from genomics and other basic crop genetics research) by dedicating at least \$50 million per year to this research and prioritizing farmer-participatory breeding endeavors, regionally adapted and climate-resilient, resource-efficient cultivars, and cultivars that meet market needs of farmers. Additionally, a separate Agriculture and Food Research Initiative (AFRI) sub-program funded at least \$10 million per year dedicated for public cultivar development should be established. Steps should also be taken to ensure that new cultivars developed with public funding remain in the public domain, not subject to utility patents or other excessively restrictive intellectual property provisions.

In addition to maintaining production in the face of climate disruption, this innovation area will protect water quality and water resources through enhanced nutrient and water use efficiency and mitigate climate change by reducing the use of nitrogen fertilizer and other inputs. Breeding for crop vigor and enhanced plant-microbe interactions can also enhance soil carbon sequestration.

***11. Increase research that engages farmers, ranchers, and stakeholders in perennial production systems, such as agroforestry, alley cropping, permaculture, and silvopasture, and incentivize widespread adoption of these production systems.***

Perennial production systems are highly promising, both in terms of production (highly nutritious fruit, nut, and other perennial crop products, and high quality meat, dairy, and eggs from pastured livestock) and environmental benefits. Conversion of annual cropland to any of these forms of perennial agriculture typically sequesters 2,000 lb. carbon per acre annually, compared with just 400-600 lb./ac. for conversion of conventional production of annual crops to either organic or conservation agriculture management of the same annual rotations. Perennial cropping systems and crop-livestock integrated systems cycle nutrients efficiently, protect soil from erosion and degradation, and require far less fertilizer per acre-year. Low fertilizer inputs combined with year-round living roots protect water quality by reducing nutrient losses as well.

These systems simulate the biodiversity and functioning of natural plant communities and ecosystems, and hence they are inherently highly resilient. However, additional research that engages end users and all stakeholders in permaculture systems is needed to build productivity up to levels that will meet the needs of the U.S. population, while maintaining a small environmental and climate footprint. This innovation is not excessively complex as it entails integration of existing horticultural, agronomic, and grazing management skills that have been extensively researched and

developed by practitioners and scientists. It is also quite transferable due to the many books, bulletins, courses, and other educational materials developed by practitioners, NGOs, and the USDA Agroforestry Center. Furthermore, this innovation is highly compatible with the environmental stewardship, food quality, and aesthetic needs and values of farmers and ranchers and their surrounding communities. In addition to the tremendous relative advantage of perennial versus annual cropping systems in terms of soil, water, other resources, and carbon sequestration, advances in agroforestry, silvopasture, and permaculture depend more on the creative integration of “low-tech” practices with available plant and animal genetic resources (species, cultivars, and breeds), making them much more accessible and transferable than many more costly high-tech approaches.

***12. Increase support for composting as a climate-friendly alternative to landfill and manure lagoon disposal of organic residues.***

In addition to stabilized nitrogen, finished compost delivers stable organic carbon estimated in one study at 222 lb. per ton of compost (Carpenter-Boggs et al., 2016), making contributions to soil organic carbon that can persist for centuries (McLauchlan, 2006). Furthermore, several studies indicate that cover crops plus compost can build more soil organic carbon than either alone (Delate et al., 2015b; Hooks et al., 2015; Hurisso et al., 2016).

When organic materials are diverted from manure lagoons or landfills (e.g., food waste, yard waste, municipal leaves) to make compost for agricultural use, the greenhouse gas emissions from the composting process and materials transport are far outweighed by the avoided methane emissions from anaerobic decomposition in lagoons and landfills, and the enhanced plant growth and soil organic carbon accrual on treated acreage (DeLonge et al., 2013). Composting – and land-applying organic residues that would otherwise be disposed of as “waste” – is an important societal strategy for climate mitigation and adaptation/resilience in the agriculture and food system.

USDA should increase support for composting as a climate-friendly alternative to landfill and manure lagoon disposal of organic “wastes.” The Natural Resources Conservation Service (NRCS) should rename conservation practice standard (CPS) 317 (Composting Facility) to “Composting and Composting Facility” and the agency should expand the purposes, criteria and considerations to include the composting process itself and the proper use of compost based on sound nutrient management.

Additionally, NRCS should revise criteria for CPS 317 (Composting Facility) and CPS 633 (Waste Recycling) to support composting of both on-farm and off-farm sourced organic residues so that they do not become “wastes” discarded in landfills or held in waste lagoons, where they will emit large amounts of methane. If composted, they become a valuable soil amendment for building soil health and resilience and sequestering carbon. Both recommendations would improve soil health and water quality, and they represent “ready to go” approaches that USDA can implement now.

***13. Improve the Interim Conservation Practice Standard 808 and make it a national and permanent practice standard as soon as possible.***

This standard promotes soil health, soil carbon sequestration, and compost use as a conservation practice. However, the Standard covers a collection of highly disparate amendment materials with very divergent properties and impacts on soil carbon and nutrient dynamics, and thus different management considerations. Because soil carbon includes both soil organic carbon and soil inorganic carbon, we strongly recommend this Practice Standard focus on organic amendments and their effect on soil organic carbon. Soil inorganic carbon can comprise 20-80 percent of total soil carbon in alkaline soils of lower-rainfall regions such as the Great Plains and Intermountain West. Managing these soils to optimize total carbon sequestration entails a new set of challenges and considerations, which would be best addressed by the development of a separate soil carbon conservation practice tailored to these regions and soils.

Furthermore, organic carbon materials brought in from an off-field or off-farm site do not necessarily represent net carbon sequestration, unless those materials would otherwise be landfilled (to become methane) or burned (releasing carbon dioxide). If the material is gathered from a hayfield, forest, or other land where it could otherwise be returned to the soil in situ, then the result would be no net carbon sequestration and should not be encouraged through implementation of this Standard.

As currently written, each of the soil carbon amendments discussed in the Standard is very different from the others and will have very different impacts on soil organic carbon accrual, soil biology, nutrient cycling, and other soil health and conservation objectives, further warranting revisions to the Standard. Additionally, the impact of management practices on soil organic carbon and soil health will also differ among the various amendment types covered by the Standard, and best results may accrue from mixing different materials. In regard to compost, we recommend the Standard provide (either in the General Criteria or in the Considerations section) the additional information that, even on soils with low or moderate phosphorus levels, compost application rates consistent with sound nutrient management will be only a fraction of an inch (not two inches as currently written), and that these low rates can be valuable for enhancing carbon sequestration and soil health.

NSAC also encourages the Natural Resources Conservation Service (NRCS) to have a separate Standard for biochar due to its distinct properties and novelty. Biochar is a highly promising, relatively new technology, one that warrants additional research to refine guidelines for practical application.

Overall, each of the amendment types addressed in Interim CPS 808 may require separate sets of criteria for their optimal use for carbon sequestration and other conservation objectives. Once CPS 808 and other potential associated standards, as suggested above, are revised, we urge NRCS to

make them a national, permanent conservation practice standard as soon as possible. We also recommend continuing and expanding the Conservation Stewardship Program (CSP) conservation enhancements that promote soil health.

***14. Advance renewable energy produced and used on farm (wind, solar, and on-farm use) to lower costs and improve resilience of farms.***

Our farms and ranches can improve energy use efficiency and become major producers of renewable energy for use within and beyond the agriculture sector. Solar and wind show great promise as low-carbon energy sources, while biofuel production from agricultural biomass requires careful lifecycle assessment and consideration of social impacts. Powering America's farms with low-carbon renewable energy rather than fossil fuels can increase the control of farmers and ranchers over their energy sources, reduce costs, and combat climate change.

On-farm energy production eliminates the need to run electric lines or pipelines to remote locations. It also allows farmers to decrease their reliance on increasingly expensive fossil fuels, produce energy from low-carbon sources with fewer greenhouse gas emissions, develop new value-added revenue sources, reduce on-farm costs, and complement organic and sustainable farming practices. However, large-scale solar panel installations are sometimes being installed on prime farmland, key wildlife habitat, and other healthy soil-plant ecosystems that presently sequester carbon and perform other vital functions. Thoughtful integration of solar collectors into a diverse farm landscape can maximize benefits and avoid or minimize costs to productivity and other ecosystem services.

USDA should incentivize adoption of existing agrovoltatics technology and wind turbines that support renewable on-farm energy production, while protecting farmland productivity and conservation outcomes. Furthermore, USDA should accelerate research to ensure solar and wind on-farm energy is installed in a way that does not harm agricultural production and actually helps increase production.

***15. Invest in the development of an Online Supplemental Nutrition Assistance Program (SNAP) Portal and associated regulatory and information technology infrastructure to allow for cost-effective acceptance of SNAP online by direct market farmers, relevant small businesses, and independent grocery retailers.***

USDA has taken a number of important steps to improve the opportunity for people to use their SNAP and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) benefits at farmers markets and community supported agriculture (CSAs). However, as these programs transitioned to electronic benefit transfer (EBT) systems, the complexity of ensuring universal access and program integrity have been thwarted by the lack of a USDA-wide strategy to lower barriers to participation, provide necessary equipment and technical support, and accommodate rapidly evolving payment technologies. Elevating and prioritizing this critical healthy

food access issue must be a priority for USDA under its AIA. It is a “ready to go” technology that can benefit small and midsize farmers and those relying on SNAP for food assistance.



## Sources

Blanco-Canqui, H., A. L. Stalker, R. Rasby, T. M. Shaver, M. E. Drewnoski, S. van Donk, and L. Kibet. 2016a. Does Cattle Grazing and Baling of Corn Residue Increase Water Erosion? *Soil Science Society of America Journal*, 80 (1): 168-177.

Blanco-Canqui, H., J. Tatarko, A. L. Stalker, T. M. Shaver, and S. J. van Donk. 2016b. Impacts of Corn Residue Grazing and Baling on Wind Erosion Potential in a Semiarid Environment. *Soil Science Society of America Journal*, 80(4): 1027-1037.

Carpenter-Boggs, L., D. Granatstein, and D. Huggins. 2016. Greenhouse Gases and Agriculture: Where Does Organic Farming Fit (Webinar).  
<http://articles.extension.org/pages/30835/greenhouse-gases-and-agriculture:-where-does-organic-farmingfit-webinar>.

Delate, K., C. Cambardella, C. Chase, and R. Turnbull. 2015b. A review of long term organic comparison trials in the US. *Sustainable Agricultural Research*, 4(3): 5-14.

DeLonge, M. S., R. Ryals, and W. L. Silver. 2013. A lifecycle model to evaluate carbon sequestration potential and greenhouse gas dynamics of managed grasslands. *Ecosystems*, 16: 962-979.

Hooks, C. R., K. H. Wang, G. Brust, and S. Mathew. 2015. Using Winter Cover Crops to Enhance the Organic Vegetable Industry in the Mid-Atlantic Region. Final report for OREI project 2010-01954. CRIS Abstracts.

Hurisso, T. T., S. W. Culman, W. R. Horwath, J. Wade, D. Cass, J. W. Beniston, t. M. Bowles, A. S. Grandy, A. J. Franzluebbbers, M. E. Schipanski, S. T. Lucas, and C. M. Ugarte. 2016. Comparison of Permanganate-Oxidizable Carbon and Mineralizable Carbon for Assessment of Organic Matter Stabilization and Mineralization. *Soil Science Society of America Journal*, 80 (5): 1352-1364.

Lal, R. 2016. Beyond COP21: Potential challenges of the “4 per thousand” initiative. *Journal of Soil & Water Conservation*, 71(1): 20A-25A.

McLauchlan K. 2006. The nature and longevity of agricultural impacts on soil carbon and nutrients: A review. *Ecosystems*, 9(8), 1364-82.