



American Society of Agronomy • Crop Science Society of America • Soil Science Society of America

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President-elect Joe Biden  
1401 Constitution Avenue NW  
Washington, D.C. 20230

To President-elect Biden and Vice President-elect Harris:

Climate change is this generation's most important challenge. It also represents a significant and singular opportunity for agriculture—the opportunity to make farmers, ranchers, and foresters the heroes of the climate change story by reducing atmospheric greenhouse gases (GHGs). Agricultural research is essential for this to occur. Climate change is multifaceted in its causes and effects; similarly, agriculture is a complex system—changes to any one component will impact others. To meet the challenge of climate change, systems-level thinking needs to be woven throughout all agricultural research. Systems science, which includes traditional agriculture domains, soil science, engineering, economics and sociology, will enable critical opportunities for farmers, ranchers, and foresters to reduce and mitigate the effects of climate change and to participate in the carbon economy.

The American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and Soil Science Society of America (SSSA) have, and will continue, to help coordinate an understanding of systems science with USDA's leadership, in the topics below and beyond.

### **Carbon sequestration represents an immense opportunity that cannot be ignored**

American farmers, ranchers, and foresters are no strangers to USDA conservation programs. These programs are popular and successfully encourage a variety of conservation practices. Carbon markets, backed federally or through private clearinghouses, such as the Ecosystem Services Market Consortium, represent additional opportunities poised to offer financial incentives for farmers to sequester carbon. The quantification of soil carbon sequestration, which would underpin the level of reimbursement to farmers, requires funding for the scientific community to turn soil science research into evidence-based policy recommendations.

Agriculture is one of the few sectors that can offset GHG emissions, primarily through the mechanism of soil carbon sequestration. Mitigation and management activities that can sequester soil carbon include reduced tillage, water and nutrient management, perennial grains, cover crops, afforestation and reducing deforestation, restoring terrestrial wetlands, and improved land-management practices in forests, grasslands, and croplands. These activities can maintain or increase carbon storage while decreasing the sources or emissions of carbon to the atmosphere, and additional agronomic activities, such as increasing the diversity of planted crops, can decrease GHG emissions in the first place while providing farms resilience to a changing climate. However, warming temperatures and disturbances such as pest outbreaks, wildfires, and destruction of crops, forests and wetlands may disrupt and decrease carbon sequestration and release stored carbon back to the atmosphere. Ongoing research on the dynamic nature of carbon fluxes and stocks in the terrestrial carbon reservoir will help determine whether the land will continue to absorb similar amounts of carbon in future years since changes in climate, human activities, and ecosystem responses may alter future long-term removals of carbon from the atmosphere.

Systems-level research is needed to incorporate all of these intersecting facets, and there are additional factors that must also be considered. Rural communities, where economies are more tightly interconnected with agriculture than with other sectors, are particularly vulnerable to the agricultural volatility related to climate, and large-scale or significant land management changes may have broad socio-economic implications. For example, a farmer shifting from food to bioenergy crops or a landowner switching from growing crops to planting a forest may each cause cascading effects on rural economies, labor, and the environment. Integrating social science research would improve understanding of the vulnerability of rural communities, provide strategies to enhance adaptive capacity and resilience, and remove barriers to adoption of new strategies.

The implementation of carbon markets and federal policies that reward farmers, ranchers, and foresters for carbon sequestering practices are a first step. However, access to technology, such as robust data management tools, that can aid in implementation of these practices remains an insurmountable challenge without **universal rural broadband**. For example, precision agriculture techniques used to monitor carbon fluxes rely on vast amounts of data intended to be processed at high speeds. Only with rural

**The potential for carbon markets is linked to crops developed for carbon sequestration.** CSSA member Dr. Lee DeHaan of The Land Institute in Salina, Kansas is leading important and far-reaching work to develop Kernza® perennial grain. Other members are working to develop perennial corn, rice and sorghum. The environmental benefits of these crop are many, including soil carbon sequestration. They will address both prominent avenues to boost soil carbon in agricultural systems: increased inputs and reduced losses. Perennials allocate more carbon to roots compared to annuals and eliminate frequent soil disturbance so that carbon will accumulate in soil. Work is underway at Colorado State University to add Kernza to the USDA's Comet Farm carbon accounting tool. This tool will allow Kernza farmers to receive payment for capturing carbon under perennial production.

**SSSA members are doing the research that underpins successful carbon markets.** Farmers have a new opportunity to generate revenue from something they already do: remove CO<sub>2</sub> from the atmosphere and store it in the soil. But first, investors need to know how much carbon can be stored, and if that carbon will stay put. Deep soils are among the best places to store carbon because they have low carbon levels – meaning more room for storage – and they are buffered from changes in management that can inadvertently release surface soil carbon to the atmosphere. Mike Castellano at Iowa State University is working to help farmers maximize productivity, profitability, and environmental performance by identifying management systems that increase crop productivity while storing carbon in deep soil layers where it will endure.

broadband will producers have equitable access to the precision techniques required for carbon markets to succeed. Likewise, the research underpinning carbon sequestration practices and the efficacy of precision techniques rely on this same technology. In other words, rural broadband is not only necessary for farmers, ranchers, and foresters to participate in the carbon economy, it is necessary for the carbon economy's very development.

Once access is achieved, farmers will need technical assistance to integrate new precision techniques. For trusted advice and technical support, farmers turn to the more than 13,000 Certified Crop Advisors (CCAs) who cover more than 200 million acres of U.S. agricultural land. As trusted advisers, CCA engagement is critical for translating innovative science and scaling climate-smart management practices. USDA should partner with CCAs, industry, and other local groups to provide comprehensive assistance to farmers interested in participating in the carbon economy.

## **Agricultural research represents hope for the future of our planet**

Agricultural research also must play a role to reduce climate change impacts by building resiliency into America's food system. The dedicated scientists working on these aspirational projects continue to operate on insufficient budgets to improve resiliency. USDA's Agriculture and Food Research Initiative (AFRI) was conceived in 2008 as a competitive research program with a \$700 million budget. However, that full level of funding is yet to be achieved. AFRI needs to be fully funded for agricultural research to begin making sustained, systematic inroads on reducing the effects of climate change.

Years of flat budgets in USDA research programs have far-reaching consequences. Talented young people interested in climate change mitigation and environmental justice apply their skills in fields with more reliable funding. USDA needs to make a strong and consistent investment in graduate student fellowships that center on the student. This will clearly signal that agricultural research is important, impactful, and accessible, and it will both prepare students and steer them towards careers building expertise in this critical area.

In addition to funding the low-risk research that keeps America's food system moving, the Agriculture Advanced Research and Development Authority (AGARDA), recently authorized in the 2018 Farm Bill, is a pilot program for high-risk/high-reward advanced research that should be funded at \$50 million. AGARDA was conceived as an agency in the style of the Advanced Research Projects Agency - Energy (ARPA-E), a highly successful program of transformational research within the Department of Energy. Agricultural research would benefit from a true, ARPA-style agency at USDA that pushes the boundaries of the possible. USDA needs a strategic plan to stand up this agency, should funding be appropriated. The Societies stand ready to work with USDA to develop this plan.

### **CCAs help farmers balance food production with the environment.**

CCA Nick Guilette uses his personal experience working in agriculture and background in resource management, agronomy, and soils to guide Wisconsin farmers towards sustainable practices. As an USDA-Natural Resource Conservation Service (NRCS) demonstration farm project manager, he showcases conservation practices that protect the Great Lakes through reduced nonpoint source pollution and erosion, connecting with the public, farmers, universities, agribusiness, and other partners. Nick's work increasing no-till and cover crop practices among farmers who trust him and are impressed with his results earned him the prestigious CCA Conservationist of the Year Award in 2019.

## USDA must create a more inclusive food system

USDA should broaden representation by advancing programs for minority-serving institutions, which need access to research funding to build ranks of minority researchers.<sup>1</sup> For example, USDA can create a position in NIFA dedicated to outreach to 1890 historically Black Land Grant Universities, Hispanic Serving Institutions, and 1994 Tribal Colleges. These institutions are underrepresented in research proposals, both submitted and funded, and the United States needs them to be competitive in agricultural research to achieve an equitable food system.

Strengthening minority-serving institutions, in conjunction with universal rural broadband, are crucial for building diversity, equity, and inclusion in agriculture and agricultural science. USDA can and should do more. For example, USDA should promote and directly support K-12 programs, internships, summer job opportunities, and college and graduate student research scholarships, especially for Native American, Black, Hispanic, and urban populations.

USDA also needs a greater commitment to urban and controlled-environment agriculture. Urban agriculture leverages population density for a more efficient, circular economy of waste and re-use, creates jobs and provides opportunities for urban dwellers to learn about agriculture. It reduces greenhouse gas emissions related to long-range food transportation by growing food close to its consumers. It enhances urban greenspaces, reduces heat islands, contributes to pollution reduction, and reduces flooding hazards.<sup>2</sup> Each of these advantages, and access to fresh, nutrient-dense fruits and vegetables,<sup>3</sup> are direct benefits to those living in urban neighborhoods without access to fresh food or greenspaces, many of whom are predominantly people of color.<sup>4</sup>

### CSSA supports urban agriculture.

The Societies support the only scientific journal dedicated to urban agriculture, and our members are breeding crops that vibrant and impactful urban and controlled-environment farms will need. CSSA member Dr. Kim Lewers bred strawberries for cold tolerance and improved shelf-life so they can be grown in the Mid-Atlantic and Northeast urban centers that consume them.<sup>5</sup>

## We are the Agronomy, Crop, and Soil Science Societies

Collectively, our societies represent more than 8,000 scientists in academia, industry, and government with a combined total of more than 120,000 years of experience. We also represent 13,000 Certified Crop Advisors (CCA), and 781 Certified Professional Soil Scientists (CPSS). We are the largest coalition of professionals dedicated to the agronomic, crop, and soil science disciplines in the United States. Our member scientists work at the cutting edge of research dedicated to increasing agricultural productivity, while reducing its environmental footprint, and our certifiants offer sound, trusted advice for optimized and profitable farms, ranches, and other agricultural operations. USDA is an important partner, both supporting and using our members' research – indeed many of our members are USDA employees, and we look forward to continued partnership throughout existing areas that have so greatly improved agriculture over the last 113 years.

**For additional information** or to learn more about the ASA, CSSA, and SSSA, please contact Karl Anderson, Director of Government Relations, at [kanderson@sciencesocieties.org](mailto:kanderson@sciencesocieties.org).

1 Henkhaus, N., Bartlett, M., Gang, D., Grumet, R., Jordan-Thaden, I., Lorence, A., ... & Specht, C. (2020). Plant science decadal vision 2020–2030: Reimagining the potential of plants for a healthy and sustainable future. *Plant direct*, 4(8), e00252.

2 Ferreira, A. J. D., Guilherme, R. I. M. M., & Ferreira, C. S. S. (2018). Urban agriculture, a tool towards more resilient urban communities?. *Current Opinion in Environmental Science & Health*, 5, 93-97.

3 Pinstrup-Andersen, P., Pandya-Lorch, R., & Rosegrant, M. W. (2001). Global food security. *The Unfinished Agenda*. IFPRI, Washington, 7-17.

4 Popovich, Nadja and Christopher Flavelle. "Summer in the City Is Hot, but Some Neighborhoods Suffer More." *The New York Times*, 9 Aug 2019, <https://www.nytimes.com/interactive/2019/08/09/climate/city-heat-islands.html> Accessed 21 Dec 2020.

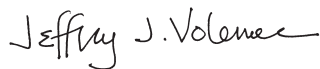
5 Lewers, K. S., Enns, J. M., & Castro, P. (2019). 'Keepsake' Strawberry. *HortScience*, 54(2), 362-367.

## Summary

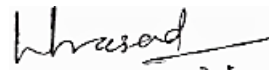
USDA can meet the challenges of agriculture in the next century by continuing to support the excellent and impactful work it already does and expand additional efforts in a few key areas:

- **Enable large-scale, on-farm carbon sequestration.**
  - ♦ Prioritize sustained, soil science research that examines carbon sequestration from multiple angles and incorporates a multitude of disciplines (systems science).
  - ♦ Commit to funding and implementing a program for universal rural broadband.
  - ♦ Empower USDA agencies to partner with CCAs and others to provide technical support to farmers, ranchers, and foresters interested in enhancing carbon sequestration on their land.
- **Commit to agricultural research budgets.**
  - ♦ Fully fund AFRI at \$700 million to maintain agricultural research and education capacity.
  - ♦ Raise AFRI's budget for direct funding for graduate student research programs to 3-5 percent.
  - ♦ Stand up the \$50 million AGARDA pilot program.
- **Create an inclusive food system.**
  - ♦ Create a position dedicated to outreach and partnerships with 1890 historically Black Land Grant Universities, Hispanic Serving Institutions, and 1994 Tribal Colleges.
  - ♦ Promote and directly support agricultural education opportunities for all age groups, especially for Native American, Black, Hispanic, and urban populations.
- **Strengthen USDA's commitment to urban and controlled-environment agriculture.**

Sincerely,



Dr. Jeff Volenic, President, American Society of Agronomy



Dr. Vara Prasad, President, Crop Science Society of America



Dr. April Ulery, President, Soil Science Society of America