

July 31, 2020

Deputy Secretary Stephen Censky  
United States Department of Agriculture  
1400 Independence Avenue SW  
Washington, D.C., 20250



**Re: Comments on Research with respect to USDA's Agriculture Innovation Agenda**  
Docket No. USDA-2020-0003

Dear Deputy Secretary Censky,

We are pleased to provide comments in response to USDA's *Solicitation of Input From Stakeholders on Agricultural Innovations* (Federal Register Volume 85, Number 63, page 18185). The Izaak Walton League of America is one of America's oldest conservation organizations. Chartered in 1922 by 54 anglers, the League grew to become the defenders of America's soil, air, woods, waters, and wildlife. We have taken an active role in agricultural policy from our earliest days, and we recognize the critical role that basic and applied research play in driving innovation and conservation on America's farms and ranches.

The National Academy of Sciences report cited in the solicitation identifies five of the most promising scientific breakthroughs that can increase the US food and agriculture system's sustainability, competitiveness, and resilience. The report identified those five areas as:

- \* A systems approach to understand the nature of interactions among different elements of the food and agriculture system;
- \* The development of field-deployable sensors and biosensors;
- \* The application and integration of data sciences to enable advanced analytics;
- \* The ability to carry out gene editing of organisms; and
- \* Understanding the relevance of the microbiome to agriculture.

USDA's announcement asking for stakeholder input, which references the National Academy of Sciences report, appears to include four of these elements -- systems based management, digital/automation, prescriptive intervention (application of data sciences), and genome design -- but appears to largely leave out the discussion of the importance of the microbiome, which includes the microbiome of the soil. We think leaving out the importance of the microbiome in the discussion of agricultural innovation would be a huge mistake, as some of the biggest opportunities for research that will benefit farmers, rural communities, and agricultural conservation are in the area of soil health. As the National Academy of Sciences report notes:

*Understanding the relevance of the microbiome to agriculture and harnessing this knowledge to improve crop production, transform feed efficiency, and increase resilience to stress and disease. Emerging accounts of research on the human microbiome provide tantalizing reports of the effect of resident microbes on our body's health. In comparison, a detailed understanding of the*

*microbiomes in agriculture—animals, plants, and soil—is markedly more rudimentary, even as their functional and critical roles have been recognized for each at a fundamental level. A better understanding of molecular-level interactions between the soil, plant, and animal microbiomes could revolutionize agriculture by improving soil structure, increasing feed efficiency and nutrient availability, and boosting resilience to stress and disease. With increasingly sophisticated tools to probe agricultural microbiomes, the next decade of research promises to bring increasing clarity to their role in agricultural productivity and resiliency.*

The failure to include any mention in the USDA Solicitation of soil health or the importance of microbiome is all the more disappointing because soil health solutions can contribute significantly to both of the USDA goals, increasing agricultural productivity and reducing agriculture's environmental footprint.

With respect to the USDA's questions outlined in the Solicitation, soil health has an impact on nearly all agriculture commodities, and research leading to improvements in soil health could ultimately benefit almost every crop or species of livestock. The biggest challenges and opportunities to increase productivity and decrease environmental footprint that should be addressed in the next 10-30 years are, in our view, in the soil health arena.

Research into soil health can help deliver solutions that address all three of the major goals for food and agricultural research identified in the National Academy of Sciences report.

(1) ***Improving the efficiency of food and agricultural systems***, because healthy soils provide nutrients and defend plants against pests, substantially reducing the chemical fertilizers and pesticides needed for crop production. That makes production systems more efficient, because the bushels or pounds of crops produced per pound of fuel, fertilizer, or pesticides are far higher than with current conventional methods.

(2) ***Increasing the sustainability of agriculture***, because the fertilizer and fuel use that can be substantially reduced through healthy soils are mostly derived from non-renewable fossil fuels (natural gas and oil), and soil health practices reverse the loss of soil through erosion and degradation, allowing soils to produce long into the future.

(3) ***Increasing the resiliency of agricultural systems to adapt to rapid changes and extreme conditions***. Healthy soils infiltrate and absorb precipitation better than unhealthy soils, making them more resilient to dry and wet times. As climate change impacts precipitation and other weather patterns, healthy soils can provide resiliency to agricultural systems.

Soil health is fundamentally important to US agriculture and the financial health of American farmers. Efforts to restore soil health show great promise for addressing multiple natural resource problems including polluted runoff of nutrients, pesticides, and soil, threats to pollinators, soil erosion, loss of wildlife habitat, flooding, and climate change. Yet the promising benefits of restoring healthy soils are falling short in part due to a lack of basic and applied research.

***The U.S. Department of Agriculture should put soil health at the center of its research agenda for the next decade. USDA should lead, carrying out, and fund critical research needed to fully realize the many potential benefits of soil health in the following areas.***

\* Research on basic soil health science, the interactions of bacteria, fungi, and other microbes, to provide a better understanding of the basic dynamics of soil biological interactions.

\* Development and promulgation of soil health testing protocols, including suites of tests that farmers can replicate easily and cheaply on cropland and grassland to understand, monitor and track changes in soil health. We greatly appreciate the recent work USDA has done to identify key metrics for measuring healthy soils and protocols for testing. This vital work needs to continue.

\* Research on the impacts on water quality, soil erosion, carbon storage, flooding, and wildlife of soil health practices at farm and landscape scales, and the synergistic and other effects of layering combinations of soil health practices together. USDA should carry out research to improve its models for estimating the impacts of soil health practices and key soil health variables on conservation outcomes.

\* Research on soil health economics, and the various economic benefits and costs for farmers adopting soil health practices and suites of practices. Such research can help farmers, farmland owners, farmland appraisers, bankers and others better understand the economic return of investments in soil health. This research should include a focus on the benefits, including reductions in required nutrients, not just the costs of implementing soil health practices.

\* On-farm trials on the impact of increasing soil organic carbon and soil health on the relationship between nutrient applications and yield. USDA should work with university researchers to revise recommendations for nutrient applications needed for crops to integrate this science to help all farmers, but especially those with healthy soils, avoid the over-application of nutrients.

\* Farmer-led on-farm research on best management practices for soil health, to identify what suites of practices perform best in various soils, climates, and agricultural systems. We suggest this research be carried out through a rapid expansion of the Sustainable Agriculture Research & Education (SARE) grant program focused on soil health and carbon sequestration, or creation of research efforts that retain the on-farm, farmer-led features of the SARE program.

In addition to the soil health research that is needed, we ask USDA to make a priority of research efforts on:

\* The human questions surrounding adoption of conservation practices; what motivates farmers to make change, who do they listen to, and what do we need to do to accelerate adoption of soil health and conservation practices that provide economic and environmental benefits.

\* Innovative conservation systems and their impacts on fish and wildlife, for example, farmers who are sewing crops into grasslands, planting multi-species cover crops, or adding small grains or perennials to a corn-soybean rotation. Innovative practices like these likely all have an impact on wildlife that needs to be better understood.

With respect to data collection, we know that USDA collects a great deal of data in some circumstances, but USDA is also missing important opportunities to collect data on the impacts of the conservation systems and practices that it helps farmers implement.

For example, USDA should review the opportunities to include soil organic carbon and/or soil health testing as a standard part of every conservation contract it funds. USDA should provide a payment to farmers to carry out annual soil health testing as part of every Conservation Stewardship Program, Environmental Quality Incentives Program, and Regional Conservation Partnership Program contract that funds a soil health practice like cover crops, no till, Integrated Pest Management, managed rotational grazing, or conservation crop rotation. The results should be reported to the participant, USDA, and landowner, so the agency can begin to collect practice-specific data on the impacts over time of the conservation practices it funds. The data could be protected from public release at an individual level but

used to better understand and assess important conservation impacts on a county, watershed, state, and national scale.

As USDA considers the potential benefits of innovative practices, technology, and applications of science, and the research needed to obtain those benefits, we strongly urge you to put soil health at the center of USDA's research agenda in the coming decade.

Thank you for your consideration.

Duane Hovorka  
Agriculture Program Director  
Izaak Walton League of America

Charlie Palmgren  
President  
IWLA Illinois Division

Rick Cerwick  
President  
IWLA Iowa Division