



RESEARCH PRIORITIES FOR ORGANIC AGRICULTURE AND CLIMATE CHANGE 2020

Organic agriculture has great potential to sequester carbon, mitigate greenhouse gas (GHG) emissions, reduce the environmental impacts of fertilizers and pesticides, and build resilience to a changing climate in our farms, ranches, rural communities, and food systems. To realize this potential, the public sector must significantly increase its investment in organic research, Extension, and education and prioritize research topics that help producers address the climate crisis by reducing net GHG emissions and adapting their operations to shifting weather patterns.

Farmers successfully implementing regenerative organic practices have an intimate understanding of biological interactions among crops, livestock, pest and beneficial insects, soil organisms, and plant pathogens. Because organic producers rely on ecological processes rather than synthetic inputs to support crop and livestock production, they seek to optimize soil health through practices that also sequester carbon, reduce GHG emissions, and limit production losses to adverse weather events.

Between 2002 and 2020, the Organic Agriculture Research and Extension Initiative (OREI) and the Organic Transitions Program (ORG) invested about \$290 million in research, education, and Extension projects focused on organic agriculture, and developed a substantial body of research-based practical information for organic farmers. However, other USDA research programs have largely ignored organic; for example, just 0.2% of the Agriculture and Food Research Initiative (AFRI) funding between 2011 and 2015 addressed organic topics. Even with increased OREI funding under the 2018 Farm Bill, organic accounts for less than 2% of total USDA research funding. The USDA should triple investment in organic research to be at least commensurate with the organic market share of 6%. This increased investment will spur urgently-needed innovation to mitigate climate change and protect our future by building more resilient food and farming systems.

To help farmers and ranchers meet the climate challenge, USDA organic research should prioritize funding in the following topic areas:

1. Advance soil health and fertility management to sequester carbon, reduce greenhouse gas emissions, and build resilience to climate change stresses

Soil health, soil biology and biodiversity, and fertility management remain top priority research topics for organic producers, especially as they experience the growing impacts of climate disruption. Specific topics within this research area include:

- Organic soil management strategies that integrate practices like cover crops, diverse crop rotations, reduced tillage, organic amendments, and livestock-crop integration to optimize agricultural resilience, carbon sequestration, and net GHG reduction.

- Biologically-based nutrient management strategies that optimize nutrient input efficiency and minimize emissions of the powerful GHG nitrous oxide through tightly coupled nutrient cycling, nutrient recovery, and nutrient budgeting for organic systems.
- Strategies that optimize soil and plant microbiome functions and interactions to enhance carbon sequestration, climate resilience, and crop nutrition and vigor.

2. *Increase research on systems-level approaches to weed, pest, and disease management to minimize pesticide use, conserve biodiversity, and enhance carbon sequestration*

Organic farmers are prohibited from using synthetic inputs to manage weeds, pests, and disease, and therefore rely on some level of physical soil disturbance to control weeds. Crop diversification, cover cropping, weed-competitive cultivars, and sound nutrient management can limit weed pressure, reduce the need for tillage and cultivation, and thereby protect soil carbon and soil health. Research topics for this priority area include:

- Practical tools and integrated strategies to manage weeds with minimal tillage.
- Integrated pest management strategies that are compatible with the National Organic Program (NOP).
- Optimizing the capacity of soil and plant root microbiomes to suppress pathogens and enhance plant defenses.

3. *Promote research on organic livestock and poultry, advanced grazing management, and crop-livestock integration to sequester carbon, reduce greenhouse gas emissions, and enhance climate resilience of livestock production systems*

USDA-funded organic animal agriculture research continues to lag far behind consumer demand for organic meat, dairy, and eggs. Furthermore, recent research highlights the climate benefits provided by advanced rotational grazing and crop-livestock integration. The USDA should expand funding for organic producers' livestock research priorities, including rotational grazing and pasture management, animal nutrition and health, product quality, crop-livestock integration, life-cycle analysis of the GHG footprint of different livestock production systems, and development of improved, climate-resilient public livestock and poultry breeds for organic systems.

4. *Promote breeding and development of new public crop cultivars for resilience to climate disruption and performance in climate-mitigating organic production systems*

Privatization of the seed industry and replacement of public cultivars with patented seeds have substantially narrowed seed choices for farmers, and revoked their right to save and select seeds adapted to their local conditions. Furthermore, with ongoing climate disruption, farmers urgently need crop cultivars specifically developed for stress hardiness. Organic farmers need regionally adapted, climate resilient, non-GMO seeds suited to their production systems and markets. The USDA took the first step to establish plant breeding and public cultivar development for organic producers as a priority under OREI, and the program has supported farmer-participatory plant breeding networks that have developed several dozen new public cultivars and hundreds of advanced breeding lines that combine water and nutrient efficiency, weed-competitiveness, disease resistance, and stress resilience with desired market traits. Now, it is time to ramp up public cultivar development across all research programs, with a specific emphasis on breeding for organic production systems and climate resilience and mitigation traits.