



September 22, 2021

Ms. Michelle Arsenault
National Organic Standards Board
USDA-AMS-NOP
1400 Independence Avenue, SW
Room 2648-So., Ag Stop 0268
Washington, DC 20250-0268

RE: Materials Subcommittee – 2021 Research Priorities

Dear Ms. Arsenault:

Thank you very much for this opportunity to provide comments on the 2021 Research Priorities.

The Organic Center is a non-profit organization with the mission of convening credible, evidence-based science on the environmental and health benefits of organic food and farming and communicating findings to the public. We are a leading voice in the area of scientific research about organic food and farming, and cover up-to-date studies on sustainable agriculture and health while collaborating with academic and governmental institutions to fill knowledge gaps.

The Organic Center thanks the Materials Subcommittee for its recommendation on Research Priorities. We appreciate the creation of the Research Priority Framework and the efforts made by each Subcommittee to bring forth its research priorities for 2021.

Summary:

- ✓ The Organic Center supports the subcommittee's proposed 2021 Research Priorities. The proposed priorities are in line with the needs of the organic community, and will serve as an important resource to guide The Organic Center's research priority focus and project development.
- ✓ In response to the "Questions to Our Stakeholders" we support the inclusion of **benefits and risks of livestock integration into crop rotations, nutritional value of organic animal products (such as dairy, meat, and eggs), comparisons of pesticide, antibiotic, and synthetic growth hormone residues in organic and conventional products, and research into the effects of organic crop production on water.**
- ✓ We also encourage you to include priorities focused on **how to protect organic farmers from chemical contaminants and alternatives to conventional celery powder for curing organic meat.**



We offer the following more detailed comments:

Current Research Needs

We have reviewed the list of topics included for 2021 Priorities, and we're particularly pleased to see the inclusion of evaluation of bio-based mulch film, whole farm ecosystem service assessments to determine the economic, social, and environmental impact of farming systems choices, organic no-till practices, plant disease management strategies, relationships between biodiversity and pathogen presence, practices that reduce greenhouse gas emissions, the examination of factors influencing organic food access, and production and yield barriers. The Organic Center is actively involved in conducting and communicating research on these issues, and we expect the prioritization of these topics by NOSB may help us secure further funding.

Evaluation of Bio-Based Mulch Film

The Organic Center has been meeting with farmers about their interest in decreasing the use of plastic in organic farming systems. Organic values are based on improving sustainability and reducing reliance on synthetic materials. However, synthetics such as plastic film and mulch is used in the field as weed control. The use of plastic has increased in the field as organic production has expanded. While the organic community is dedicated to finding alternatives to plastic, there has been a paucity of dedicated discussion and strategy investigating available alternative strategies. Additionally, the complexities surrounding the development of plastic alternatives and organic regulations of plastic use require input and collaboration across the organic sector.

The Organic Center submitted was recently awarded a grant through the Organic Research and Extension Initiative (OREI) to hold a conference that would bring together farmers, processors, distributors, retailers, researchers and policy makers to discuss challenges of plastic from the perspective of waste, climate change, and environmental/human health. The workshops will include explorations of innovative solutions to plastic use and waste, and policy discussions to set the stage for the current global perspective on plastic alternatives and USDA National Organic Program allowances. Research conducted under this NOSB priority would help further our discussions on reducing plastic use and investigating ways to replace plastic mulch with bio-based mulch films.

Economic, Social, and Environmental Impact of Farming Systems Choices

The Organic Center has been interested in the economic and social impacts of organic farming for a number of years, as there is extremely limited research on these issues. Understanding the economic impact of best practices is especially important because it can dictate adoption rates of new techniques. One of our current research projects addresses this by quantifying yield impacts of soil health practices, because different soil building practices do not necessarily have an equitable effect on yields. When considering the adoption of new practices, it is important for farmers to be able to evaluate which practices are most likely to promote environmental sustainability while simultaneously maintaining (or increasing) their bottom line. One goal of this project is to act as an immediate incentive for encouraging the adoption of best soil building practices in organic, because it will connect all the dots between the most important organic strategies for building soil health and sequestering carbon that also translate into higher, more consistent yields.

Unfortunately, while yield data is available to conduct this analysis, most studies do not track the full suite of variables that would be needed for a full profitability comparison, such as input costs. We are pleased to see the NOSB highlight the need for additional economic analyses of organic systems, as it will allow for a more holistic understanding of the economic opportunities and pitfalls for organic growers, and more accurately pair environmental practices with economic incentives for organic growers.

Organic No-Till Practices

The Organic Center is collaborating with Dr. Kate Tully's lab at the University of Maryland to examine practices improving soil health on organic farms. We [published a scientific article](#) from research on this topic, and one of the areas that we included was the comparison of no- and low-till in organic production versus standard tillage in organic production. Overall, our results suggest that surface-level soil organic carbon levels are higher in low/no-till



organic plots compared to standard organic tillage plots. However, we also found that no/low-tillage in organic was associated with significant reductions in yield. These findings suggest that while organic farmers could improve carbon sequestration through no/low-tillage, there needs to be further research to support farmers wishing to make this conversion to ensure that it is a viable and economically feasible option for a wider variety of crops. We are thankful that NOSB included this priority in its 2021 Research Priorities, as it will help encourage research on this critical issue, and provide much-needed tools to help organic farmers realize the benefits of reduced tillage without the threat of reduced yields.

Plant Disease Management

The Organic Center has been working on several aspects of plant disease management. For example, we have an active project on citrus greening, caused by the bacterium *Candidatus liberibacter*. Our research to find organic solutions to control citrus greening disease is an ongoing project in collaboration with the University of Florida, the University of California, Davis, USDA-ARS, citrus growers, and other non-profits. We published a scientific paper and accompanying farmer guide consolidating existing literature on allowable methods for combating citrus greening in organic groves. It details science-based best practices for organic citrus growers. We leveraged this paper to apply for additional funding, and were awarded an OREI planning grant to develop a proposal that takes a systems-based approach to combat both the bacterium that causes citrus greening disease and its insect vector, the Asian citrus psyllid, in organic systems. Additionally, we recently submitted a multi-regional OREI grant proposal to develop systems-based strategies for organic citrus growers.

Relationships between Biodiversity and Pathogen Presence

Organic farmers face many challenges when it comes to food safety management, but one of the most commonly cited issues is incongruities between third party food safety requirements and the National Organic Program requirements. Unfortunately, food safety regulations and requirements originate from various sources, from federal standards (such as the National Organic Standards and the Food Safety Modernization Act) to third party standards required by commodity groups (such as the Leafy Greens Marketing Association) and private retailers, with varying degrees of stringency in what food producers must do to reduce risk. Third party auditors, consultants, and farm advisors may also have their own interpretations of how certain farming practices affect risk of foodborne illness contamination. While all food producers are subject to food safety rules, organic farmers can face unique challenges in trying to meet both NOP and food safety standards, especially the tensions between supporting biodiversity while some food safety concerns pressure them to limit wildlife on or near the farm. Unfortunately, there are often disparities between third-party food safety regulations and biodiversity-maintenance strategies employed by organic farmers due to the fallacy that increased on-field faunal biodiversity may increase the risk for introduction of human pathogens on the field. While some research has been conducted disproving this myth, more research, extension, and education are needed to fully understand the impact these discrepancies are having on organic farmers, and the true relationship between on-farm biodiversity and food safety. Additionally, extension must take place to both organic growers third-party food safety auditors alike so that evidence-based strategies can be incorporated into their audits. Therefore, we thank the committee for including priority focusing on the relationships between biodiversity and pathogen presence.

The Organic Center recently submitted an OREI grant proposal to bring together organic growers, third party food standards association, researchers, and policy makers to determine which producers are most impacted (product sectors and regions) by disparities between third-party food safety standards and organic biodiversity requirements, which third-party certification requirements are the most difficult to synchronize with the National Organic Program requirements, and research needs for addressing these specific conflicts. The long-term goal of this proposal is to provide organic growers and industry members with organic-appropriate tools and strategies for mitigating food safety risk while retaining third-party certification viability.

We have been involved in research examining pathogen presence in organic soil amendments for several years, and the proposed work will build on our current and past research on pathogen suppression. For example, we are collaborating with the University of California, Davis, among other organizations, to address the need for additional



information on raw manure intervals to provide critical information for guidelines on risk mitigation of foodborne pathogens for organic and sustainable agriculture. We have [published multiple articles and abstracts on the subject](#), and are currently developing an education module in collaboration with Cornell University to communicate our findings to a broad audience.

Reducing Greenhouse Gas Emissions

Climate change is having serious consequences on our environment and public health, and we appreciate the inclusion of the “Climate Change” focus in the 2021 priorities. The Organic Center has been engaged with climate change issues for several years now on multiple levels. For example, last year co-hosted our annual Organic Confluences Conference with USDA, FiBL, The Climate Collaborative, and ISOFAR to focus on mitigating and adapting to climate change. The conference brought together scientific experts, farmers, policymakers, and organic stakeholders to address the current impacts of climate change and best practices within the organic sector for mitigation and adaptation, while examining methods for encouraging the adoption of strategies for fighting climate change. We are currently working on a white paper detailing the outcomes of the event, but it is clear that additional research is needed to address this issue; the long-term security of our food system depends on it.

We also have active research projects on the subject of climate change mitigation, and are specifically conducting analyses to “pinpoint specific strategies that organic farmers can take to reduce greenhouse gas emissions and respond to current climate challenges threatening the future of our food security.” For example, we recently published a project in collaboration with researchers at the University of Maryland pinpointing specific strategies organic farmers can take to increase carbon sequestration in the soil. We are also working with Harvard University’s Department of Public Health examining the specific aspects of organic agriculture that can contribute the greatest benefits to climate stability. These net benefits include carbon sequestration in the soil and reduced energy usage by avoiding synthetic nitrogen fertilizer.

Factors Influencing Organic Food Access

Marginalized populations often lack access to nutritious food, especially higher quality products that are also produced without pesticides and support sustainability, such as organic foods. However, meeting the global goal of ending hunger —while responding to climate change and the COVID-19 pandemic—calls for applying a racial equity lens to organic foods. Increasing equitability of access to organic foods will help ensure that people living with food insecurity can benefit from foods that are affordable, available near their homes, and culturally appropriate. Therefore, we thank the NOSB for including this priority.

Production and Yield Barriers

Organic faces unique challenges in overcoming barriers to pre- and post-farm gate production due to their limited tool availability. One area that could help farmers overcome these challenges are agricultural technology (AgTech) solutions that are in line with the organic values. While there has been a sharp increase in the development of agricultural technologies (AgTech) over the last five years, most of these products and systems are focused on supporting large-scale conventional systems. However, there is an opportunity through AgTech to deliver novel, cost-effective strategies for sustainable production across a diversity of farming systems by allowing for increased production in tandem with reduced reliance on synthetic and labor inputs. These prospects are especially promising for organic farmers, who are limited in the materials they are able to use for addressing on-farm challenges, while needing additional tracking tools for organic regulatory compliance. The intersection of AgTech and organic would serve to expand the technology sector into a rapidly growing farming niche while developing tools that could serve to improve sustainable production across farming systems.

The Organic Center plans to host a series of conferences examining this issue, serving as a bridge toward developing organic-compliant AgTech tools by 1) closing the communication gap between AgTech innovators and organic farmers, 2) matching organic farmer needs with existing technologies or, where technology is yet to be developed, informing AgTech innovators of opportunities to expand their current programming in the organic sector, and 3) creating a roadmap to building and retain long-term collaborations so that future technological innovations will



continue to support farming practices that make the food system more sustainable. We will also focus on solutions to make AgTech accessible across farm scales, demographics, and income levels by developing a framework for improving technological equity, accessibility, and inclusivity.

Answers to “Questions to Our Stakeholders”

In response to the “Questions to Our Stakeholders” section, we would like to support the inclusion of benefits and risks of livestock integration into crop rotations, nutritional value of organic animal products (such as dairy, meat, and eggs), comparisons of pesticide, antibiotic, and synthetic growth hormone residues in organic and conventional products, and research into the effects of organic crop production on water into the 2021 research priorities.

Benefits and risks of livestock integration into crop rotations

Livestock grazing of cover crops could be beneficial for organic systems, because it maximizes the strengths of cover cropping, including enhanced soil fertility, structure, water infiltration and storage, and reduced nitrate leaching, while addressing challenges that have limited the expansion of cover crop use such as concerns over cover crop water use and nutrient immobilization, which could increase deficiencies and increase input costs of the crops that follow.

Unfortunately, despite the well-known benefits of animal-crop integration, concerns over microbial food safety are limiting the expansion of animal integration into cropping systems. Recent research has shown that integrated crop-animal systems [perform well in keeping pathogens out of meat](#), but additional research is needed to examine the synergistic impacts of the use of livestock for cover crop grazing on ecosystem health and food safety.

The Organic Center is working on this project in collaboration with the University of California, Davis by examining food pathogen persistence and survival in soil and transfer to vegetable crops, and the relationship between soil health properties, environmental factors and pathogen survival in grazed cover crop-vegetable production in three states. Researchers will measure changes in soil health indicators over two years of grazed cover crop-vegetable production, and assess benefits and potential tradeoffs of vegetable cash crop productivity.

Nutritional value of organic animal products (such as dairy, meat, and eggs)

We were pleased to see the inclusion of “Factors impacting organic crop nutrition, and organic/conventional nutrition comparisons” in the 2021 Research Priorities, as we agree with the committee analyses that a better understanding of how pre- and post-farm gate practices impact crop nutrition is needed. However, the committee discussion focuses around fruit and vegetables. We encourage the committee to include animal products such as meat, dairy, and eggs in their priorities, because while

Last year the Organic Center conducted a review of recently published studies on the impacts of organic meat production, and while we found that while research suggests that organic practices result in animal products with higher nutritional value most of that research has been conducted in Europe and are based on European livestock standards. Additional studies based on U.S. standards will be critical for fully understanding the impacts of production methods on meat nutrition.

Comparisons of pesticide, antibiotic, and synthetic growth hormone residues in organic and conventional products

Understanding the benefits of organic when it comes to avoiding synthetic toxins is critical, because it is the basis behind hypotheses for recent research finding health benefits to consuming an organic diet such as a 25% reduction in overall cancer risk.

The Organic Center completed a study in collaboration with Emory University showing that organic is an easy way to avoid pesticides, antibiotics, and synthetic growth hormones in dairy. Specifically, the study found no detectable levels of any antibiotics in organic milk in comparison with 60% of conventional samples having detectable levels of antibiotics. We also found that over 30% of conventional samples had residues of antibiotics that are banned for use in lactating cows. Conventional levels of growth hormones were twenty times higher than the organic levels. For



pesticides, we found that organic milk didn't have any residues of currently used pesticides, but pesticides over 60% of conventional milk, including chlorpyrifos, atrazine, and diazinon.

Additional research on the impacts of organic on exposure to residues, and connections between these exposures and health outcomes are critical for understanding emerging research on the long-term health effects of an organic diet.

Research into the effects of organic crop production on water

Studies on the impacts of organic production on water are limited, but may have major implications for organic growers who must meet nutrient runoff restrictions (eg. in California). However, we want to emphasize that research on water quality should not be limited to nutrient losses, but must also take into account the impacts of pesticide pollution on waterways. Almost all water quality discussions that have been circulating recently focus on nutrient loss, but pesticide runoff has an equally, if not larger, impact on environmental and human health. We need to integrate research on pesticide residues into our discussion about water quality by reviewing the research on contaminated watersheds, the impacts of pesticide residues in water, and how organic can keep pesticides out of waterways.

In addition to pesticide impacts on water quality, some areas of research need include: (1) additional research examining the impacts of organic versus conventional systems on nutrient loss. Dr. Cambardella *et al.* were able to isolate all runoff from a farming system in Iowa, but there needs to be an examination of data from a broader regions to better understand the overarching effect that farming system has on nutrient runoff/leaching. (2) best practices on reducing nutrient runoff/leaching for organic farmers. This is a hot issue with organic farmers right now, because several states have mandated reductions in nutrient loss, but many of the recommended strategies for reduction are not developed with organic systems in mind, so might not be useful to organic farmers and/or would not have the same nutrient loss impact as they would on conventional farms.

Additional Research Needs

The Organic Center is continually collecting information on research needs from multiple sectors of the organic community. We conduct industry roundtables, work with the Organic Trade Association's Farmers Advisory Council, meet with professors on our Science Advisory Board and hold one-on-one meetings with individual companies, farmers, professors, and consumers. We feel that the NOSB Materials Subcommittee's 2021 Research Priorities are in line with the needs of the organic industry, and appreciate the release of this report as an important resource to guide The Center's own research priorities and project development. Based on feedback we've received during our own outreach efforts, we would also like to suggest that the areas of protection of organic farmers from chemical contaminants and conventional celery powder alternatives be considered for inclusion in the 2021 Research Priorities. We also feel that the focus on alternatives to conventional celery powder for curing organic meat that was included in the 2019 Research Priorities be included in this year's priorities, because, while research is underway, the importance of this topic should not be forgotten.

Protection of organic farmers from chemical contaminants

Unintentional pesticide contamination in organic crops has been flagged as a major challenge by the organic sector, across the supply chain. For example, the Organic Trade Association's Farmers Advisory Council has highlighted it as a top priority in their 2019 work plan, and the Organic Trade Association is currently assembling a task force to engage the industry in protecting organic integrity from pesticide contamination. Contamination can have a disproportionate impact on organic farmers, because organic stakeholders along the entire supply chain are burdened with the cost of testing and experience losses when tests are positive. While the organic community has identified this as a critical topic for investigation, little data has been collected synthesizing the current experiences and specific research needs of the organic community.

The Organic Center was recently awarded an OREI planning grant to address this issue by bringing together organic stakeholders across the supply chain with scientists to determine the crops that are most heavily impacted by



contamination, pesticides that the organic industry has detected on its crops, losses that organic farmers and industry members have experienced, strategies that organic farmers have undertaken to reduce pesticide drift, and research needs for identifying vectors and preventing contamination to inform the development of a large-scale and multi-disciplinary research project that will provide farmers with strategies for combating current contamination.

While we laud the NOSB for including the focus “Prevention of GMO Crop Contamination: Evaluation of effectiveness,” the issue of contamination is not unique to genetically modified material, and we request that chemical contamination be included in the research priorities as well.

Celery Powder

In collaboration with the Organic Trade Association’s National List Innovation Working Group and the University of Wisconsin, Madison, we are investigating the potential for developing organically grown celery or other vegetables used in the curing of organic meat products. This OREI-funded research will help identify potential varieties of organic crops that would meet the chemical specification needed for curing, while being easily incorporated into current crop rotation systems. It will also identify potential management protocols to achieve target nitrate levels in the curing crop to produce the required shelf life and prevent bacteria in the cured meat, and to produce the desired flavor, color and texture in food. This research will take 4 years to complete. During this time period, or until final results are collected to meet this need, we request that alternatives to conventional celery powder for curing organic meat be included in the NOSB Research Priorities.

Please do not hesitate to contact us for information on the data that we have been collecting or with questions you would like us to pose the research community.

Again, on behalf of The Organic Center, I would like to extend my thanks to the Materials Subcommittee for your commitment to furthering organic agriculture.

Respectfully submitted,

Jessica Shade
Director of Science Programs
The Organic Center