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Ms. Michelle Arsenault
National Organic Standards Board
USDA-AMS-NOP
1400 Independence Ave. SW
Room 2648-S, Mail Stop 0268
Washington, DC 20250-0268

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Re. MS: Research priorities

These comments to the National Organic Standards Board (NOSB) on its Fall 2022 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

We offer a few suggestions for additional research priorities.

Copper sulfate in rice production

In 2012, copper sulfate in rice production was identified as a research priority, with specific questions addressing hazards to aquatic organisms, fate of copper materials, and alternative practices. In our comments on the sunset of copper sulfate, we present information documenting on-going hazards to aquatic organisms from the use of copper sulfate in rice. The Crops Subcommittee (CS) review reiterates environmental concerns and concludes:

> It appears that to date there is sufficient evidence to conclude that:
> 1) use of copper sulfate in rice fields can cause environmental damage,
> 2) alternative seeding practices could eliminate the need for copper sulfate as both algae and tadpole shrimp cease to be problematic once seedlings are established and
> 3) international standards do not allow for spraying of copper sulfate for organic rice production.

The CS concludes, "The Crops Subcommittee recommends re-listing copper sulfate and has called for a comprehensive review of copper sulfate as part of its Research Priorities for 2021." This comprehensive review of copper sulfate did not make it onto the list as reported by the Materials Subcommittee. In view of the conclusions of the CS, copper sulfate should be eliminated from organic rice production. Failing that, it must be reinstated as a research priority and the listings annotated with an expiration date to ensure that the problems are not ignored.

Contaminated inputs into organic crop production

Another issue that has fallen off the NOSB agenda is the examination of contaminated inputs. In 2015, the NOSB recommended a system of evaluation of potentially contaminated inputs into organic crop production.[1] In view of the use of organic materials in organic systems that originate in chemical-intensive systems—ranging from manure to grass clippings to commercial or municipal composts—the investigation of possible sources of contamination is important.

Plastics in organic

Plastic is found in every facet of organic production and handling. Yet, the human and environmental health implications of plastic are becoming increasingly well documented. Scientists are increasingly concerned about the impacts of microplastics—plastic fragments less than 5 mm in size in size—on a wide range of organisms. Microplastics can cause harmful effects to humans and other organisms through physical entanglement and physical impacts of ingestion. They also act as carriers of toxic chemicals that are adsorbed to their surface. Some studies on fish have shown that microplastics and their associated toxic chemicals bioaccumulate, resulting in intestinal damage and changes in metabolism.[2] Microplastics can increase the spread of antibiotic resistance genes in the environment.[3]

Soil organisms and edible plants have been shown to ingest microplastic particles.[4] Earthworms can move microplastics through the soil, and microplastics can move through the food chain to human food.[5] Microplastics can have a wide range of negative impacts on the soil, which are only beginning to be studied, but include reduction in growth and reproduction of soil microfauna.[6] When looking at the impact of microplastics, it is important to include the impact of associated substances. As noted above, they can carry toxic chemicals. A review by Zhu et al. cites several studies showing, "[M]icroplastics can serve as hotspots of gene exchange between phylogenetically different microorganisms by introducing additional surface, thus

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[1] Crops Subcommittee, 2015. Contaminated Input Plan, NOSB Spring 2015 meeting materials, pp. 135-141. https://www.ams.usda.gov/sites/default/files/media/meeting.pdf.

[2] Li, J., Liu, H. and Chen, J.P., 2018. Microplastics in freshwater systems: A review on occurrence, environmental effects, and methods for microplastics detection. *Water Research*, *137*, pp.362-374.

[3] Shi, J., Wu, D., Su, Y. and Xie, B., 2020. (Nano) microplastics promote the propagation of antibiotic resistance genes in landfill leachate. *Environmental Science: Nano*, *7*(11), pp.3536-3546.

[4] Zhu, F., Zhu, C., Wang, C. and Gu, C., 2019. Occurrence and ecological impacts of microplastics in soil systems: a review. *Bulletin of environmental contamination and toxicology*, *102*(6), pp.741-749.

[5] He, D., Luo, Y., Lu, S., Liu, M., Song, Y. and Lei, L., 2018. Microplastics in soils: analytical methods, pollution characteristics and ecological risks. *TrAC Trends in Analytical Chemistry*, *109*, pp.163-172.

[6] He, D., Luo, Y., Lu, S., Liu, M., Song, Y. and Lei, L., 2018. Microplastics in soils: analytical methods, pollution characteristics and ecological risks. *TrAC Trends in Analytical Chemistry*, *109*, pp.163-172.

having a potential to increase the spread of ARGs [antibiotic resistance genes] and antibiotic resistant pathogens in water and sediments." [7]

Plastics—both large and small—are introduced into the environment directly from sources like plastic (including biodegradable bioplastic) mulches, but a huge source of plastic is leachate from landfills, where plastic is deposited after use.[8] In addition, there is evidence that we consume microplastics directly from food containers,[9] including baby bottles.[10]

We need research into ways to replace all forms of plastic in organic production and handling.

Thank you for your consideration of these comments.

Sincerely,

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[7] Zhu, F., Zhu, C., Wang, C. and Gu, C., 2019. Occurrence and ecological impacts of microplastics in soil systems: a review. *Bulletin of environmental contamination and toxicology*, *102*(6), pp.741-749.
[8] Hou, L., Kumar, D., Yoo, C.G., Gitsov, I. and Majumder, E.L.W., 2021. Conversion and removal strategies for microplastics in wastewater treatment plants and landfills. *Chemical Engineering Journal*, *406*, p.126715.
[9] Fadare, O.O., Wan, B., Guo, L.H. and Zhao, L., 2020. Microplastics from consumer plastic food containers: Are we consuming it?. *Chemosphere*, *253*, p.126787.
[10] https://www.theguardian.com/environment/2020/oct/19/bottle-fed-babies-swallow-millions-microplastics-day-study.