National Organic Standards Board
Materials Subcommittee
Proposal: Research Priorities for 2013

August 27, 2013

Introduction

A Recommendation for a Framework to set Research Priorities was approved at the National Organic Standards Board (NOSB) meeting in May 2012. Part of that recommendation was that the priorities from the previous year of NOSB deliberations would be presented at each fall meeting. Therefore, we have collected suggested research topics from the NOSB subcommittees and from suggestions within the public comments and present the top research priorities for approval this fall.

After a recommendation is finalized by the NOSB each fall the Chair of the Board will make sure it is sent to the primary organic research funders such as NIFA, ARS, NRCS, and private foundations and other funders that may be identified. In addition all NOP staff, NOSB members and stakeholders can use the list for inspiring appropriate research.

Background

The reasons for encouraging research into organic production systems are well discussed in the previous two Materials Committee papers from fall 2011 and spring 2012.

The recommendation that was passed recommends that potential topics be prioritized. The criteria for prioritization are for those topics that the NOSB believes will have the largest long-term impact on growth and integrity of organic agriculture. These criteria are not presented in order of importance, but will be evaluated by the Materials Committee in selecting the top research needs.
Criteria for research topics are:

- A. Persistent and chronic (i.e., perennial topics of debate and need)
- B. Challenging
- C. Controversial (i.e., topics on which there are widely differing perspectives or for which there have been close NOSB votes)
- D. Nebulous (i.e., the research need is hard to identify but the organic agriculture need is clear). For example, improved methods of weed control.
- E. Lacking in primary research. That is, topics for which there is no active research being conducted, primarily relating to the criteria in OFPA for review of materials.
- F. Relevant to assessing the need for alternative cultural, biological, and mechanical methods to materials on the National List.

Call for Researchers

We hope that this information will be useful for researchers in many fields to defend and solicit funds for research that benefits organic production and handling. Therefore, we invite the public to comment on these topics, to circulate this widely, and to recommend that funders also prioritize these topics. Please submit comments on funders who might want to remain informed of research opportunities in organics.

NOSB Research Priorities 2013:

For 2013 the Subcommittee has re-emphasized four topics that were on the list last year, and has added several more pertinent topics. The top priorities are in this section without any ranking, with a description of some research questions and why each topic is important. The following section titled "Topics for future review" contains other subjects that the NOSB subcommittees put forward but are secondary to the top priorities here. Research into these and interrelated issues is urgently needed.

- **Whole Farm Systems**

How can working with the natural world by including diversity of habitat, cropping systems, and biological life benefit an organic farm? Selected subjects within this heading include: Can crop species and varieties be specifically adapted to their site through plant breeding or cultural practices? How does biodiversity contribute to pest and disease resistance? What is the relationship between nutrient balancing fertilization practices and microbial life in the soil and susceptibility or resistance to pests? How can the need for a diverse ecological system be balanced with food safety concerns for a sustainable organic farming system?

- **Alternatives to Antibiotics (Tetracycline and Streptomycin) for Fire Blight**

With oxytetracycline and streptomycin due to expire from the National List in October of 2014, the organic apple and pear growers must find suitable alternatives to control the deadly fire blight disease. Since apples and pears are grown throughout the United States in many regions, these alternatives must work in a variety of climates and a variety of management systems. The following research issues are important to investigate: location, planting density, choice of varieties of cultivar and rootstock, soil improvement practices, pruning practices and general sanitation, groundcovers or intercrops, pollinator management, dormant copper sprays, bloom thinning/lime sulfur, early, full bloom, and late sprays with approved organic materials to prevent fire blight establishment, surveys for fire blight activity, and other cultural and preventative techniques.

- **Evaluation of Genetically Modified Vaccines (GMO)**

Prevention and avoidance of unintended GMO contamination are foundational to organic production and brand. It is of such importance that NOSB has a GMO Ad-Hoc Subcommittee. A need exists for research and/or outreach on easier ways to determine the types of vaccines. A better way of identifying the types of vaccines is critically important to our stakeholders, especially livestock producers. The testing of products that could be alternatives to GMO vaccines in livestock production is a top priority.

- **Methionine Alternative**

Methionine is an essential amino acid for poultry. Prior to the 1950’s poultry and pigs were fed a plant and meat based diet without synthetic amino acids such as methionine. One former NOSB member stated, in §205.237(5) (b), “We have seemingly made vegetarians out of poultry and pigs”. As the organic community moves toward reducing, removing, or providing additional annotations to synthetic methionine in the diets of poultry, a heighten need exists for the organic community to rally around omnivore producers to assist in marshaling our

collective efforts in finding viable alternatives to synthetic methionine and help find approaches for making them more commercially available.

The key research areas are on alternatives such as herbal methionine, corn gluten meal, potato meal, management practices, pastures management, fish meals, animal by-products, and other non-plant materials. Additional research on the more promising alternatives related to bringing them into commercial production is also encouraged.

- **Organic Aquaculture**

Organic aquaculture is on the rise. It is said to be the fastest growing organic sector in the world according to one source. In general in organic production, the agroecosystem feeds the crop and non-synthetic inputs are used to supplement what nature provides, with synthetic inputs needed occasionally to tweak the system or to respond to unusual situations. In animal agriculture there is an emphasis on pasture, outside access, and natural inputs. However, the petitions received by the NOSB for materials to be used in aquaculture assume or imply synthetic inputs as a normal part of the system. Is this consistent with organic and sustainable agriculture?

There is a great debate as to whether organic aquaculture should be approved for open, closed, or both in the United States. Some concern exists around whether materials already approved by NOSB for organic plant, animal, and handling should be automatically approved for organic aquaculture systems. Therefore, research efforts pertaining to open and closed systems seem warranted in some cases. Evaluating the use patterns of synthetic materials permitted on the National List outside of a defined policy on whole aquaculture systems for plants and animals runs contrary to organic process and practice because the use of a synthetic material must be evaluated relative to a practice norm in which few synthetics are added.

Research topics include: the impact of fish waste water on the environment, feed and other supplements such as trace minerals that may have synthetic sources, fish health (diseases and parasites), and fish escapes in open and closed systems. The subcommittee also requests research into defining “organic aquaculture” in a framework that is consistent with OFPA and supportive of materials decisions.

- **Aquatic Biodiversity**

Organic farmers promote biodiversity in cultivated and uncultivated areas, and are expected to maintain areas like hedgerows, woodlands, wetlands, and wildlife corridors to promote non-crop biodiversity on the farm. The conservation of biodiversity must be included in organic systems plans for aquaculture as well. NOSB materials recommendations need to be made with a goal of preserving and enhancing biodiversity. With the impending implementation of rules on organic aquaculture, it is important that decisions be made with a firm understanding of aquatic ecology and possible impacts of the Board’s decisions. Decisions concerning terrestrial inputs derived from aquatic environments also need to be based on an understanding of impacts.

In particular, the NOSB needs to understand: nutrient and mineral cycling in various aquatic systems, the structure of aquatic food webs, the movement of pollutants in various aquatic systems, bioaccumulation and bioconcentration in aquatic organisms, and the status and impacts of overharvesting and other stresses on aquatic/marine plants and animals. Board members, certifiers, and aquaculture operators all need to know how biodiversity conservation measures should be implemented in aquaculture systems and materials decisions.

- **Herd Health**

The assessment of preventive organic practices to improve organic livestock health is critical and of high importance. These include general animal health as it relates to diseases prevention, uterine infections in peri-parturient animals, growth, and identification of vaccine types, nutrition, and production systems. Research that could lead practitioners to better prevention strategies, use of non-synthetic substances such as feed supplements that would improve health and management practices that minimize health issues are all important topics.

- **Pastured Poultry and Salmonella**

Raising poultry on pasture where the birds get a varied diet, are outdoors and have space to roam makes sense from an organic standpoint. But does pasturing of poultry lead to higher rates of Salmonella? Some critics have claimed this but there is scant evidence to support or refute this opinion. Exploring where Salmonella infections can originate, whether the pasture system has some inherent buffering capacity against pathogens getting a foothold, and whether there truly is more risk involved in raising organic poultry on pasture are key research topics.

- **Commercial Availability Assessments**

The NOSB must make assessments of commercial availability or organic sources every time there is a petition or a sunset review for substances on §205.606 in particular (agricultural substances that may be used from non-organic sources). What are some resources for commercial availability information? Is it out there? If there is no information available, how could such information be developed?

- **Consumer Demand**

The NOSB get told often by commenters who are or claim to represent consumers that consumers have expectations about what organic means and what inputs and ingredients should be in organic food. Sometimes there is a wide difference between what consumer activist groups claim and sales of specific categories of organic products in the marketplace. How can the NOSB determine whether the consumers and groups who speak up are truly representing all consumers of organic, and if not, is there a better measure of consumer preference and expectations than sales figures for organic products? This has come up in the past year with particular regard to fortification by synthetic nutrients in infant formula and other processed food, as well as in the apple and pear marketplace with the discussion of

oxytetracycline. Research into the relationship of consumer buying habits and their beliefs about them would be helpful.

➢ Fate of Genetically Engineered Plant Material in Compost?

What happens to altered DNA in the composting process? Materials such as cornstalks from GMO corn or manure from cows receiving rBGH are often composted yet there is little information on whether the genetically engineered material and traits break down in composting process. Do these materials affect the microbial ecology of a compost pile? Is there trait expression of Bt (*bacillus thuringienses*) after composting?

➢ Reduction of Genetically Modified Content of Breeding Lines

In grappling with the issue of a Seed Purity Standard, it came up in comment that breeding lines of corn and other crops had become polluted by GMO pollen entering their germplasm. This research question is posed to determine if breeding lines can be selected for to reduce the contamination once it has entered the genome. Can lines be "purified" so that there are non-detectable levels of GMOs after several selection cycles and how many generations would it take?

Topics for Future Review

This group of topics was submitted by the Crops and Livestock Subcommittees of the NOSB but did not make it into the Priorities for Research in 2013. They will remain in consideration for future year priorities.

- **Chlorine Alternatives**

Chlorine compounds are the most common equipment and food contact sanitizers used in the food processing and handling. They are also common disinfecting agents for farm equipment and tools. In its reactive forms –chlorine gas, hypochlorite, etc. – chlorine may react with organic matter to form organochlorines, which are generally persistent, toxic, carcinogenic, and often endocrine disruptors. Sometimes the reactions are purposeful, to create pesticides, solvents, pharmaceuticals, and other synthetic chemical products. Other times unintentional byproducts, such as chloroform or carbon tetrachloride, result from processes such as disinfection.

The fact that use of chlorine –as opposed to chloride– is so universally associated with the production of persistent toxic chemicals has led some environmental groups to seek a ban on chlorine-based chemicals. Since chlorine compounds have so many adverse impacts in the production-to-disposal life of the materials, we recommend that the NOSB support research to determine how organic production can move beyond reliance on chlorine-based materials.

- **Sulfuric Acid Alternatives**

Sulfuric acid is commonly used to lower the pH in the manufacture or processing of some agricultural inputs. The NOSB has received petitions for sulfuric acid itself and also for materials that have sulfuric acid as a processing aid in the manufacture. Recent examples include vinasse, magnesium oxide, and laminarin.

In 2006, the Crops Subcommittee voted unanimously to reject a petition to allow use of sulfuric acid in anaerobically digested livestock manure because “Sulfuric acid, when used in livestock manure, is

changed to sulfate, which is in this case a synthetically derived plant nutrient. Additionally, it is an important air pollutant, e.g. acid rain. Other wholly natural materials can be used." In 2012, the Crops Subcommittee took a similar position on a similar petition.

Unfortunately, the NOSB is not always able to identify alternatives, despite concerns about sulfate as a synthetic plant nutrient and environmental impacts. Research into natural acids or other substitutes that could be used in place of sulfuric acid to lower pH in the production of inputs for organic agriculture, as well as whether the pH lowering step is always required to purify, extract or stabilize raw inputs is important to the NOSB deliberations on materials.

- **Parasitism**

The control of internal and external parasites is important to animal welfare, growth, reproduction, and production. In organic production, the control of parasites is critical. The use of antibiotics is prohibited. A limited number of substances are available to control parasites. Antibiotics are not allowed in organic livestock production for growth, reproduction, and production. Antibiotics can be used on sick animals. However, these animals cannot be sold as organic. A critical need exists to explore ways to find materials for the control of internal and external parasites in organic livestock operations.

- **Mastitis**

Mastitis is a disease of the mammary gland. It is an inflammation in the mammary gland. It is generally associated with dairy cattle. It can be caused by bacteria, physical injury, etc. Mastitis is one of the most common and expensive diseases of dairy cattle. It can result in reduced milk production, discarded milk, treatment, and veterinary expenses. An urgent need exists for looking at ways to reduce mastitis in dairy herds. The research needs include the areas of herbal treatment of mastitis and management practices.

- **Pneumonia**

Pneumonia denotes a swelling of the lungs. Pneumonia is rare when animal populations and densities are low. In the winter, animals are housed or gather more closely together, increasing the concentration of pathogens in their environment. Confinement and higher animal densities result in increased air temperatures, humidity, and condensation, which are beneficial conditions for pathogen survival and transmission. Pneumonia in a herd or flock means animals are not performing up to their maximum potential, production costs are higher, labor is increased, and food product quality is compromised. Responsible animal caretakers know it is their duty and responsibility to address animal welfare concerns and ensure a safe and healthy environment for their animals.

Committee Vote

Motion to adopt the proposed recommendation on NOSB Research Priorities for 2013.

Motion by: Zea Sonnabend
Second: Tracy Favre
Yes: 6 No: 0 Absent: 1 Abstain: 0 Recuse: 0