OHIO ECOLOGICAL FOOD AND FARM ASSOCIATION

ORGANIC TRANSITION GUIDE

ACKNOWLEDGMENTS

Dedicated to the memories of John E. Hirzel and Paul Dutter.

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THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OHIO ECOLOGICAL FOOD AND FARM ASSOCIATION

COVER PHOTOS: TOP: OEFFA STAFF; BOTTOM: MELISSA FAST, PEARL MARKET CAPITAL CROSSROADS SPECIAL IMPROVEMENT DISTRICT; GRAPHIC STOCK; JULIA BURNSIDE, SUNBEAM FAMILY FARM; ANNE MURPHY, SNAKE HILL FARM.

TABLE OF CONTENTS

CHAPTER 1

The Goal of this Transition Guide

Transitioning to organic agriculture can be both rewarding and challenging. It is the goal of this manual to assist you step-by-step through the transition process. Read on for information to help you understand the certification process, the organic standards, and learn about the methods organic farmers use to meet them.

What is Organic Agriculture?

Organic Agriculture, as we know it today, formed and grew out of grassroots efforts by people dedicated to creating a rigorous, clear, transparent set of requirements for organic food production, harvest, and processing. These standards continue to be informed and changed by a democratic process through public comment and the recommendations of the National Organic Standards Board, which represents various players (producers and processors, environmentalists, consumers, retailers, certifying agents, and scientists) in the organic industry. This text works to break down the USDA organic standards into a useable guide as you consider transitioning your farm to organic.

The Organic Foods Production Act (OFPA) is the law behind the organic standards and was passed in 1990. The USDA organic standards were codified in 2002 and reside at 7 CFR Part 205 of the Code of Federal Regulations. The standards provide production and certification requirements for organic producers and certifiers.

The NOP definition of organic production is "an agricultural production system that is managed in accordance with the Organic Foods Production Act and its standards to respond to site-specific conditions by integrating cultural, biological and mechanical practices that foster the cycling of resources, promote ecological balance, and conserve biodiversity." In other words, organic farming is an integrated production system based on ecological principles that foster harmony with nature and promote ecosystem balance.

Organic Principles

A few fundamental principles ground and support organic agriculture (Benbrook & Kirschenmann, 1997):

1) **Ecological Principle** – Organic production works with nature's systems. Organic systems build upon nature's strengths, respect the earth's finite resources and recognize and accommodate nature's limitations. The goal is to produce the highest quality food with the least impact on the environment while ensuring the sustainability of the production system.

2) **Systems Principle** – Organic farming requires a system or whole farm approach to planning and operations. When designing or managing an organic production system, consider the appropriateness of any practice, process or input based on its potential impact on the whole system and the biological and ecological processes that govern the interactions within the ecosystem.

3) **Precautionary Principle** – Because the sustainability of the system is the long-term goal, new practices or products must be demonstrated to be safe before introduction into the organic production system. Producers build-in protection from technologies (GMOs) and inputs (synthetic pesticides and herbicides) used on other farm plots or adjacent farms.

4) **Local Differences Principle** – Each farm's organic system is unique because of variations in soils, climate, topography, management, ownership, pest complexes, disease pressures, etc. Organic agriculture has guiding principles and certification rules to follow. These standards may be met with consideration of local differences.

For a successful transition to organic agriculture, it is important to understand the organic founding principles of organic farming. Some farmers report experiencing a motivational change concerning the way they view their farm and farming when they transition to organic agriculture. In an Ohio State University survey of Ohio organic farmers (Ryzewnicki, 2000), the most frequently stated reasons given for why the respondents farm organically included concerns for the environment, and stewardship of natural resources. Many saw their values change as they began to place a greater emphasis on their role as custodians of the health of people, their communities and the environment.

Organic Opportunities

In the past, many farmers considered converting to organic farming as they became increasingly frustrated with the economics of conventional farming. Rising debt coupled with low returns made the premium prices that organic crops receive look very attractive. Prices for some certified organic crops were two or more times higher than prices for conventionally grown crops (See price comparison chart).

The "face" of organic is also changing. Organic farmers tend to be younger, and significantly more diverse than a few years ago. In fact, the population of organic purchasers seems to mirror the demographics of the US population, according to a 2015 survey by the Organic Trade Association (OTA) of 1,200 US households.

When it comes to the bottom line, the elimination of expensive inputs such as synthetic fertilizers, herbicides, insecticides, fungicides can help a lot too. There are also federal government programs such as

Certification Cost Share Programs, Environmental Quality Incentives Program (EQIP), Conservation Stewardship Incentive Program (CSIP), Sustainable Agriculture Research and Education (SARE) Producer Grant Programs and the Organic Transitions Program that provide various forms of funding for farmers who improve soil, water, plant, animal, air, and related resources on agricultural land using organic farming methods.

Finally, the economics of organic agriculture also makes it more likely that a farmer can be profitable on smaller amounts of land and run a viable family farm operation (Welsh, 1999).

Organic farming provides other benefits to you and your farm. By farming organically, you may be able to improve the quality of your soil and water. Research has shown that organic management practices such as using natural soil amendments, crop rotation, intercropping, green manures, cover crops and minimum tillage result in soils that leach less nitrogen, hold nutrients more effectively, cycle biological nutrients more efficiently and have less runoff and erosion than soils managed conventionally (Kuepper & Gegner, 2004).

Furthermore, organically managed soils maintain a high level of biological diversity and organic matter content and have good tilth and drainage (Fliessbach, 2000; Mendoza, 2004; Scialabba and Williamson, 2004). The elimination of synthetic pesticides and fertilizers means less exposure to these chemicals for you and your family through the application process or through your drinking water and food. Ultimately, organic farming gives you more control over how you operate your farm.

Rodale Institute Organic Price Report

Grain		**Minneapolis** (grains only)		**Omaha** (grains only)	
Quality	**Quantity**	**Certified**	**Conventional**	**Certified**	**Conventional**
Corn, #2 Yellow					
PQ	Bushel	$ 13.00	$ 3.44	$ 13.00	$ 3.65
Soybeans: Feed Stock					
PQ	Bushel	$ 25.00	$ 9.49	$ 25.00	$ 9.47
Soybeans: Tofu Type					
PQ	Bushel	$ 27.00	na	$ 27.00	na
Wheat: Hard Red					
PQ	Bushel		na	$ 27.00	na

Product Category Notes: Week of May 11, 2015

Omaha (grains only): Prices shown are spot wholesale prices delivered to a particular loading dock, and are for reference only. Because of the variables involved with grain pricing, please contact your local grain buyer for pricing.

Minneapolis (grains only): Prices shown are spot wholesale prices delivered to a particular loading dock, and are for reference only. Because of the variables involved with grain pricing, please contact your local grain buyer for pricing.

Source: Rodale Institute, *Organic Price Report* (http://rodaleinstitute.org/farm/organic-price-report-tool/)

AMS Weekly Retail Report for Conventional and Organic Dairy Products

AMS Dairy Retail Report Vol. 79–No. 30 Thursday, July 26, 2012

		National Average		
		Conventional	Organic	Price premium
Commodity	**Pack size**	**Weighted Average**	**Weighted Average**	**Percentage**
Butter	1lb	$ 2.34	$ 4.32	85%
Cheese (natural varieties)	8 oz block	$ 2.20	$ 3.00	36%
Cheese (natural varieties)	8oz shredded	$ 2.16	$ 2.50	16%
Milk	half gallon	$ 1.82	$ 3.64	100%
Milk	gallon	$ 2.82	$ 5.99	112%
Sour cream	16 oz	$ 1.45	$ 4.49	210%
Yogurt	32 oz	$ 2.15	$ 2.99	39%
			Average premium	85%

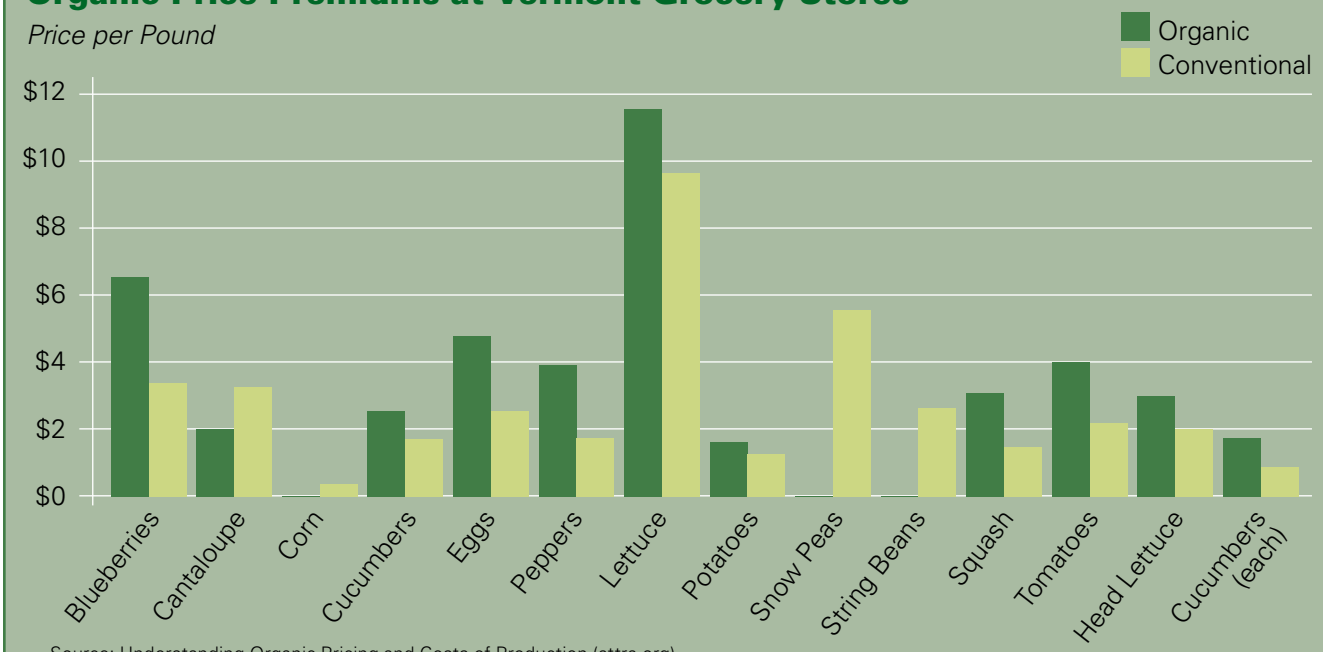
* Based on retail store advertising throughout the country.

Organic farming research indicates that it provides many environmental benefits such as the:

- **conservation of natural resources:** Organic farmers work to conserve natural resources and protect water quality through the recycling of organic wastes, soil and water conservation, and improved soil tilth and productivity (Dabbert, 2006);
- **enhancement of biodiversity:** Organic farming practices protect the biodiversity of organisms in the soil and on the land (Mader, 2002; Stolton, 2002);
- **production of food with fewer pesticide residues:** Because synthetic pesticides are generally not allowed for use in organic production, organic food has fewer pesticide residues than conventionally produced food (Baker et al, 2002; Lu et al, 2006);
- **reduction in on-farm energy use:** The systems approach in organic production leads to greater energy efficiency on organic farms. On conventional farms, more than 40% of all energy used can be tied to synthetic pesticides and inorganic fertilizers, many of which are not approved for use in organic production (Pimentel, 2006);
- **development of a farming system that strives to be sustainable:** Organic farmers work to develop systems that ensure their own sustainability through a reduced reliance on off-farm inputs and an integration with nature's systems;
- **reduction in environmental pollution:** Organic farms produce less soil erosion and pesticide and nutrient runoff than conventionally managed farms (Reganold et al, 1987; Stolze et al. 2000; Cambardella et al, 2015).

Organic Price Premiums at Vermont Grocery Stores

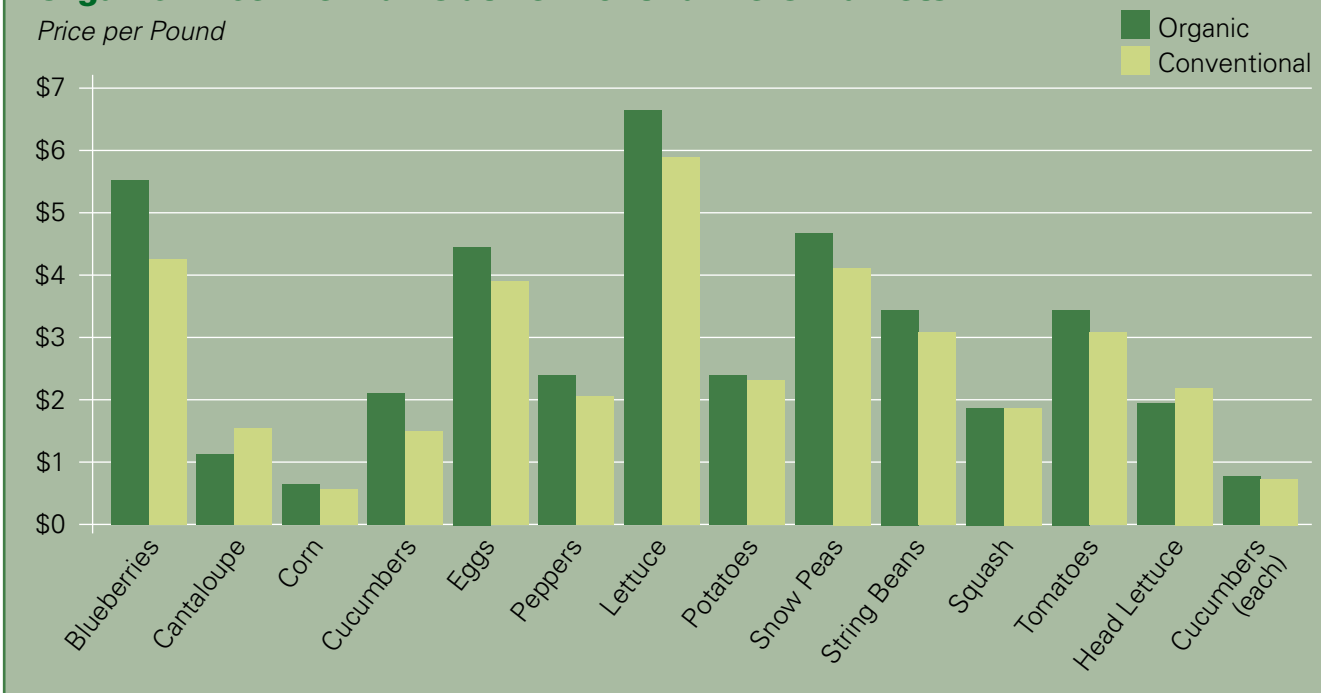
Price per Pound



Source: Understanding Organic Pricing and Costs of Production (attra.org)

Organic Price Premiums at Vermont Farmers Markets

Price per Pound



Source: Understanding Organic Pricing and Costs of Production (attra.org)

Realities and Prospects

Being fully informed about the opportunities and potential challenges of transitioning to organic production will help you to better plan for and execute the transition process. Let's examine some of the realities and prospects you may encounter.

- While organic farming today borrows from the agriculture that was practiced before the introduction of synthetic pesticides and fertilizers (pre-1940's), it is not a complete return to that system. While many of the older technologies still apply, current organic farmers use a wide range of equipment, plant varieties, seed, recommended soil and water conservation practices, inventive practices for livestock management, and organic waste and residue management. The practices used on the farm vary based on the operation's needs- its size, products, and the cultural appropriateness of its tools and equipment.
- You probably already have an intimate knowledge of your farming operation. This is good, as it will help you to develop an effective management plan. You will need to know details about your fields – soil quality, nutrient content, persistent weeds, and drainage issues. Other aspects to consider include labor options and equipment.
- Your soil is the lifeblood of your farm. Much of your success as an organic farmer will depend on your ability to build and maintain healthy soils. Build upon what you already know about methods that improve or preserve soil structure, soil biological life and organic matter content while providing an optimal balance and supply of nutrients to your crops.
- You may find that you rely less on off-farm inputs and more on knowledge and planning. Armed with the extensive knowledge about your farm, the information you have learned about the problems it faces, and the many management options available to organic farmers, you may be able to design a farm system that will move you in the direction of lessening your reliance on off-farm inputs while giving you economically viable yields.
- Think of your farming operation as an integrated system with all parts interconnected. Simply substituting one set of "natural" inputs (for example, manure), for another (synthetic fertilizers) is not enough.
- To ensure the profitability of your organic enterprise, there are rules to be followed. You will have to understand the term "organic" as defined by the USDA organic regulations. Certified organic refers to agricultural commodities produced in accordance with the standards of the National Organic Program. You must be certified to market your product as organic, which, in turn, enables you to receive premium prices for your organic products.

In order to be certified, you must comply with the standards. The next chapter of this manual is devoted to explaining the relevant standards and developing an understanding of the certification process.

- Many resources exist to help you navigate organic production and certification. The amount of research and publications about organic farming has increased tremendously in the past decade. Take the information you learn and adapt it for your farming system. Local variations in soil, climate, topography, and markets do not allow organic producers to farm "by the book." Even though much of organic production information still remains outside of conventional agriculture sources, this guide will help you access what is available and show you how to adapt what you learn for your own farming system.
- In the past, grain, vegetable and fruit producers have experienced a decline in crop yields during their transition process. Most of

Transition Experiment in Ohio and Iowa

Research	Year	Crop	Organic Yield	Conventional Yield
Stinner et al. (2004) Ohio	2000	Corn	60 bu/A[3]	187 bu/A
	2000	Soybeans	28 bu/A *(Food grade)*	47 bu/A *(Round-up™ Ready)*
	2001	Corn	150 bu/A	147 bu/A
	2001	Soybeans	21 bu/A *(Food grade)*	57 bu/A *(Round-up™ Ready)*
	2002[1]	Corn	62 bu/A	23 bu/A
	2002[1]	Soybeans	31 bu/A *(Food grade)*	34 bu/A *(Round-up™ Ready)*
	2003[2]	Corn	105 bu/A	153 bu/A
	2003[2]	Soybeans	47 bu/A *(Food grade)*	63 bu/A *(Round-up™ Ready)*
Delate & Combs (2004) Iowa	1998	Corn	9.0 Mg/ha	10.6 Mg/ha
	1998	Soybeans	3.25 Mg/ha	3.3 Mg/ha
	1999	Corn	7.6 Mg/ha	10.1 Mg/ha
	1999	Soybeans	3.15 Mg/ha	3.3 Mg/ha
	2000	Corn	8.8 Mg/ha	0.8 Mg/ha
	2000	Soybeans	2.45 Mg/ha	2.7 Mg/ha
	2001	Corn	8.1 Mg/ha	7.1 Mg/ha
	2001	Soybeans	3.05 Mg/ha	2.7 Mg/ha

1 Wet spring followed by severe drought.
2 Wet Spring.
3 Starting an organic transition with corn after corn would not be advisable, this was done in this experiment so that all crops in the rotation (corn-soybean-small grain-hay) could be represented each year.

these problems arise from farming on soils that are compacted, have little organic matter content and minimal biological activity. Lack of experience in organic management practices also can negatively impact yields. The results from the transition experiment in Ohio shown in the table reflect these problems (Stinner et. al, 2004). However, research conducted on the organic transition process has demonstrated that with good preparation and management, yields can be obtained in organic plots that are near if not more than those in the conventional plots (Delate and Combs, 2004, Martini et al., 2004). It is important to note that the transition research conducted by Delate and Combs was done on rich prairie soils that had been in alfalfa for the three previous years with a farm manager experienced in organic production, whereas the Ohio study was done on conventional land that had been in continuous corn for 15 years prior to the experiment.

- Including livestock in your organic production system is not required to be successful. However, it can be helpful in soil and weed management. Livestock can cycle nutrients and energy, limiting the need to purchase fertility inputs while providing an additional source of income.
- Going organic is a long-term commitment. It takes three years to certify a field from the last date that a prohibited substance was applied. Other parts of your farm, however, such as a pasture, fallow fields, or a recently cleared area to which prohibited substances, such as non-approved fertilizers, pesticides, or herbicides have not been applied, may be immediately certifiable.

Arming yourself with knowledge and foresight increases your chances of success from the beginning of the process.

CHAPTER 2

Understanding the Organic Certification Process

Developing a complete understanding of the organic standards and the certification process will enable you to write a more effective transition plan.

Third-Party Certification

The issue of third party certification in the organic industry came from the need to demonstrate to consumers that farmers did indeed use organic methods to grow their crops. In 1990 Congress passed the Organic Foods Production Act (OFPA) that included provisions for the establishment of the National Organic Program (NOP) and the development of national standards. By October 2002 all organic farmers, processors, handlers and certifiers had to be in full compliance with the regulation. The NOP does not certify individuals but it does accredit certifiers to assure they are meeting the national standards as they carry out certification services.

If you plan to market less than $5000 annually, you will not need to obtain certification, although you still will have to follow the federal standards for organic production and handling, including recordkeeping. You will be able to label your product as organic but you will not be able to use the USDA or a certifier's seal.

While you Consider Transitioning to Organic

Before you seek certification, follow these steps:

- If you are currently applying prohibited substances (see page 24: Material inputs on your operations) to your land or crops, stop doing so. The transition process takes three years and begins on the last date on which you apply prohibited substances. Prohibited materials include: salt soluble products; urea; sewage sludge; synthetic insecticides, fungicides, herbicides, and fertilizers, treated seed, and ammonia derived nitrogen products. If you have a field that has not received any of these prohibited substances in the past three years you can seek certification for that field right away.
- Choose a certifying agency or organization. These groups serve as an extension of the federal government's National Organic Program. Different certification organizations offer different services and sometimes have specialties in different areas. Ask yourself the following questions in order to pick the best certifier for your farm.
  - How willing and able are they to answer questions about their certification program?

- Are they members of prominent organizations such as the Accredited Certifiers Association (ACA), the National Organic Coalition (NOC), Organic Trade Association (OTA) and/or the Organic Materials Review Institute (OMRI)?
- Do they have experience in certifying your kind of operation?
- How stable of an operation is the certifier? Will they be around next year?
- Do they offer additional certifications beyond organic certification?
- Does your potential market recognize the certifier's logo?
- Do your potential buyers have specific certification requirements?
- What are the costs and cost structure of certification? Is the fee flat or are a percentage of sales also calculated?

Source: Organic Farm Certification & the National Organic Program, ATTRA (2002)

- Obtain an application packet from acertifying organization. These are generally available in both paper and digital form. Read all materials received including the standards, materials list, and any agency specific policies or interpretations of the standards. It is important to learn and fully understand the standards. Your certification agency is available to answer questions, help clarify the standards, and to guide you through the certification process.
- An important part of earning and maintaining your organic certification is the ability to keep complete records. You will need to get the records for the land you want to transition in good order and develop a system that will allow you to keep efficient records as you move forward. Maintain records concerning the production, harvesting, and handling of all products that you intend to sell, label, or represent as "100% organic," "organic," or "made with organic (specified ingredients or food group(s))." According to the national standards (§205.103) "such records must:
  - "Be adapted to the particular business that the certified operation is conducting;"
  - "Fully disclose all activities and transactions of the certified operation in sufficient detail as to be readily understood and audited;"
  - "Be maintained for not less than 5 years beyond their creation; and"
  - "Be sufficient to demonstrate compliance with the Act and the regulations in this part."
- Many certification organizations provide you with recordkeeping templates for you to use or you can make up your own. ATTRA (Appropriate Technology Transfer for Rural Areas) also has sample forms available. Organic operators keep the following types of records:

NCAT strives to make our information available to everyone who needs it. If you are a limited-access or low-income farmer and find that one of our publications is just not in your budget, please call 800-346-9140.

- Accurate maps showing field locations, field ID and acreage, production beds, greenhouse units, adjoining land use, buffers, storage locations, water sources, etc.
- Accurate field histories for the previous three years providing crops, material applications and **the last application date of prohibited materials for each field.**
    - Previous land use statements for recently acquired or rented land;
    - Verification of organic seeds, seedlings, and planting stock or attempts to source organic;
    - Non-GMO verification for purchased inputs;
    - Field activity logs;
    - Input records and receipts/ingredient labels for all purchased soil; amendments, seeds, manure/compost, pest/disease control products, etc.;
    - Monitoring records (i.e. soil, manure, tissue, pest/disease, etc.);
    - Compost production records;
    - Equipment cleaning records;
    - Harvest and storage records for organic and non-organic products;
    - Clean transport statements;
    - Shipping and sales records for organic and non-organic products;
    - Correspondence/notices informing neighbors, utilities, road authorities of your organic status.

The Certification Process

There are five steps to the certification process:

1. **Complete and submit an application.** These can be obtained on paper from the certifier, or often also through the certifier's website. The certifier will have specific deadlines and fee structures regarding certification. It can be helpful to choose a certifier early on so that you can make sure to take advantage of early discounts and meet application deadlines. For most certifiers, your application serves as your Organic System Plan (OSP). Your Organic System Plan describes your organic farming operation. The forms provided by the certifier will ask you for the information needed. If you have any trouble filling it out, call the certification office. It is important to fill out all of the applicable sections and questions clearly and completely.
2. **Initial Review:** After you send your application to the office and pay the certification fee, the certifier will conduct an initial review of your Organic System Plan (OSP). Based on the OSP, the certifier makes sure all of the needed information is included

and determines if your farm appears to be eligible for organic certification. If so, the certifier assigns your file to an inspector.

3. **Inspection:** An on-site inspection is conducted to verify the information in your OSP and evaluate how the plan has been implemented. After being assigned your file, the inspector, who may be a contractor for the certifier, or may be certification staff, will contact you to set up a time for the inspection.
4. **Post-Inspection Review:** After the certifier receives the inspector's report, staff conducts a final review to determine if your farm complies with organic standards.
5. **Certification Decision:** If your farm is meeting the organic standards, the certifier issues a certificate.

When you have a copy of your certificate, you can begin marketing the farm products listed on the certificate as organic and your transition process will be complete. Each year, you will need to re-submit an application highlighting any changes to your farm plan, including the current year's crops, complete an annual inspection, and continue meeting the organic standards to remain certified. One of the keys to making this process easier will be how you conduct your transition phase. Setting up effective recordkeeping and monitoring strategies will serve you well in your initial certification application process and in the many years to follow.

CHAPTER 3

Learning the Organic Standards – Crops

In order to meet the National Organic Program (NOP) standards, it's important to have a good understanding of them. In this guide, first, we attempt to take the regulatory language used in the organic standards and translate it into everyday English. Following each section of explanation of the standards, we have also included the ***actual regulatory language*** of the organic standards so that you can read it for yourself.

WHAT HAS TO BE CERTIFIED... AND WHAT ARE THE EXCEPTIONS?

§205.100	***What has to be certified***
§205.101	***Exemptions and exclusions from certification***
§205.102	***Use of the term, "organic"***
§205.310	***Agricultural products produced on an exempt or excluded operation.***

Explanation of the Standards

Anyone making an organic claim (stating that their product is organic in any way- 100% organic, organic, or made with organic ingredients) needs to be certified organic according to the USDA NOP standards, with a few special exceptions discussed below. Anyone making any organic claim (including those exceptions below) needs to be able to demonstrate that s/he is following the USDA organic standards, including recordkeeping standards.

There are a few special cases in which certification is not required. A producer or handler making an organic claim does not have to be certified organic if:

- The producer or handler's gross agricultural income from organic sales is $5,000 or less per year;
- The handler is a retail food establishment;
- A handler only works with product with less than 70% organic content can only make an "organic claim" in the ingredient statement. (The ingredient statement is the small print on food packages where ingredients are listed.)

In short, you do NOT need to go through the certification process if the gross sales of your organic product are $5,000 or less per year. You will, however, need to meet all of the NOP standards for organic

production, recordkeeping, handling, and labeling. Exempt operations must NOT use the organic seal. See §305.310 for more information. If you meet this exemption, consider contacting a certifier near you to let them know that you fall under the $5,000 threshold. That way, should someone file a complaint about your organic claims without certification, you can let them know that you are aware of the rules, that you're following them, and that you're in touch with a certifier regarding the exemption.

Organic handlers

If you have a handling operation that only handles products made from less than 70% organic ingredients or only identifies organic ingredients contained in a product on the information panel (not in the primary display panel- the main advertising on the front of the package- see the diagram below), then you are exempt from the requirements for certification EXCEPT you must:

- Be able to show how you keep your organic ingredients from being contaminated by prohibited substances (i.e. keep them in a sealed container, store them separately, etc.),
- Follow the labeling guidelines which state that you can
  - Only identify the organic content of the product by indicating each organically produced ingredient in the ingredient list and listing the percentage of organic content on the nutrition information panel,
  - Not use the USDA organic seal or the seal, logo or identifying mark of any organic certifying agent on any label for these products,
  - Not have your product be represented as a certified organic to any buyer
  - List an ingredient in a multi-ingredient product as organic if it has been organically produced by your operation.
- Follow the recordkeeping guidelines which state that you must keep sufficient records for no less than 3 years to:
  - Demonstrate that the ingredient(s) identified as organic was organically produced, and
  - Verify the quantities produced from such ingredients
- In short, if you want to sell, label or represent an agricultural product as "100% Organic," Organic," or "Made with Organic…." you must produce and handle that product in accordance with the following rules.

Principal Display Panel

◀ The word "Organic may appear in the name of the product, but this is optional [§205.303(a)(1)]

Nutrition Facts

Serving Size 1 cup (228g)
Servings per Container 2

Amount Per Serving	
Calories 280	**Calories from Fat** 120
	% Daily Value*
Total Fat 13g	20%
Saturated Fat 5g	25%
Trans Fat 2g	
Cholesterol 2mg	10%
Sodium 660mg	28%
Total Carbohydrate 31g	10%
Dietary Fiber 3g	0%
Sugars 5g	
Protein 5g	

Vitamin A 4% • Vitamin C 2%
Calcium 15% • Iron 4%

*Percent Daily Values are based on a 2,000-calorie diet. Your daily values may be higher or lower depending on your calorie needs

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

▲ The USDA sealand Certification Agency Seal may be used on products labeled "Orgnaic" or "100% Organic," but they are not required. The USDA logo must meet certain color specifications, and the Certification Agency Logo must not be more prominent than it. [§205.303(a)(4-5)]

All organic ingredients must be identified as such, either with the word "organic" in front of each one, or with an asterisk which refers to "Organic" written underneath. [§205.303(b)(1)] ▶

INGREDIENTS: Peanuts*, Raisins*, Dried Cranberries*, Dried Blueberries*, Dried Cherries*, Almonds*, Salt.
*Organic

FINNEGAN'S TRAIL MIX CO.
COLUMBUS, OH 43214

CERTIFIED ORGANIC BY OEFFA

NOP Standards

§205.100 What has to be certified

(a) Except for operations exempt or excluded in §205.101, each production or handling operation or specified portion of a production or handling operation that produces or handles crops, livestock, livestock products, or other agricultural products that are intended to be sold, labeled, or represented as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))" must be certified according to the provisions of subpart E of this part and must meet all other applicable requirements of this part.

…

(b) Any production or handling operation or specified portion of a production or handling operation that has been already certified by a certifying agent on the date that the certifying agent receives its accreditation under this part shall be deemed to be certified under the Act until the operation's next anniversary date of certification. Such recognition shall only be available to those operations certified by a certifying agent that receives its accreditation within 18 months from February 20, 2001.

(c) Any operation that:

(1) Knowingly sells or labels a product as organic, except in accordance with the Act, shall be subject to a civil penalty of not more than 3.91(b)(1)(xxxvii) of this title per violation.

(2) Makes a false statement under the Act to the Secretary, a governing State official, or an accredited certifying agent shall be subject to the provisions of section 1001 of title 18, United States Code.

§205.101 Exemptions and exclusions from certification

(a) Exemptions.

(1) A production or handling operation that sells agricultural products as "organic" but whose gross agricultural income from organic sales totals $5,000 or less annually is exempt from certification under subpart E of this part and from submitting an organic system plan for acceptance or approval under §205.201 but must comply with the applicable organic production and handling requirements of subpart C of this part and the labeling requirements of §205.310. The products from such operations shall not be used as ingredients identified as organic in processed products produced by another handling operation.

(2) A handling operation that is a retail food establishment or portion of a retail food establishment that handles organically produced agricultural products but does not process them is exempt from the requirements in this part.

(3) A handling operation or portion of a handling operation that only handles agricultural products that contain less than 70 percent organic ingredients by total weight of the finished product (excluding water and salt) is exempt from the requirements in this part, except:

(i) The provisions for prevention of contact of organic products with prohibited substances set forth in §205.272 with respect to any organically produced ingredients used in an agricultural product;

(ii) The labeling provisions of §205.305 and §205.310; and

(iii) The recordkeeping provisions in paragraph (c) of this section.

(4) A handling operation or portion of a handling operation that only identifies organic ingredients on the information panel is exempt from the requirements in this part, except:

(i) The provisions for prevention of contact of organic products with prohibited substances set forth in §205.272 with respect to any organically produced ingredients used in an agricultural product;

…

(ii) The labeling provisions of §205.305 and §205.310; and
(iii) The recordkeeping provisions in paragraph (c) of this section.

(b) Exclusions.

(1) A handling operation or portion of a handling operation is excluded from the requirements of this part, except for the requirements for the prevention of commingling and contact with prohibited substances as set forth in §205.272 with respect to any organically produced products, if such operation or portion of the operation only sells organic agricultural products labeled as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))" that:

(i) Are packaged or otherwise enclosed in a container prior to being received or acquired by the operation; and
(ii) Remain in the same package or container and are not otherwise processed while in the control of the handling operation.

(2) A handling operation that is a retail food establishment or portion of a retail food establishment that processes, on the premises of the retail food establishment, raw and ready-to-eat food from agricultural products that were previously labeled as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))" is excluded from the requirements in this part, except:

(i) The requirements for the prevention of contact with prohibited substances as set forth in §205.272; and
(ii) The labeling provisions of §205.310.

(c) Records to be maintained by exempt operations.

(1) Any handling operation exempt from certification pursuant to paragraph (a)(3) or (a)(4) of this section must maintain records sufficient to:

(i) Prove that ingredients identified as organic were organically produced and handled; and
(ii) Verify quantities produced from such ingredients.

(2) Records must be maintained for no less than 3 years beyond their creation and the operations must allow representatives of the Secretary and the applicable State organic programs' governing State official access to these records for inspection and copying during normal business hours to determine compliance with the applicable regulations set forth in this part.

§205.102 Use of the term, "organic."

Any agricultural product that is sold, labeled, or represented as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))" must be:

(a) Produced in accordance with the requirements specified in §205.101 or §205.202 through §205.207 or §205.236 through §205.239 and all other applicable requirements of part 205; and

(b) Handled in accordance with the requirements specified in §205.101 or §205.270 through §205.272 and all other applicable requirements of this part 205.

…

§205.310 Agricultural products produced on an exempt or excluded operation.

(a) An agricultural product organically produced or handled on an exempt or excluded operation must not:

(1) Display the USDA seal or any certifying agent's seal or other identifying mark which represents the exempt or excluded operation as a certified organic operation, or

(2) Be represented as a certified organic product or certified organic ingredient to any buyer.

(b) An agricultural product organically produced or handled on an exempt or excluded operation may be identified as an organic product or organic ingredient in a multiingredient product produced by the exempt or excluded operation. Such product or ingredient must not be identified or represented as "organic" in a product processed by others.

(c) Such product is subject to requirements specified in paragraph (a) of §205.300, and paragraphs (f)(1) through (f)(7) of §205.301.

KEEPING USEFUL RECORDS

§205.103 Recordkeeping by certified operations

Explanation of the Standards

Recordkeeping allows you to demonstrate to your inspector, your certifier, and ultimately, your buyers (through your certificate) that you are following the organic standards. This section emphasizes the importance of developing an effective recordkeeping system and gives some examples of the types of records you will keep.

Good records have value for your business and for the certification process. You may have already developed an efficient recordkeeping system for your operation, or you may be starting from scratch. If you already have a system, evaluate that system to see what's working, what might have room for improvement, and how you might add in additional records required for organic certification. Fortunately, there are many sample forms and templates that include all of the required information for certification. ATTRA has put together a list of all of the possible documentation necessary for certification. During transition, many of these items may not be applicable, but you might like to start keeping them for practice, or plan for their incorporation in the future. The ATTRA list for organic crop producers includes:

- **List of crops** being grown, field locations (maps), acreages, and estimated yields;
- **Field history** or prior land use documentation;
- **Field activity logs** for all practices performed (cultivation, weed control, use of manure or fertilizers, spraying, pruning, beneficial organisms released, etc.);
- **Input purchase/source records** of all inputs used for crop nutrients, pest, disease, or weed control;
  - Receipts;
  - Invoices;
  - Delivery tags;
  - Receipts or logs recording the pick-up or delivery of free materials;
  - Labels and/or documentation demonstrating that each material is allowed for use in organic production;
  - A generic material (e.g., mined limestone) must be on the National List as allowed;
  - A brand name product must either;
    - have a label that discloses all ingredients, including inert ingredients, so that they all may be verified as allowed; or
    - be listed as an allowed brand-name material on a list approved by the certifier (such as the Organic Materials Review Institute

(OMRI) Brand Names List, the Washington State Department of Agriculture (WSDA) list, or others). Find out from your certifier whether they maintain their own list of approved materials, perform their own brand-name material reviews, or whether they honor other lists, and if so, which ones.

- **Input application records** (material, source / brand name / manufacturer, regulatory status, field location, date, and rate or quantity used);
  - Seeds (crop and cover crop), planting stock, annual seedlings, and transplants;
  - Seed coatings and inoculants;
  - Greenhouse materials (e.g., potting soils or soil mix ingredients);
  - Crop nutrients and soil amendments;
  - Pest management materials;
  - Beneficial insect releases;
  - Natural, organic, or plastic mulches;
  - Any other materials applied.
- **Seed, planting stock, and transplant records**
  - Documentation that seeds and annual transplants are certified organic, or;
  - For any non-organic seed or planting stock used, documentation of your unsuccessful search for commercially available organic seed or planting stock (most certifiers require documentation of non-availability from three sources), and;
  - Verification that the seed or stock used is not genetically modified or treated with prohibited materials;
  - Documentation of compliance of any inoculants or seed coatings (non-GMO status of inoculant organisms and allowed status of all seed coating materials).
- **Audit trail documents** that track products from the seed to the field of origin to final use or sale. An audit is part of inspection procedures. It may require the following:
  - Field, planting and production records;
  - Harvest and yield records;
  - Post-harvest handling records;
  - Storage records;
  - Transport records;
  - Sales records.

If you do not currently have a system in place to track all of this information, start developing one. Some producers keep basic information on calendars or in field notebooks. Other producers keep some information in the calendar and other information in more formal record books. You can design the system that works best for you and it may incorporate many different forms of records (computer or

paper-based). You are not required to use a specific format. Ideally, you will to be able to provide the information to the inspector in the most efficient and concise manner and over time you will be able to better determine what works best for you and your operation.

- **Soil management activities**, including crop rotation and erosion prevention activities
- **Pest management activities** for control of crop pests (insects/ mites/invertebrates/ vertebrates), diseases and weeds, including:
  - Preventative practices;
  - Materials used, if any;
  - Pesticide use reports, as required by law, if applicable (*Some states require reporting of all applications of EPA-registered materials to commercial crops to the County Agricultural Commissioner, Department of Weights and Measures).*
- **Organic Integrity: Documentation** of measures to avoid contamination and commingling (touching or mixing of organic and

Here's an example of what an inspector may use for your audit:

(1) **Crop** – The inspector will choose, at random, one of your crops to audit. This can be anything from corn (grain, silage & ear) to hay to butternut squash. This audit will cover either the previous year's crop or the current depending on whether or not you've harvested the crop at the time of inspection.

(2) **Field** – After determining the crop, you will need to provide the location of all of the fields that you grew this crop in as well as activities that took place in the fields. Ideally, your records will have field activity logs for all of your fields and you will readily be able to show the inspector what activities were done, and when, in your records.

(3) **Field Acreage** – In addition to field locations, field size is important when determining how much crop you grew and whether or not the harvest yields are reasonable for the total acreage.

(4) **Seed** – This can be useful when determining if the amount of seed purchased and subsequently left over is adequate for the end harvest. The seeding rate is typically the total number of seeds per acre but depending on the equipment technology used can also include the speed of seeding.

(5) **Planting Date** – Using your field activity logs, the inspector will verify the planting date or series of dates.

(6) **Harvest Date** – Again, referencing your field activity logs, the inspector will verify the harvest date or series of dates.

(7) **Yield** – Show how much of the crop was harvested. Yields may be measured in different ways depending on the type of operation and crop you have. It may make more sense to quantify hay in bales, corn in bushels, or vegetables in pounds. It doesn't matter what system you use, however, you do need to be able to measure these amounts. If you do not have a formal system for measuring, try to determine the best way to estimate harvests based on your system. Let's say you harvest ear corn into a gravity wagon and then store it in a bin but you don't formally weigh your yields. You can estimate the yield based on capacity of the bin or wagon and then calculate based on reasonable estimates of how full the bin or wagon is.

(8) **End Use** – You will be expected to provide information and/or documentation of where your harvests end up. Did you sell it? If so, how much and to whom? Did you store it? If so, how much and where is it located? Was some used or fed on farm? If so, other records will need to back up this information, such as feed ration records if fed to on-farm livestock.

non-organic product), as applicable to your operation;
  - Information about neighboring land use;
  - Prevention of contamination from borders;
  - Production, harvest, and sales records for buffer crops, transitional or conventional crops;
  - Material storage: adequate separation of allowed materials from any non-allowed products;
  - Irrigation water and system for contamination prevention (i.e., diagram of valves, backflow prevention, and/or documentation of purge or flushing procedures to prevent contamination from shared water systems where fertilizers or other prohibited materials are used);
  - Equipment clean-out or purge logs (including the method used) for equipment used for both organic and conventional operations;
  - Documentation of procedures to verify the absence of sanitizer residues, if sanitizers are used.
- **Certification documentation** of any organic product purchased for resale.
- **Labels and labeling**
  - Printed packaging, bags, boxes, ties, bands, and stickers;
  - Lot numbering of retail and bulk products, if applicable.

Adapted from source: *Preparing for an Organic Inspection: Steps and Checklist* (http://www.attra.org/attra-pub/PDF/organic_inspection.html)

NOP Standards

§205.103 Recordkeeping by certified operations

(a) A certified operation must maintain records concerning the production, harvesting, and handling of agricultural products that are or that are intended to be sold, labeled, or represented as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s)."

(b) Such records must:
  (1) Be adapted to the particular business that the certified operation is conducting;
  (2) Fully disclose all activities and transactions of the certified operation in sufficient detail as to be readily understood and audited;
  (3) Be maintained for not less than 5 years beyond their creation; and
  (4) Be sufficient to demonstrate compliance with the Act and the regulations in this part.

(c) The certified operation must make such records available for inspection and copying during normal business hours by authorized representatives of the Secretary, the applicable State program's governing State official, and the certifying agent.

MATERIAL INPUTS ON YOUR OPERATION

§205.105	***Allowed and prohibited substances, methods, and ingredients in organic production and handling***
§205.203	***Soil fertility and crop nutrient management practice standard***
§205.206	***Crop pest, weed, and disease management practice standard***
§205.271	***Facility pest management practice standard***

The National List (§205.600–§205.606)

§205.600	***Evaluation Criteria for allowed and prohibited substances, methods and ingredients***
§205.601	***Synthetic substances allowed for use in organic crop production.***
§205.602	***Nonsynthetic substances prohibited for use in organic crop production.***
§205.603	***Synthetic substances allowed for use in organic livestock production.***
§205.604	***Nonsynthetic substances prohibited for use in organic livestock production.***
§205.605	***Nonagricultural (nonorganic) substances allowed as ingredients in or on processed products labeled as "organic" or "made with organic (specified ingredients or food group(s))"***
§205.606	***Nonorganically produced agricultural products allowed as ingredients in or on processed products labeled as "organic"***

Explanation of the Standards

Agriculture, whether it is considered sustainable, conventional, organic or otherwise, requires material inputs to some degree on almost every farm. The organic standards regulate what types of materials, methods and ingredients can and cannot be used on operations that are certified organic. The philosophy behind organic farming emphasizes that materials and inputs are important to certification, but the bigger picture focuses on a management system and not just input substitution. The standards attempt to identify the substances, methods and ingredients prohibited in organic production and handling as a way to further uphold the integrity of organic production and handling systems.

Materials are often referred to as "inputs" or "allowed substances" and these can range from soil amendments to seeds and seed treatments as well as production aids like surfactants. Materials are relevant in multiple locations within the standards and it is important to be able to identify these standards and understand their meaning. **All products must be reviewed before a certified operation uses them. Use without pre-approval could lead to suspension or denial of certification of the affected land, animals, and/or products depending on the nature of the product and the use.** Learning the organic standards is essential, but note that materials can be complex and you do not need to rely just on your own knowledge or experience when determining the allowance of material inputs. It is very helpful to check with your certifier ahead of time if you are unsure whether or not a material may be allowed.

Material Inputs Referenced in the NOP Standards

§205.105 Allowed and prohibited substances, methods, and ingredients in organic production and handling

This standard covers several different topics which all refer to the National List of Allowed and Prohibited Substances. The National List specifically identifies substances that may and may not be used in organic crop and livestock production. It also lists the substances that may be used in or on processed organic products. The general rules are as follows:

- Natural substances (nonsynthetic) are ALLOWED unless they are specifically prohibited on the list.
- Synthetic substances are NOT ALLOWED unless they are specifically approved on the list.
- For information on how to determine which category a material falls into, please see the next standard NOP §205.600.

Additionally, you may hear the term the "**Big 3.**" While this is not a technical term in the standards, it may help you remember to avoid materials produced using these 3 prohibited methods or inputs:

- **Excluded methods:** A variety of methods used to genetically modify organisms or influence their growth and development by means that are not possible under natural conditions or processes and are not considered compatible with organic production.
- **Ionizing radiation:** A practice that is used to preserve food and eliminate pathogens.
- **Sewage sludge:** Comes from domestic sewage sources.

§205.600 Evaluation Criteria for allowed and prohibited substances, methods and ingredients

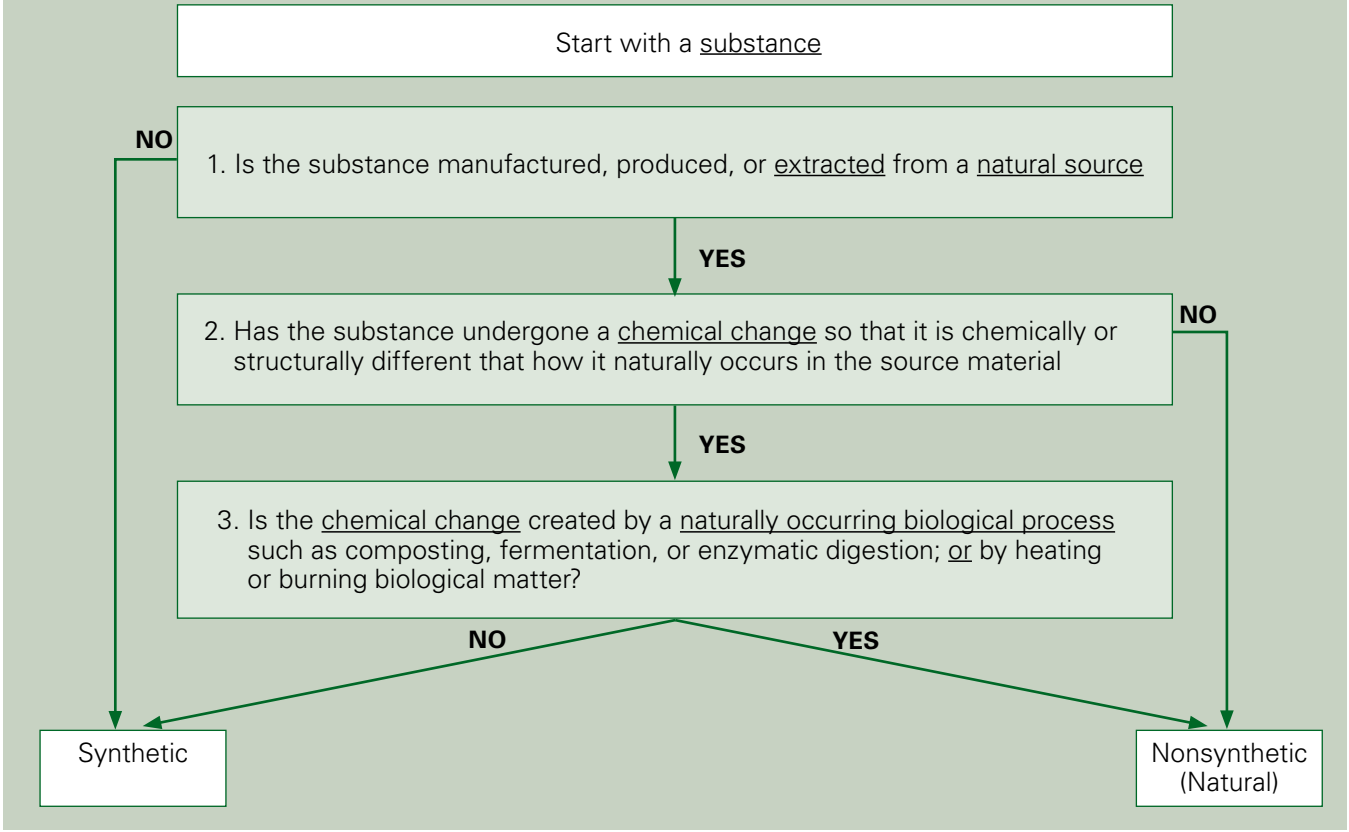
This standard describes how materials are to be evaluated. As previously mentioned, all substances are considered either synthetic or nonsynthetic with regard to crop and livestock production.

- The NOP defines synthetic and non-synthetic as follows:

> **Synthetic:** A substance that is formulated or manufactured by a chemical process or by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources, except that such term shall not apply to substances created by naturally occurring biological processes
>
> **Non-synthetic (natural):** A substance that is derived from mineral, plant, or animal matter and does not undergo a synthetic process as defined above. For the purposes of this part, non-synthetic is used as a synonym for natural as the term is used in the Act.

- Additionally, NOP Draft Guidance 5033-1 provides a useful flow chart for determining the status of a material.

Draft Guidance
Decision Tree for Classification of Materials as Synthetic or Nonsynthetic



The National List of Approved and Prohibited Substances, covering §205.600–§205.606 is listed on pages 106-118 of this guide. See the bullets below to better understand how this list is organized so you can read it for yourself.

- ***§205.601 – Synthetic substances allowed for use in organic crop production.***
  - All synthetic substances are NOT ALLOWED unless on this list.
- ***§205.602 – Nonsynthetic substances prohibited for use in organic crop production.***
  - All nonsynthetic substances ALLOWED unless on this list.
- ***§205.603 – Synthetic substances allowed for use in organic livestock production.***
  - All synthetic substances are NOT ALLOWED unless on this list.
- ***§205.604 – Nonsynthetic substances prohibited for use in organic livestock production.***
  - All nonsynthetic substances are ALLOWED unless on this list.

§205.203 Soil fertility and crop nutrient management practice standard.

This standard covers important information regarding animal and plant materials used for fertility purposes as well as other types of amendments.

For the purposes of organic production, manure and compost are treated quite differently. Later in this guide, we discuss these inputs in more detail as part of your organic system, but this section offers special insight into manure and compost as material inputs in organic production. Manure, or a pile or lagoon of manure mixed with bedding materials, regardless of how long it has been decomposing, is treated like raw manure. Compost, on the other hand, whether it contains manure or not, must undergo a very specific process to be considered "compost" according to the organic standards. Read on to find out how these different products may and must not be used in organic systems.

- **Manure**–Animal manure that is not composted according to NOP standards must be considered raw manure. Manure can be sourced from certified organic farms or conventional farms, however, if you're sourcing off-farm manure, it is important to verify with the supplier if anything was added to the manure (for example, to manage odors or flies) and to determine whether or not these are approved. If using raw manure, adhere to the following restrictions:
  - Apply only to land used for crops **not intended for human consumption.**

OR

- For crops **for human consumption** whose edible portion has direct contact with the soil: incorporate no less than 120 days prior to harvest.

For example, if you want to sidedress strawberries with manure, you must apply the manure 120 days before you harvest the strawberries. So if you're harvesting the first week of June, then you would need to make sure to apply manure before the first week of February. There might be lots of snow in February, and you don't want to apply manure to frozen ground, so you might choose to do a fall application of manure following planting, in order to harvest your strawberries the following spring.

- For crops **for human consumption** whose **edible portion does not have direct contact with the soil**: incorporate no less than 90 days prior to harvest.

For example, if you grow a sweet corn variety to harvest in early August, and you'd like to apply manure, you must apply the manure by early May. You'll need to keep records of these application and harvest dates to show your inspector how you're following the rules.

- **Compost**–Composted animal and plant materials to be used without any raw manure restrictions must meet specific guidelines and compost production must be documented. If you plan to make your own compost, work with your certifier to be sure you're meeting the guidelines. If you plan to purchase compost, be sure to have your certifier approve the composting process prior to purchasing it. Specifically, the following guidelines must be met:
  - Initial Carbon:Nitrogen (C:N) ratio of feedstocks must be between 25:1 and 40:1
- AND one of the following:
  - For in-vessel or static aerated piles, a temperature of between 131º - 170º F must be maintained for 3 days.

  OR
  - For windrow composting systems a temperature of between 131º - 170º F must be maintained for 15 days and the material must be turned at least 5 times.
- **Mulch** containing only plant materials- does not need to meet the above requirements and can be used as mulch without restriction.
- **Other allowed substances include:**
  - **Mined substances of low solubility**– Some examples may include: limestone, gypsum, bentonite, clay, greensand, humates, langbeinite, phosphate rock, zeolite, vermiculite
  - **Mined substances of high solubility**–Some examples may include: calcium chloride, potassium chloride, sodium nitrate.

- Note that when using these materials you must be able to verify that they are strictly mined and unprocessed. For example, lime can be sourced straight from the ground which is allowed, but it may also be a by-product from wastewater treatment or slaked or burned lime which is not allowed. The use of prohibited liming materials is one example of a material that may remove land from certification for three years.
    - **Biochar or charcoal**–is allowed as long as it has not been treated or combined with other prohibited substances.

§205.206 Crop pest, weed, and disease management practice standard.

The standard allows for the use of certain products only after producers have tried other preventative practices that have failed. Read the section for this standard on page 65 to better understand those preventative measures.

- Approved inputs are accounted for in this section, including biological and botanical substances (non-synthetic) and synthetic substances on the National List.
- **Treated lumber** may not be used for new installations or to replace old structures that come into contact with soil or livestock once you're certified organic. If you currently have some treated lumber on your farm, note that previously existing treated lumber may be "grandfathered" in for new operations not yet certified. However, if such structures pose a risk to contamination of organic products, soil, or livestock, measures (like physical barriers) must be taken to prevent such contamination.
    - For more information about different treatments allowed and prohibited, please contact your certifier. Many certifiers have fact sheets available on special topics such as treated wood.

§205.271 Facility pest management practice standard

Similar to the crop pest, weed and disease standard, an operator must implement preventative practices to avoid pests, like rodents, which can affect the value of products and sanitation. Read the section for this standard on page 101.

- If preventative practices are not effective, producers may use products allowed on the National List. Currently, the only listing allowed is Vtiamin D3 for use as a rodenticide (§205.271(c)).

- If none of these practices are effective in preventing or removing pests, with the approval of a certifier, a producer may use a synthetic substance not on the National List. In such instances, special measures will need to be taken to ensure the substances are used in a manner that will not compromise the organic integrity of certified products (§205.271(d)).

Changes to the National List

Individuals or groups can petition the National Organic Standards Board (NOSB) to have a substance evaluated by the board. The NOSB then makes recommendations to the Secretary of Agriculture on substances that should be added to or removed from the National List. The NOSB is made up of a board of experts who make decisions about such substances. This board accepts public comment on an ongoing basis and they love to hear from producers. If you're interested in providing input to the board, contact your certifier, or the USDA directly, to get involved.

Resources for material inputs

While learning to read the NOP standards and the National List is an important skill for all producers, there are organizations which have streamlined some materials review information.

Organic Materials Review Institue (OMRI) is a non-profit organization that offers a service to manufacturers who pay to have their products reviewed against the NOP standards. Once products have been reviewed and approved by OMRI, they will be allowed to carry the "OMRI Listed" seal on their labeling. This OMRI seal can be extremely helpful to producers when determining the use of inputs.

- Note: not all manufacturers will have their products reviwed by OMRI, especially smaller companies, or those with a strong local following.
- OMRI lists products online at www.omri.org and also publishes various book lists for both generic materials and specific products. Your certifier should be able to provide this to you if you are not able to or choose not to access the internet.

The **Washington State Department of Agriculture** (WSDA) Organic Program maintains a list of products that they have determined meet the requirements under the National Organic Standards. Manufacturers and distributors of the products have specifically requested a review of their formulations and manufacturing processes. WSDA's list is not a comprehensive list of all materials that are allowed for use in organic agriculture, but WSDA certified organic operators, and producers whose certification agency recognizes the WSDA list can use products that appear on this list and maintain confidence that the use of these products will not jeopardize certification.

If you are certified by a certification agency other than WSDA, check with your certifier prior to the use of any material. The list is available online at agr.wa.gov.

Many certifiers also review products for organic producers according to the organic standards and share this list only with producers they certify. Check with your certifier to see if they can provide you with a list of approved substances, or if you'd like them to review a specific material before you use it.

A final note about materials and inputs

You may be noticing a trend about the importance of communication with your certifier. An allowed substance is not always allowed for every use on your operation. This is especially important to consider if you currently are thinking about certifying livestock. For example, hydrated lime is listed on the National list as an allowed synthetic for use as plant disease control in organic crop production. It is also listed on the National List as an allowed synthetic for use as an external pest control in organic livestock production. However, if used as a soil ammendment on a field, it is prohibited and can take land out of certification for three years. It is always important to be aware of the purpose of the inputs you intend to use. Communicating this information clearly to your certifier is essential in material input decision making for your operation.

NOP Standards

§205.105 Allowed and prohibited substances, methods, and ingredients in organic production and handling.

To be sold or labeled as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))," the product must be produced and handled without the use of:

(a) Synthetic substances and ingredients, except as provided in §205.601 or §205.603;

(b) Nonsynthetic substances prohibited in §205.602 or §205.604;

(c) Nonagricultural substances used in or on processed products, except as otherwise provided in §205.605;

(d) Nonorganic agricultural substances used in or on processed products, except as otherwise provided in §205.606;

(e) Excluded methods, except for vaccines: Provided, That, the vaccines are approved in accordance with §205.600(a);

(f) Ionizing radiation, as described in Food and Drug Administration regulation, 21 CFR 179.26; and

(g) Sewage sludge.

§205.203 Soil fertility and crop nutrient management practice standard – see standard on page 101

§205.206 Crop pest, weed, and disease management practice standard – see standard on page 101.

§205.271 Facility pest management practice standard – see standard on page 101

YOUR ORGANIC SYSTEM PLAN (OSP)

§205.201 Organic production and handling system plan standard

Explanation of the Standards

An important step in the certification process is the construction of a yearly, "Organic System Plan," or OSP. The organic system plan required in the regulations will be a "nuts and bolts" description of how you will manage your farm and/or run your processing operation. You will be required to include information such as the kinds of inputs and management practices you will use. The document serves as a contract between you and your certifier because it provides a way of making sure you are following the federal regulations. It also helps you to organize your thoughts as you approach the growing season. Certifiers understand that the OSP is a "living document" or one that can change with regard to changes in weather or time. It's a good practice to update your certifier about any major changes to your OSP. Minor changes can be updated in your records and shared at inspection, or when you turn in a new plan each year in the winter or early spring.

The regulation specifically lists five types of required information: descriptions of all practices and procedures to be used; a list of all substances to be used as inputs; explanations of monitoring practices; recordkeeping system; and the management practices you will use to prevent contamination of your product. Certifiers provide producers with forms requesting all of the necessary information, which makes it easier to give them what they need to verify that you're following the organic standards. These forms are usually available both on paper and in a digital format.

- Description of Practices and Procedures - Describe your management practices with regard to:
    - fertility (crop rotation, cover crops, incorporating residues, compost, summer fallow);
    - pest and disease management (monitoring, trapping, resistant varieties, crop rotation, protecting and building natural enemy habitat);
    - soil conservation (contour plowing, conservation tillage, winter cover crops);
    - weed management (flaming, mechanical cultivation, hand weeding, crop rotation, mulching);

- List of the Substances to be used as Inputs and Seeds– List all of the materials you will use as production or handling inputs and their source or manufacturer. In your records, keep track of where (in what fields, for example) you used them. If you use non-organic seeds, keep documentation of the search you did for organic seed (3 sources) before you purchased non-organic, untreated, non-gmo seed. Keep documentation that any non-organic seed you purchase is indeed untreated and non-gmo.

Some material inputs, such as biopesticides, botanicals and allowed synthetic substances can only be used if they are listed in your farm plan and if other strategies are not working, so it's important to keep track of the practices you use first. If you have any questions about materials for use in organic production, contact your certifier before you use the material.

- Monitoring – Much of what you will do as an organic farmer will involve the prevention of situations that could cause problems in your production system, requiring keen observation. This includes not only watching for problems such as insect pests and diseases in your crops or possible contamination of your products, but also being aware of how your entire farming system is operating.
- Recordkeeping – Good records are an important part of your Organic System Plan. Your records provide an audit trail that permits you or anyone else to trace a certified product from the planted seed to market. Your recordkeeping system must be appropriate for your business and list all activities and transactions in detail. When you are audited, your records will need to track your crops or other farm products back to the field in which they were grown and show how that field was managed for at least three years prior to production of the crop. Some certifiers provide recordkeeping templates for you to use and you can also find sample forms on the ATTRA website (www.attra.ncat.org). Take a look at various samples and modify as needed to find the form and system that works for you.
- Prevention of Contamination – Your organic products can become contaminated in three general ways: commingling (touching or mixing) of organic crops with non-organic crops; when your organic crops come in contact with a prohibited substance; or when pollen from a genetically modified organism (GMO) pollinates an organic crop. There are many practices commonly used that will help you prevent contamination of your organic crop. Some of these include:
    - Buffer Zones consisting of crop land, tree lines, hedgerows, or grass strips. The standards do not have a defined width for a

buffer zone; however, your certifying agency may have more specific rules. What's most important is that the zone provides adequate protection from possible sources of contamination. So, if the adjoining farm is sprayed by an airplane and there are no trees in your buffer zone, the zone may need to be larger than if you have a well-established hedgerow and herbicides are applied, for example, with a backpack sprayer;

- Locating your organic fields in remote or isolated places so that they are a significant distance from conventionally farmed fields, roadside spraying, or any other possible source of contamination;
- Posting "No Spray" signs on the edges of your property;
- Contacting neighbors and others such as the highway department, electric company, aerial spray companies that operate in your area, adjoining landowners, your drainage commission, any farm service offices and anyone else who might have a reason to apply a prohibited substance anywhere near your farm or your organic operation. Make sure you keep copies of any letters you send for your records;
- Locating organic fields on higher ground when possible, or diverting drainage from conventional fields away from your organic fields;
- Monitoring (visual observations, residue analysis, GMO testing, photographs, tracking wind speed and/or direction) to catch any contamination early.

The final requirement for your Organic System Plan is to provide any additional information requested by your certifying agent about any part of your production system. This could include a better explanation of a practice, or more information regarding a certain product. It is best to provide as much information as is requested up front to avoid delays in the certification process. If you have any questions about the information that is needed while filling out your Organic System Plan or providing additional information, contact your certifier.

NOP Standards

§205.201 Organic production and handling system plan standard

(a) The producer or handler of a production or handling operation, except as exempt or excluded under §205.101, intending to sell, label or represent agricultural products as "100 percent organic," "organic' or "made with organic (specified ingredients or food group(s))" must develop an organic production or handling system plan that is agreed to by the producer or handler and an accredited certifying agent. An organic system plan must meet the requirements set forth in this section for organic production or handling. An organic production or handling system plan must include:

(1) A description of practices and procedures to be performed and maintained, including the frequency with which they will be performed;

(2) A list of each substance to be used as a production or handling input, indicating its composition, source, location(s) where it will be used, and documentation of commercial availability, as applicable;

(3) A description of the monitoring practices and procedures to be performed and maintained, including the frequency with which they will be performed, to verify that the plan is effectively implemented;

(4) A description of the record keeping system implemented to comply with the requirements established in §205.103;

(5) A description of the management practices and physical barriers established to prevent commingling of organic and non-organic products on a split operation and to prevent contact between your organic production and handling operations and products and prohibited substances; and

(6) Additional information deemed necessary by the certifying agent to evaluate compliance with the regulations.

(b) A producer may substitute a plan prepared to meet the requirements of another Federal, State, or local government regulatory program for the organic system plan: Provided, that, the submitted plan meets all the requirements of this subpart.

LAND USE AND MANAGEMENT

§205.202 Land Use Standards

Explanation of the Standards

Effective land management will be vital to your success as an organic farmer. This section is designed to help you build and maintain healthy soils. The standard begins by stating that you must manage the land you want to be certified as organic in accordance with the provisions of the standards in the next four categories:

1) Soil Fertility and Crop Nutrient Management;
2) Seed and Planting Stock;
3) Crop Rotation; and
4) Crop Pest, Weed, and Disease Management.

A detailed description of all of these requirements follows. The next portion of this standard refers to the substances you will not be able to use on the land you want to be certified organic. Starting with your transition period and when your farm becomes certified, you will not be able to apply any of the prohibited substances found in the previously listed section §205.105 unless otherwise noted.

Finally, as discussed in the OSP section, your organic fields must have distinct, defined boundaries and buffer zones. These boundaries and/or buffer zones are important to protect your organic crops from contamination. This is especially important if not all of your acres are in organic production or if your neighbor does not farm organically. Part of your management plan involves protecting your land from an accidental application of a prohibited substance to your crop or pollen drift from nearby GMO crops. Make sure you know the use(s) of all the land surrounding your property so that you can plan your buffer zones accordingly. Buffer zones commonly consist of cropland, tree lines, hedgerows, and grass strips. If crop land is used as a buffer zone, the crops in these zones are considered conventional and must be kept separate from your organic crop. End use (sale, your own use, or mowing and leaving the residue in the field) of buffer crops must be documented in your records.

Another option to make sure your organic crop or livestock does not come into contact with prohibited substances is good communication with your neighbors. Many certifiers can provide an "Adjoining Land Use Form" for you and your neighbors to use. This form lets your neighbor know that you're farming organically. Further, they can use this form to promise not to apply any prohibited substances on their land adjoining your fields that could put your organic transition or certification at risk. Having such a document in place with a neighbor could prevent the need for a buffer strip on your land, but it remains your responsibility to make sure your crop is not contaminated.

NOP Standards

§205.202 Land Use Standards

Any field or farm parcel from which harvested crops are intended to be sold, labeled or represented as "organic," must:

(a) Have been managed in accordance with the provisions of §205.203 through §205.206;

(b) Have had no prohibited substances, as listed in §205.105, applied to it for a period of 3 years immediately preceding harvest of the crop; and

(c) Have distinct, defined boundaries and buffer zones such as runoff diversions to prevent the unintended application of a prohibited substance to the crop or contact with a prohibited substance applied to adjoining land that is not under organic management

SOIL FERTILITY AND CROP NUTRIENT MANAGEMENT

§205.203 Soil Fertility and crop nutrient management practice standard

Explanation of the Standards

When attempting to manage fertility, it is good to begin with the facts. Understanding your soil type, proper interpretation of your soil test, balancing soil nutrients and understanding nutrients removed annually, will lead to healthy crops with better yields and less disease and pest pressure.

Maintaining and Improving the Soil

Tilling the soil, whether for weed control or seedbed preparation is one management practice that affects the quality of your soil and its ability to provide nutrients to your crops. In organic farming, the type of tillage used must not degrade, but help to improve the physical (structure, tilth), chemical and biological properties of the soil (bacteria, fungi, and insects). Conventional tillage using the moldboard plow improperly can lead to the development of fields with hard crusts, compaction, run-off, and erosion because little residue is left on the field and the plow tills deep into the soil. Moldboard plowing should be avoided in primary tillage but is a necessary tool for some cover crop incorporation. The challenge is to properly adjust the coulter to avoid plowing too deeply. When using the moldboard plow, avoiding inverting the soil entirely will allow oxygen to aid in the decomposition of residue. Ideally, a minimum or conservation tillage system will incorporate plant residues in the top few inches of the soil where it is easily broken down by soil organisms, but also leaves enough residues on the surface to prevent erosion.

Many organic farmers have replaced use of the moldboard plow by the chisel plow and the reduced tillage practices of zone, ridge and mulch tillage. Most organic farmers do not use the conservation tillage practice of no-till because of its heavy reliance on the use of herbicides. However, the Rodale Institute and several land grant universities have been experimenting with the use of cover crops suppressed by a crimp-roller which leaves the residue on the surface and allows drilling the seed into this mulch. This technique is successful for some crops and suppresses weed pressure for a few seasons, but requires specialty equipment. The chisel plow does not invert the soil during plowing, leaves much more plant residue on the surface of the soil, and allows for more flexibility in depth of tillage (usually 5-12”). Minimum or conservation tillage systems leave a greater (more than 30%) amount of residue on the field.

Minimum cultivation systems include:

- **Zone tillage** – Only a narrow zone (5-7" wide and 4" deep) is cultivated for planting. The rest of the field is left undisturbed. The zone is made by multiple fluted coulters mounted on the front of a planter and yields a well-prepared seedbed;
- **Ridge tillage** – In this type of tillage, permanent or semi-permanent ridge beds are formed across the field. Special cultivators with large coulters and sweeps mounted on single shanks are used to establish and maintain the ridges. The advantage of this type of tillage is that it allows for earlier soil warming and drying of the seedbed area which is especially helpful in cold, wet soils;
- **Mulch tillage** – Full field tillage using a chisel plow, sweep cultivator or disk harrow is done in fields with significant reside. The residues are not buried deep so that decomposition can easily occur.

Full field tillage with a moldboard plow is sometimes necessary in organic fields with significant weed pressure, to incorporate manure and suppress cover crops. The best tillage system for your farm depends on your soil and climate type and the amount of mechanical weed control, cover crop and manure incorporation needed.

Rotations and Cover Crops for Soil Building

Maintaining soil fertility and providing your crops with the nutrients they need in an organic system takes sound planning and management, and some willingness to experiment. Conducting a complete soil test in each of your fields is a good way to start your fertility program. This test will give you baseline information about nutrient and organic matter levels. Depending on the test you order, it may also report the existence of potential contaminants (such as heavy metals) in your soil. Addressing nutrient deficiencies at the beginning through the addition of off-farm fertility inputs will sometimes be necessary to correct historic depletion.

You will be able to provide most of the nutrients your crops need and maintain a fertile soil through the use of a well-designed crop rotation, cover crops, and the addition of plant (crop residues, mulches, cover crops), animal (manure) materials, and compost. Developing an effective crop rotation will be a key to the success of your organic farming system. Not only does a good crop rotation help with soil fertility, it also helps minimize insect pest, weed, disease and erosion problems. Crop rotations are so important to organic production systems that §205.205 of the National Organic Standards is devoted to this topic. You will find more detailed information about crop rotations in that section.

A cover crop is a crop grown primarily for the purpose of protecting the soil from erosion during the time when the soil would otherwise be bare. Fortunately, a well-managed cover crop can do much more than this. Cover crops are a great way to add nutrients and organic matter to your soil and improve its physical characteristics. They are also helpful in scavenging excessive nutrients and holding nutrients in the field until needed by the cash crop. A legume planted as a cover crop can, with the help of nitrogen fixing bacteria, provide a significant amount of nitrogen for subsequent crops. Certain species of rhizobium bacteria will attach to the root of the legume and in a symbiotic relationship, convert the nitrogen gas in the air spaces in the soil to ammonia, a form of nitrogen the plant can use. Some of this kind of bacteria occurs naturally in the soil but the best way to ensure that the nitrogen fixation process is maximized is to inoculate your legume seeds with the correct species of bacteria. Milk, weak sugar water or a commercial sticking agent are often used to help the inoculum stick to the seed. Enough sticking solution is added to moisten seeds and then they are mixed with the inoculant. The seeds are dried for a half hour before planting. If the seed is not planted within 24-48 hours it will need to be re-inoculated. The chart below lists some of the most commonly used legume cover crops and the type of bacteria to use as an inoculant.

The nitrogen that is fixed by the bacteria and used by the plant is made available to succeeding crops when the cover crop decomposes after being plowed under or mowed. A cover crop used in this manner is usually referred to as a "green manure" because it is grown specifically for soil improvement. If the above ground part of the plant is removed for hay, there is usually no net gain of nitrogen in the soil from growing the crop but there are many other soil ecological benefits. Different cover crops (legumes and non-legumes) under different conditions will provide a varying amount of nitrogen for the next crop. Cool temperatures and wet soils can slow down

Legume	Rhizobia
Alfalfa, Black Medic, Bur Medic, Sweetclovers (white or yellow)	*Rhizobium meliloti*
Clover I (Red, White)	*Rhizobium leguminosarum bv trifolii strain*
Clovers II (Berseem, Crimson)	*Rhizobium leguminosarum bv trifolii strain*
Clovers III (Subterranean)	*Rhizobium leguminosarum bv trifolii strain*
Field peas, Lentils, Vetches	*Rhizobium leguminosarum bv viceae*
Cowpea	*Bradyrhizobium japonicum strain*
Birdsfoot Trefoil	*Rhizobium loti*

the rate of decomposition and the subsequent availability of nitrogen. Conventional plowing followed by multiple passes of disking can cause a green manure to decompose quickly. For planning purposes it will be helpful to be able to estimate how much nitrogen your cover crop will provide. The information in the box below describes a way to do this.

Cover crops work to improve soil fertility in other ways. The continuous plant cover prevents erosion of the topsoil, the most fertile portion of the soil. Cover crops increase water infiltration rates, minimizing run-off that often contains water-soluble nutrients. Using cover crops as green manures not only increases the amount of nitrogen available, but also the amount of organic matter in the soil. Soils with high amounts of organic matter have better soil structure because they have more stable soil aggregates, better infiltration and water holding capacity, and are better at storing plant nutrients. Cover crops are also helpful because they can take up nutrients that otherwise might leach from the soil. These nutrients are made available to the following crops when the cover crop is plowed under and decomposes. Deep-rooted cover crops can bring up nutrients from lower in the soil profile and certain cover crops also increase the availability of phosphorus and potassium. The chart on pages 44-45 lists many common plants used as cover crops and their characteristics that help increase soil fertility.

To find out approximately how much nitrogen will be available from your cover crop (green manure), first estimate its yield. One way to do this is to take cuttings from several areas in the field, dry and weigh them. Each area you cut from must be the same size. Use a yardstick or some kind of frame to lay these areas out. Dry the cuttings in the sun for a few consecutive days or in an oven at 140ºF for 24-48 hours until the plants are "crunchy dry." The following equation can be used to determine your yield per acre of dry matter.

$$\textbf{Yield(lb.)/Acre} = \frac{\textbf{Total weight of dried samples(lb.)}}{\textbf{Number of square feet sampled}} \times \frac{\textbf{43,560 sq. ft.}}{\textbf{1 Acre}}$$

Next, determine the percent nitrogen contained in the plant material. Use the general rules listed below to find that number.

- Annual legumes have between 3.5-4 % nitrogen in their aboveground parts prior to flowering (for young material use the higher end of the range), and 3 to 3.5 % at flowering. After flowering, nitrogen in the leaves decreases quickly as it accumulates in the growing seeds.
- For perennial legumes that have a significant number of thick, fibrous or woody stems, reduce these estimates by 1%.
- Most cover crop grasses contain 2-3 % nitrogen before flowering and 1.5-2.5 % after flowering.

Now put the data into the equation below to get the approximate amount of nitrogen.

$$\textbf{Yield (lb/A)} \times \frac{\textbf{\%Nitrogen}}{\textbf{100}} = \textbf{Total Nitrogen in green manure (lb/A)}$$

Source: Managing Cover Crops Profitably, SAN, 1998

Cover Crop	Purpose									Other Roles & Characteristics										
	Reduce Erosion	Increase SOM	Recycle Nutrients	Fix Nitrogen Save Energy	Improve Biodiversity	Suppress Weeds	Remove Excess Soil Moisture	Loosen Topsoil	Reduce Subsoil Compaction	Grazing Potential	Living Mulch	Broadcast Interseed	Companion Crop	Nurse Crop	Reduce Soil Diseases	Rapid Growth	Drought Tolerant	Flooding Tolerant	Shade Tolerant	Reseeds (Potential Weed!)
Cool-Season Grains																				
Winter Rye (Common)	✓+	✓+	✓+			✓+	✓+	✓+		✓–		✓		✓	✓	✓	✓	✓–	✓	✓
Winter Rye (Aroostook)	✓+	✓+	✓+			✓+	✓+	✓+		✓–		✓		✓	✓	✓+	✓	✓–	✓	✓
Triticale and Spelt	✓	✓+	✓			✓	✓+	✓	✓–	✓				✓+		✓	✓–			
Wheat	✓	✓+	✓			✓	✓+	✓	✓–	✓				✓+		✓	✓–		✓–	✓–
Barley	✓+	✓+	✓		✓–	✓	✓	✓	✓–	✓				✓+	✓–	✓	✓		✓–	✓
Oats	✓–	✓	✓–			✓+	✓	✓		✓–	✓–	✓–	✓+	✓+	✓–	✓+		✓–		
Warm-Season Grains																				
Buckwheat		✓–	✓+		✓+	✓+		✓					✓+	✓		✓+				✓+
Sorghum/Sudangrass	✓+	✓+	✓+		✓–	✓+	✓–	✓–	✓+	✓					✓	✓+	✓+	✓–	✓–	✓–
Japanese/Foxtail Millet	✓	✓+	✓			✓+		✓		✓+				✓		✓	✓+			✓–
Pearl Millet	✓	✓+	✓			✓+		✓		✓–						✓	✓+			✓–
Teff	✓+	✓	✓–			✓–		✓+		✓+	✓+	✓–	✓–	✓			✓+			
Legumes																				
Red Clover	✓–	✓	✓	✓	✓+	✓–	✓	✓–	✓	✓+		✓+	✓+					✓–	✓	
White or Alsike Clover	✓	✓		✓	✓	✓	✓	✓		✓+	✓	✓	✓				✓–	✓	✓	✓+
Berseem Clover	✓	✓+	✓+	✓+	✓–		✓+	✓		✓+	✓+	✓	✓	✓		✓+	✓–	✓–	✓	
Sweetclover	✓	✓+	✓+	✓+	✓+	✓	✓	✓+	✓+	✓						✓–	✓+			✓–
Crimson Clover	✓	✓		✓	✓+		✓–	✓–		✓+		✓+	✓+			✓–			✓	✓+
Subterranean Clover	✓	✓		✓	✓	✓+	✓+	✓–		✓	✓+	✓+	✓+			✓–	✓	✓–	✓	✓+
Alfalfa	✓	✓+		✓+	✓		✓		✓+	✓+										
Hairy Vetch	✓–	✓+	✓–	✓+	✓	✓	✓	✓	✓–	✓–	✓–	✓	✓		✓–		✓–		✓–	✓–
Chickling Vetch	✓	✓	✓–	✓+	✓–	✓	✓	✓		✓+	✓	✓	✓				✓–		✓–	✓–
Field Pea	✓	✓		✓+	✓		✓	✓		✓			✓+	✓	✓	✓	✓–			
Soybean	✓–	✓		✓+				✓		✓			✓+				✓			
Cowpea	✓+	✓	✓–	✓+	✓	✓+		✓	✓–	✓–			✓			✓	✓		✓–	
Brassicas																				
Radish or Turnip	✓	✓	✓+			✓+		✓–	✓+	✓–		✓	✓–			✓			✓–	✓–
Mustard or Canola	✓	✓	✓		✓–	✓–		✓		✓–		✓	✓–	✓–	✓+	✓	✓		✓–	✓+
Arugula	✓	✓–	✓–					✓				✓			✓+	✓			✓–	✓–
Grasses																				
Annual Ryegrass	✓+	✓+	✓+			✓+	✓+	✓+		✓+	✓	✓+	✓+	✓+	✓–	✓		✓	✓	✓+
Perennial Ryegrass	✓+	✓+	✓+			✓	✓+	✓+		✓+	✓	✓+	✓	✓	✓–	✓		✓	✓	✓
Orchardgrass	✓+	✓+	✓–			✓	✓+	✓		✓+		✓				✓		✓	✓–	✓
Timothy	✓+	✓+	✓–			✓	✓+	✓		✓		✓–						✓–		✓

Rating: Above Average (✓+); Average (✓); Below Average/Unknown (✓–). Blank = Not Recommended

	Seeding Rate (lbs/acre)		Seeding Depth	Planting Season								Termination Method				
Cover Crop	**Broadcast**	**Drilled**	**Inches**	**Spring**	**Early Summer**	**Summer**	**Early Fall**	**Fall**	**Late Fall**	**Dormant**	**Frost**	**Mow**	**Till**	**Crimp**	**Frost**	**Winter**
Cool-Season Grains																
Winter Rye (Common)	150	110	1-2				✓	✓+				✓	✓	✓+		
Winter Rye (*Aroostook*)	150	110	1-2				✓	✓+	✓			✓	✓	✓+		
Triticale and Spelt	150	110	1-2				✓	✓+				✓	✓+	✓		
Wheat	160	120	½-1½	✓+			✓+	✓+				✓	✓+	✓		
Barley	160	120	1-2													
Oats	140	100	½-1½	✓+			✓+			✓–	✓–	✓–	✓+	✓		✓
Warm-Season Grains																
Buckwheat	90	70	½-1½		✓+	✓+						✓	✓+	✓+	✓	✓+
Sorghum/Sudangrass	50	35	½-1½		✓+	✓+							✓		✓	✓+
Japanese/Foxtail Millet	35	25	½-1½		✓	✓							✓		✓	✓+
Pearl Millet	30	20	¼-½		✓	✓						✓	✓	✓	✓	✓+
Teff	10	8	0-¼		✓	✓							✓		✓	✓+
Legumes																
Red Clover	15	10	¼-½	✓+			✓+			✓	✓		✓			
White or Alsike Clover	12	8	¼-½	✓+	✓		✓+			✓	✓		✓			
Berseem Clover	20	15	¼-½	✓+	✓+	✓	✓–			✓–	✓–		✓–		✓–	✓
Sweetclover	20	15	¼-½	✓			✓			✓–	✓–	✓–	✓			
Crimson Clover	30	20	¼-½	✓+	✓+	✓	✓			✓–	✓–	✓	✓	✓+		✓–
Subterranean Clover	30	20	¼-½	✓	✓+	✓							✓–		✓–	✓
Alfalfa	20	15	¼-½	✓+			✓						✓			✓–
Hairy Vetch	35	25	½-1½				✓+			✓–	✓–	✓–	✓–	✓+	✓–	✓
Chickling Vetch	70	50	½-1½	✓+	✓	✓–				✓–	✓–	✓–	✓–	✓		✓
Field Pea	140	100	1-3	✓+	✓		✓+					✓+	✓+	✓		✓
Soybean	120	90	1-2	✓	✓							✓	✓+	✓–		✓
Cowpea	140	100	¾-1½		✓	✓+						✓–	✓+	✓–	✓–	✓
Brassicas																
Radish or Turnip	15	10	¼-½	✓+	✓		✓+			✓	✓	✓	✓+	✓	✓–	✓
Mustard or Canola	15	10	¼-¾	✓+	✓		✓+			✓	✓	✓–	✓	✓	✓–	✓
Arugula	4	3	¼-½				✓+						✓+			
Grasses																
Annual Ryegrass	30	20	0-½	✓+	✓	✓–	✓+			✓+	✓+	✓	✓+			✓-
Perennial Ryegrass	35	25	0-½	✓+		✓–	✓+			✓	✓		✓+			✓-
Orchardgrass	20	15	0-½	✓+		✓–	✓+			✓	✓		✓+			
Timothy	15	10	0-½	✓+		✓–	✓+						✓+			

Reliability: Above Average (✓+); Average (✓); Below Average/Unknown (✓–). Blank = Not Recommended

Many farmers mix two or more types of cover crops to maximize the benefits of each. Using both grasses and legumes can give you better ground cover, biomass and nitrogen production, weed control, tolerance to adverse conditions, different forage options, diversity of beneficial insects attracted and better response to variable soil characteristics. Whereas a cover crop mix may have higher seed costs and require more complicated management, it can also reduce your risk because of each component's different response to soil, pest and weather conditions. Some of the common cover crop mixes are listed below. The percent of each component and the seeding rate are given for the mixture's use as a monoculture.

Green Manure

One important way to add plant material to your soil to "manage crop nutrients and soil fertility or to improve soil organic matter content" is to till a green manure crop into the soil as discussed previously. Crop residues are also often incorporated into the soil for the same reason. This is done shortly after harvest or later when soil cover is needed until the next crop is planted. Weeds are another plant material added to the soil on organic farms during the process of mechanical weed control. The decomposing weeds also add organic matter and some nutrients to the soil.

This section of the standards concludes by stating that you may also use plant and animal materials to manage crop nutrients and soil

Common Cover Crop Mixes

Annual ryegrass(44%)/Alfalfa(23%)/Crimson clover(33%) seed at 15lb./A,

Annual ryegrass(44%)/Annual sweet clover (22%)/Crimson clover (34%) seed at 15 lb/A

Annual ryegrass (57%)/Crimson clover (43%) seed at 25 lb/A

Annual ryegrass (67%)/Mammoth red clover (33%) seed at 20 lb/A

Annual ryegrass (67%)/Medium red clover (33%) seed at 15 lb/A

Annual ryegrass (80%)/White clover (20%) seed at 15 lb/A

Annual sweet clover (33%)/Mammoth red clover (33%)/Arrowleaf clover (33%) seed at 10 lb/A

Crimson clover (33%)/Mammoth red clover (33%)/Alsike clover (33%) seed at 10 lb/A

Grain rye/Hairy vetch seed at 2 bu/A (112 lbs) Rye and 40 lb/A Vetch

Grain rye/Crimson clover seed at 2 bu/A (112 lbs) Rye and 15 lb/A Clover

Winter barley/Crimson clover seed at 2-3 bu/A (100 lbs) Barley and 15 lb/A Clover

Winter barley/Hairy vetch seed at 2-3 bu/A (100 lbs) Barley and 40 lb/A vetch

Winter barley/Mammoth red clover seed at 2-3 bu/A (100 lbs) and 10 lb/A Clover

Source: The New Farm's Cover Crop Guide, 1988

fertility. This topic will be addressed in more detail in the next section, including *§205.203(c)(d) and (e),* below.

Manure, Compost, and Mulch

The use of animal materials, raw and composted manure and bedding in your fertility management program is easier if animals are part of your organic operation. In an effort to reduce the need to purchase off-farm fertility inputs, many organic farmers have mixed operations raising livestock and growing crops. Livestock animals are not very efficient at extracting nutrients from the food they eat, so their manure usually contains a significant portion of the original nutrients in the feed. To give you a sense of the relative nutrient values of different types of manure see the chart below.

In this section we will discuss some materials that you may consider to be components of compost. The NOP has a very distinct definition for compost that may or may not align with how you've previously thought of this common input. Let's quickly break down the differences between these materials

Raw manure

This can be used only under certain circumstances due to food safety concerns. It can be applied to land used for a crop not intended for

Animal	Type	Size (lb)	Manure (ft3/day)	Water (%)	N (%)	P_2O_5 (%)	K_2O (%)
Dairy Cattle	Lactating Cow	1400	2.4	88	0.82	0.42	0.48
	Dry Cow	1400	1.8	88	0.5	0.2	0.4
	Heifer	750	1	88	0.23	0.07	0.22
Beef Cattle	Calf	450	0.42	92	0.14	0.1	0.11
	Cow	1000	1	88	0.31	0.19	0.26
Swine	Nursery	25	0.4	89	0.02	0.01	0.01
	Lactating	375	.36	90	0.18	0.13	0.14
	Boar	350	0.12	91	0.05	0.04	0.04
Sheep		100	0.06	75	0.04	0.02	0.04
Poultry	Layer	4	0.004	75	0.0035	0.0027	0.0016
	Broiler	2	0.003	74	0.0023	0.0014	0.0011
	Turkey	20	0.014	75	0.013	0.011	0.0054
Horse		1000	0.8	78	0.28	0.11	0.23

*Phosphate (P_2O_5) =2.29xP, Potassium (K_2O)=1.21xK

Note: Values do not include bedding. Use for planning purposes only. Actual nutrient content can vary + or - 30% from table values.

Source: *MWPS-18 Manure Management System Series* University of Missouri Extension

human consumption without any specific application time restrictions. However, when it is being applied to land used for growing crops for human consumption, a producer must take care in application times to ensure the crop is not harvested too close to the application time. So for crops whose edible portion has direct contact with the soil (such as potatoes or greens), raw manure must be incorporated into the soil not less than 120 days prior to the harvest. For crops whose edible portion does not have direct contact with the soil (such as corn), raw manure must be incorporated into the soil not less than 90 days prior to the harvest. This is one reason why it's important to keep accurate field activity records.

Raw manure used in any other way than listed above has to be composted first before it can be used as a fertility input on an organic farm. Composting is a method to decompose organic matter (manure, bedding, crop residues, etc.) that relies on microorganisms and the presence of oxygen. Besides being a good way to recycle nutrients on the farm, there are many advantages to using compost over raw manure. With a lower density (the volume of raw manure is decreased by 50-60% during composting) compost is much easier to handle and has fewer odor and pollution problems. Compost improves soil quality by stimulating soil organisms and adding organic matter. Raw manure can create an imbalance of nutrients, temporarily disrupting soil life. Compost releases nutrients in the soil more slowly than raw manure and is usually less acidic. Many of the weed seeds, pathogens and insect pest eggs that are found in raw manure are destroyed during the compost process. Beneficial bacteria in the compost have been shown to reduce the incidence of soil born diseases. Using compost is a great way to build and maintain your soil fertility.

Compost

Under the NOP, compost must be produced in a very specific manner. The standards require that "compost" is produced through a process that meets the following requirements:

- Initial Carbon to Nitrogen (C:N) ratio of between 25:1 and 40:1;

  AND

- If using an in-vessel or static aerated pile system (rather uncommon): Temperatures between 131 degrees F and 170 degrees F must be maintained for 3 days;

  OR

- If using a windrow system (most typical): Temperatures between 131 degrees F and 170 degrees F must be maintained for 15 days during which time, the compost must be turned a minimum of 5 times.

Compost Source Material	C:N
Dairy manure	20:1
Sheep manure	14:1
Poultry manure	10:1
Vegetable wastes	12:1
Straw	80:1
Corn stalks	60:1
Leaves	45:1
Alfalfa	13:1
Grass Hay	80:1
Rotted sawdust	200:1
Raw sawdust	500:1

Source *Organic Field Crop Handbook*, COG, 2001

There are different methods farmers can use to make compost on their farms. The success of each of these methods is determined by the quality of the source materials and the conditions under which the process is conducted. Along with manure and bedding material, any other organic material can be composted. Raw manure is high in nitrogen while most plant material is higher in carbon. Finding the right balance of material can be tricky and is part of the "art" of making compost. The chart at right gives the C:N ratio for materials commonly used in on-farm composting systems.

The amount of water in your compost is also important. If there is too much water the decomposition process will not occur properly. If there is not enough water the microbes can't survive to do their work. The moisture content of compost ideally should be 50%.

The composting process can generate much heat. The standards give you a temperature range of 131º - 170º F, that must be maintained for various periods of time depending on the method used. It is difficult to rapidly change the temperature of your compost pile if it gets too high or too low. For this reason, and since many nutrients are lost at the higher temperatures, try to keep the temperature of the compost between 140º - 158º F. Periodic turning of your compost helps regulate the temperature by providing oxygen for the microbes helping to ensure that all the organic matter is broken down and that the temperature does not get too high.

A form of passive composting, **static aerated passive** composting, can be done on a large scale. In this case, the material to be composted is laid out in windrows, long, narrow, flat rows, that are aerated. The windrows are built on perforated, open-ended pipes and laid in beds of peat moss, chopped straw or other coarse material. The pipes are either laid perpendicular to the length of the windrow at 1 foot intervals or one long pipe with a blower attached to one end and a cap at the other runs the length of the windrow. Windrows can be any length that the farmer finds manageable. Having the right mix of materials in terms of C:N (25:1 to 40:1) and proper moisture content (50%) are also essential to success in aerated passive composting. Additionally, the compost must reach and be maintained within the required temperature range for 3 days to make sure that any human pathogens (such as E. coli), weed seeds and plant pathogenic organisms are killed. Static aerated passive composting takes about 2 ½ to 3 months to complete.

A more costly option for composting manure is an **in-vessel** system. As the name suggests, this type of composting occurs in a large bin or a small building and uses forced aeration and mechanical turners. One version of this type of composting uses a channel composter. Here the manure and other materials are placed in channels and are

turned regularly by a machine that moves above the compost. Again, the standards state that the compost must reach and be maintained within the required temperature range for 3 days for safety purposes. In-vessel composting is relatively quick (2-3 weeks), limits the amount of pest and odor problems, and requires little supervisory labor. However, this method is expensive to set up and may require a higher level of knowledge and skill in composting.

The most common type of on-farm composting is **windrow** composting. Here, the manure and other materials are placed in windrows similar to those used in aerated passive composting but the windrows are made on bare soil (heavy clay is the best) or on concrete pads. A concrete pad constructed with a slope is helpful to collect any liquid leaching from the windrow. The standards stipulate a 15 day period that the compost pile must be kept within the required temperature range of 131º - 170º F and that the compost must be turned at least five times for this method of composting. A front-end loader can be used to turn the windrow if the temperature gets too low or too high, if flies become a problem, or just to speed up the process. Commercially available compost turners are also available to do this work. The composting process using windrows usually takes three months to complete

The final stage of composting, no matter which method is used, is the curing phase. This phase begins once the composting pile cools for a sustained period of time. The temperature of the compost typically remains above 50º F. The curing process helps bring compost to full maturity and improve its quality. During curing, compost is stabilized so that it will no longer react to turning or watering by a substantial rise in temperature. The curing phase is important in the composting process because it helps to further decompose and stabilize potentially toxic organic acids and resistant compounds. It is important that compost is mature before applying it to the soil because immature compost can rob plant roots of oxygen as it further breaks down and stunt plant growth by introducing harmful materials that have not been fully decomposed. During curing, the compost can be piled higher than active compost piles and is covered with a material that allows for air circulation and protects from nutrient leaching through exposure to rain water. The pile can be left alone until curing is complete since it does not need to be turned. While the NOP standards have very specific compost requirements, it can be helpful to know that the curing process is normally complete after 1-2 months but can take up to one year depending on the ingredients used and rate at which they are added.

When the compost is finished, it should be brownish-black in color, have a crumbly texture, a rich, earthy smell, and have a temperature

close to the ambient air temperature. For best results, use compost soon after it is ready. The nutrients will mineralize and become less available for uptake by your crops the longer the compost sits. The amount of nutrients in your compost will vary, but in general, mature compost contains 1.5% nitrogen, 0.5% phosphorus, and 1.0% potassium by dry weight.

One final note about composting, It will be important to keep accurate records of your compost production, including the date it was started, the method you used, the materials used (including any inoculants) and the estimated C:N ratio when you start. Then, be sure to record the date, temperature and whether the pile was turned each time you check it. Finally, you will need to know where the finished product is used so it can be included in your field activity records.

Mulch

All other plant-based composts that do not contain animal materials are considered uncomposted plant material or "mulch" and do not carry any restrictions.

Other Nutrient Management Tools

Sometimes, especially as you begin to farm organically, you may find that your soil fertility management practices are not providing all of the nutrients you need to grow a healthy crop. The standards allow you to apply certain substances and products to your fields to help build and maintain healthy, fertile soil. A good place to begin is with a Natural Resource Conservation Service (NRCS) Nutrient Management Plan. Call the NRCS Distribution center at 888-526-3227 to reach your local NRCS office. As with the plant and animal material you apply, these products must not contaminate your crop environment with excess nutrients, disease causing organisms, heavy metals or residues of any prohibited substance.

Excess nutrient runoff is a growing concern and must be managed in an environmentally responsible manner. From the National List of synthetic substances allowed for use on organic crops, the fertility amendments include: aquatic plant extracts, elemental sulfur, humic aids from naturally occurring deposits, magnesium sulfate (when soil shows a deficiency), micronutrients (soluble boron, sulfates, carbonates, oxides or silicates of zinc, copper, iron, manganese, molybdenum, cobalt and selenium), liquid fish products and vitamins B1, C and E. Other soil amendments include mined substances with low solubility like lime, gypsum, rock phosphates, greensand and aluminum silicate, and highly soluble mined substances like potassium chloride (permitted if it is applied in a manner that does not allow the buildup of chlorides in the soil) and sodium nitrate. It should be noted that most commercial sources of potassium chloride are synthetic and not allowed in organic

production. Ash from burned plant or animal material can be applied as a fertility input as long as it contains no prohibited synthetic substances or was produced as a way to get rid of crop residues. Other allowed fertilizers and amendments not specifically mentioned in the standards include leaves, seed meal, blood meal, bone meal, feather meal, bat guano, kelp seaweed extract, crabshell meal and microbial inoculants and enzymes that are not GMO-derived or do not contain GMOs. Finally, the standards list the fertility inputs that are specifically prohibited in organic production. Those inputs include synthetic commercial fertilizers or any fertilizer or compost that contains a synthetic substance not on the allowed list of synthetic substances, and sewage sludge (also known as biosolids).

NOP Standards

§205.203 Soil fertility and crop nutrient management practice standard.

(a) The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of soil and minimize soil erosion.

(b) The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials.

(c) The producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances. Animal and plant materials include:

(1) Raw animal manure, which must be composted unless it is:

(i) Applied to land used for a crop not intended for human consumption;

(ii) Incorporated into the soil not less than 120 days prior to the harvest of a product whose edible portion has direct contact with the soil surface or soil particles; or

(iii) Incorporated into the soil not less than 90 days prior to the harvest of a product whose edible portion does not have direct contact with the soil surface or soil particles;

(2) Composted plant and animal materials produced through a process that:

(i) Established an initial C:N ratio of between 25:1 and 40:1; and

(ii) Maintained a temperature of between 131 °F and 170 °F for 3 days using an in-vessel or static aerated pile system; or

(iii) Maintained a temperature of between 131 °F and 170 °F for 15 days using a windrow composting system, during which period, the materials must be turned a minimum of five times.

(3) Uncomposted plant materials. …

(d) A producer may manage crop nutrients and soil fertility to maintain or improve soil organic matter content in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances by applying:

(1) A crop nutrient or soil amendment included on the National List of synthetic substances allowed for use in organic crop production;

(2) A mined substance of low solubility;

(3 A mined substance of high solubility: Provided, That, the substance is used in compliance with the conditions established on the National List of nonsynthetic materials prohibited for crop production;

(4) Ash obtained from the burning of a plant or animal material, except as prohibited in paragraph (e) of this section: Provided, That, the material burned has not been treated or combined with a prohibited substance or the ash is not included on the National List of nonsynthetic substances prohibited for use in organic crop production; and

(5) A plant or animal material that has been chemically altered by a manufacturing process: Provided, That, the material is included on the National List of synthetic substances allowed for use in organic crop production established in §205.601.

(e) The producer must not use:

(1) Any fertilizer or composted plant and animal material that contains a synthetic substance not included on the National List of synthetic substances allowed for use in organic crop production;

(2) Sewage sludge (biosolids) as defined in 40 CFR part 503; and

*(3) Burning as a means of disposal for crop residues produced on the operation: Except, That, burning may be used to suppress the spread o*f disease or to stimulate seed germination.

SEED AND PLANTING STOCK

§205.204 Seeds and planting stock practice standard

Explanation of the Standards

The general rule here is that you must use organic seeds (including cover crop seed), annual seedlings and planting stock. However, if an equivalent organic variety is not "commercially available," then you are allowed to use non-organic (untreated and non-GMO) seed, annual seedlings and planting stock. You may determine that organic seed is not "commercially available" based on appropriate form (such as pelleted or non-pelleted), quality (a variety that performs well in your growing conditions), or quantity. Most certifiers require a search of three seed suppliers that carry organic seed to see if organic seed meeting those needs for form, quality, and quantity is available. When making comparisons for an equivalent variety, you may consider factors such as comparable growing habits, days to maturity, disease resistance, flavor, milling qualities, etc. You may also use a test plot to evaluate organic varieties for equivalency with other, non-organic varieties that may work well on your farm. Cost of the seed or shipping costs are not considered a valid reason for choosing to use non-organic seeds.

All seedlings used to produce certified organic crops must be organically grown except in very rare circumstances (NOP §205.204(a)(3) & (a)(5)). It may be acceptable for seedlings to be grown organically in an off-farm facility, but that facility must be included in the OSP and inspected each year. Annual planting stock is subject to the same rules as seed. Examples of annual seedlings are: onion seedlings (with green tops), tomato and pepper starts, and brassica seedlings. Onion sets, sweet potato slips, seed potatoes, cloves of garlic, and mushroom spawn are all examples of planting stock.

Documentation of Seed and Planting Stock Search and Purchase

If you are using non-organic seed or planting stock, make sure you document the search you conduct. Many certifiers have a form for you to fill out to document this search. If you document the search and do not find an equivalent variety, it's important to keep documentation that the seed you are purchasing is both 1) untreated, and 2) non-GMO.

Edible Sprouts

If you are producing edible organic sprouts, the seed must be organic-no exceptions.

NOP Standards

§205.204 Seeds and planting stock practice standard

(a) The producer will be required to use organically grown seeds, annual seedlings, and planting stock: Except, that,

(1) Non-organically produced, untreated seeds and planting stock may be used to produce an organic crop when an equivalent organically produced variety is not commercially available, Except, that, organically produced seed must be used for the production of edible sprouts;

(2) Non-organically produced seeds and planting stock that have been treated with a substance included on the National List of synthetic substances allowed for use in organic crop production may be used to produce an organic crop when an equivalent organically produced or untreated variety is not commercially available;

(3) Non-organically produced annual seedlings may be used to produce an organic crop when a temporary variance has been granted in accordance with §205.290(a)(2);

(4) Non-organically produced planting stock to be used to produce a perennial crop may be sold, labeled, or represented as organically produced only after the planting stock has been maintained under a system of organic management for a period of no less than 1 year; and

(5) Seeds, annual seedlings, and planting stock treated with prohibited substances may be used to produce an organic crop when the application of the materials is a requirement of Federal or State phytosanitary regulations.

CROP ROTATION

§205.205 Crop Rotation Standard

Explanation of the Standards

One of the important management tools that organic farmers have is their crop rotation. A crop rotation is a planned sequence of crops on the same piece of land over time. A well designed crop rotation can help maintain and improve soil quality, help with pest and disease management, provide many necessary crop nutrients, maintain soil and above-ground biodiversity, break up weed cycles, provide a defense against erosion and maximize water use.

Note: Much of this section has been adapted from the Organic Field Crop Handbook, Canadian Organic Growers

The best combination of crops to use in your rotation will be unique to your farm and will be dependant upon the climate; the condition of the soil; existing pest, disease and weed pressures, and the marketability of the crops you choose. You may not even use the same rotation for all of your fields because of variations in soil type, topography and micro-climate. Some of the characteristics of a good crop rotation include:

- Crops adapted to your local climate and soils;
- A balance between nitrogen fixing crops and nitrogen demanding crops;
- Both deep and shallow rooted crops;
- Cover crops to keep the soil protected when needed;
- Crops with different pest and disease susceptibility;
- An identified market or use for all crops produced; and
- Compatibility with the your management system and labor availability.

The crop rotation standard states that your crop rotation needs to maintain or increase the organic matter content of your soil, serve as a pest management tool for your annual and perennial crops, improve deficient or manage excess plant nutrients, and help control soil erosion. Your choice of crops to include in your rotation and the order in which they are planted will help you accomplish what is listed in the standards.

To maintain the existing or increase the amount of organic matter in your soil:

- Include sod-forming crops such as perennial grasses (rye) and legumes (alfalfa). Due to their extensive root system, sod crops in

rotation build soil organic matter whether they are used as green manures or harvested;

- Include green manure crops to add organic matter and nutrients to the soil.

To suppress insect pests, diseases and weeds:

- Include crops in different families to break up pest and disease cycles;
- If disease or soil borne pest problems exist in any of your fields, then susceptible or host crops should be included in the rotation for that field only once every four years. For example, if you had a problem with wireworms you would not follow corn with wheat, spring rye, potatoes or sunflowers, all of which are susceptible but you might use oats, barley, sweet clover or alfalfa;
- Following a cool season crop with a warm season crop allows you to alternate your tillage date so that in one year you take care of the early germinating weeds and the late germinating weeds in the next;
- Slow growing crops are more susceptible to weed invasions so they should follow crops that suppress weeds such as allelopathic crops (fall rye, barley and sunflower) or crops that grow a dense canopy quickly;
- After a green manure plowdown or compost application do not use a light feeding crop (legumes) because weed growth will be encouraged by the excess nitrogen in the soil. Heavy feeders like corn, winter wheat or vegetable are best used here;
- Including row crops in your rotation gives you a chance to use mechanical weed control like tillage;
- Use perennial forages and mixed hay stands because they compete well with weeds;
- Include cover crops in your rotation to minimize the amount of time the soil is bare and thus available for weed growth.

To improve deficient or control excess plant nutrients:

- Include a green manure crop in the rotation;
- Alternate nitrogen fixing crops (legumes such as peas, soybeans, alfalfa, clovers) followed by high nitrogen demanding crops (corn, winter wheat, vegetables);
- Include cover crops or use intercropping to avoid bare soil which is prone to erosion and nutrient leaching;
- Medium (spring wheat, oats, fall rye, winter barley) or light feeding crops (spring barley, flax, buckwheat, soybeans) should follow

heavy feeders (corn, sunflowers, hemp, potatoes, canola, winter wheat, spelt) in your rotation;

- Use a catch crop (a cover crop planted to take up excess nutrients in the soil) to prevent extra nutrients from leaching.

To prevent soil erosion:

- Include cover crops in the rotation to help provide continuous soil cover;
- Use a mix of crops and cultural practices that minimizes the amount of time that soil is bare.

There are many potential cash crops, cover crops and forages to include in your rotation. You will want to design a rotation that maximizes all of the benefits from using crop rotations while making sure that the rotation also fits well with your equipment and labor availability, your management style and the markets available for you to sell your products.

Row Crops Disrupt Disease Cycles

In organic field crop rotations some of the row crops commonly used are corn, soybeans, buckwheat, canola, sunflowers, and potatoes. Row crops included in rotations allow for in-between row cultivation and so help break up weed cycles. In a rotation with cereals, row crops disrupt disease cycles since they are usually not susceptible to the same diseases.

- **Corn**, because of its high demand for nitrogen, is not recommended for use in a transitional rotation. Corn is grown best after healthy, fertile soils are established and even then can require a heavy pre-application of compost or to be grown following the incorporation of a nitrogen fixing green manure. To reduce the risk of soil erosion when growing corn some farmers underseed with ryegrass at cultivation time. In a rotation corn is usually followed by a grain legume like soybeans.
- **Soybeans** are good nitrogen fixers but do not add much organic matter to the soil and during the growing season leave the soil open for erosion. They can fix at least 130 lb/A of nitrogen and leave up to 27 lb/A for the following crop like winter wheat or spelt. Some farmers overseed their soybeans with a winter cereal late in the season to provide ground cover and to act as a catch crop to hold the nitrogen fixed by the soybeans. Soybeans do well grown after small grains, corn or clover.
- **Buckwheat** is included in rotations because it has few disease problems, can help with weed control since it is a fast growing smother crop and it can grow well in poor soils. However buckwheat must be managed properly or it can become a volunteer

problem in subsequent crops. Buckwheat that is grown for seed should not follow wheat, oats, barley or flax in order to keep the grain clean. After its harvest, buckwheat can be followed by a cover crop for the winter and a row crop like soybeans the following year to allow for cultivation to control volunteer buckwheat plants.

- **Canola** or rapeseed is a brassica, a relative of broccoli and cabbage, which is grown for the oil extracted from its seeds. After extraction, the remaining meal can be used as a high protein feed supplement for livestock. Canola is also included in crop rotations as a green manure catch crop where it works well to control weeds. In fertile soils, canola can do well following most cereal crops. It will also do well after alfalfa and clover as long as sclerotinia is not a problem. Canola should only be included in a rotation once every four years.
- Like canola, **sunflowers** are grown for the oil in their seeds. It is also used as livestock feed and green manure. Because of their size, sunflowers are used as a windbreak too. Sunflowers grow well after cereal crops and potatoes. Cereals can also follow sunflowers in a rotation. Cover crops can be overseeded in sunflowers at the time of the last cultivation for weeds.
- **Organic potatoes** are in high demand as a food crop and as seed potatoes. If potatoes are included in your rotation they should not follow crops that are hosts to potato disease like red clover a host for verticillium wilt. Brassicas, sudangrass, cowpeas, field peas and oats are beneficial preceding crops. A cover crop should be established after potatoes to prevent erosion.

Cereal Crops in Rotations

Some cereal crops used in organic field crop rotations are barley, oats, wheat, rye and spelt. Cereals that are grown in the fall and winter (barley, rye, spelt and wheat) protect the soil from erosion over the winter and are usually planted in the early fall when the soil is dry resulting in less compaction problems. Harvest for winter cereals is in mid- to late summer allowing a niche for cover crops to be seeded thereafter. Winter cereals compete better with weeds, produce more straw and are heavier feeders compared to spring cereals. Cereals grown in the spring (barley, oats and wheat) do well when planted in the early spring on soils that drain well and have good fertility. Spring cereals are commonly grown in areas where winter cereals are not.

- **Organic barley** is used primarily as an animal feed but there is a small amount used for human consumption. As a spring crop barley is used at the end of a grain rotation but it should not follow wheat. Because of its open canopy barley is used as a nurse crop

for forages or clover. Barley has a short growing season, is a light feeder and after its early growth stage requires less water than most other grains.

- **Oats** are quick growing annuals that do well in cool, wet weather. They are grown for human consumption and livestock feed but they also have the side benefits of improving soil quality and providing good weed control. Oats, when overseeded with legume, used as a green manure or harvested with the residue left on the soil, can significantly increase soil organic matter. Oats are also used as catch crops and nurse crops for perennial forages and legumes like clover, sweet clover, alfalfa, peas and lentils.
- **Wheat** in the US is primarily grown as a winter crop. As a spring crop it is generally limited to the northern plains states, although a few organic farmers in Ohio are experimenting with growing spring wheat. Wheat has high nitrogen demands and so should not follow another heavy feeder like corn in a rotation. It usually follows a legume crop such as clover, alfalfa or soybeans. Since winter wheat is harvested before the end of summer it creates a niche in the rotation for a cover crop. A spring grain like oats can follow in the spring of the next year.
- **Rye** is a versatile and hardy crop. It is grown as a grain crop, green manure, catch crop, forage crop and cover crop. Rye needs only moderately fertile soils to grow well. Rye is used in many different stages in a rotation depending upon its use. Follow rye with oats, barley, potatoes, soybeans or buckwheat. All will benefit from the low weed populations left from the rye because of its allelopathic effect on weeds.
- **Spelt** is a valuable cash crop since the grain is used as an alternative to wheat in foodstuffs. Spelt is an adaptable crop which has good disease resistance and tolerates poor drainage and infertile soils. It does well after the incorporation of a green manure and following sod, red clover, soybeans, oats or mixed grains. Some farmers grow spelt as an alternative to winter wheat.

Cover Crop Niche

Cover crops will fit into specific niches in your crop rotation since they are not usually planted as a cash crop. Once you have figured out which of the main crops you will include in your rotation you can fill in any gaps with a cover crop used as such or as a green manure, living mulch or catch crop. Examples of some of the niches where a cover crop could be used include:

- **During winter fallow** – The cover crop is seeded after harvest of the cash crop or a shade tolerant cover crop is underseeded into the cash crop before harvest;

Species	Advantages	Disadvantages
Annual Ryegrass	Adapts to many soil types; versatile; rapid establishment	Low heat tolerance
Barley	Inexpensive; easy to grow; can be a nurse crop for a forage or legume stand	
Oats	Low cost; reliable; rapid growth in cool weather; improves productivity of legumes when planted in mixtures	High lodging potential; susceptible to diseases and insect pests; winter kills
Rye	Very cold tolerant; grows in poor soil conditions; can be an over-winter cover crop after corn or before or after soybeans, fruits or vegetables	Re-growth may occur if followed by small grains like wheat or barley
Winter Wheat	Can be grazed in spring before tiller elongation; good nutrient catch crop and nurse crop for legumes.; can be used as a spring annual	Slow to mature; incorporated residue can tie up N for following crop
Buckwheat	Grows on many types of soil; quick to mature; planted in between early and late vegetable crops or after the harvest of winter wheat or canola	Not frost or drought tolerant; limited growing season
Sorghum-Sudangrass Hybrids	Tall; fast growing; heat and drought tolerant; widely adapted to many growing conditions	Heavy N-feeder; incorporated residue can tie up N for following crop
Berseem clover	Fast growing; good nurse crop for oats; can be over-seeded into spring vegetables	
Cowpeas	Thrive in hot, moist areas; good source of N for fall planted crops; attracts beneficial insects; easy to establish,	Not tolerant of frost or water logging
Crimson clover	Grows rapidly; tolerates shade and drought once established,	Low tolerance for heat and drought
Field peas	Grows quickly in cool weather; versatile	Shallow root system; sensitive in hot and humid conditions
Hairy vetch	Very cold and drought tolerant; adapted to a wide range of soil conditions; does well before early-summer planted crops or after winter grain harvest	Slow to establish; requires much P & K for maximum growth; can harbor pest
Medics (Bur, Snail, Black)	Tolerate drought; good fit in long rotations of forages and cash crops; provide good grazing	Well adapted to limited area; do not tolerate excessive soil moisture
Red clover	Can tolerate wet soil and shade; well adapted to humid conditions	Slow initial growth; high P &K requirements; can create volunteer problems; has several insect & disease problems
Subterranean clover	Different cultivars defined by moisture preference and time to maturity; have been used in orchards & pastures inter-seeded with wheat, field corn & sweet corn	Release allelopathic compounds that suppress germination of some crops; N-leaching from early and abundant nodulation
Sweetclovers	Grows well on marginal soils and in hot weather; traditionally used as a green manure; inexpensive; drought tolerant once established; acclimated to wide range of environments; good grazing	Can deplete soil moisture; not a great competitor with weeds
White clover	Grows well in most areas; good tolerance for heat, flooding, drought, high traffic and shade; low-maintenance	Susceptible to several diseases and insect pests; requires good nutrient management

- **During summer fallow** – The cover crop provides ground cover in vegetable rotations between early and late season crops or after the harvest of a winter grain until next crop is planted;
- **Small grain rotation** – Seed a winter annual cover crop with a spring grain;
- **Year-long fallow** – The cover crop is kept in the field for a year or longer to help improve soil quality;
- **Living mulch** – The cash crop is sown into the existing cover crop for erosion and weed control and improved nutrient cycling. This can work well as long as there is sufficient moisture for both crops, not in a drought;
- **Strip crops** – Alternate rows of crops with rows of cover crops, rotate crops the next year. If beds are used, rotate out every third or fourth bed and plant a soil building cover crop.

The charts on pages 42,43, and 59 gives some of the advantages and disadvantages of using the cover crops in your rotation.

Forages and Soil Quality

Forages, crops grown for livestock feed, are often found in organic rotation. Even on farms that do not have livestock, forages are grown because they are effective at building and maintaining soil quality, managing weeds and breaking pest and disease cycles. Their dense root systems add organic matter and increases water infiltration in the soil. Forage legumes like clover, alfalfa and vetch fix nitrogen, upwards of 180 lbs/A. However, if the hay made from the forage crop is sold off-farm, you will lose any of the nutrient benefits and may deplete your soil of nutrients for use by future crops. When choosing a forage crop for your rotation, you should take into account your intended use (livestock feed, soil conditioner, green manure), the current condition of your soil, and how long you intend to keep your forage stand in the field. A grass/legume mix can be a good option for many farms. The crops commonly used as forages are listed here.

Common Forage Crops

- **Alfalfa** – a high yielding perennial legume that provides a protein-rich feed. It is often grown in combination with grasses such as brome, timothy or orchard. If managed properly, stands can last 4-6 years.
- **Red Clover** – a short-lived (2-3 years) perennial legume that is usually grown with timothy grass when grown in combination. During the first year the red clover is commonly cut for hay or silage and then once more in the second year before it is incorporated as a green manure in the fall of that year. Double cut red clover reaches maturity faster and has high yields.

- **Alsike Clover** – a perennial legume similar to red clover but has lower yields. It is more tolerant of acid soils and excessive soil moisture than red clover. Alsike clover establishes quickly and is sometimes used as green manure in the first year when grown together with annual ryegrass or a small grain. It is sometimes planted with red clover to ensure a crop is established.
- **White Clover** – exists in different types with leaf sizes ranging from small to large. The medium leaf sized plants are the best nitrogen fixers and are harvested as silage or by grazing animals. The large leaf white clovers are taller and very productive but short lived. White clover is best used for haylage mixtures or pasture.
- **Birdsfoot Trefoil** – a forage legume used frequently in pastures. It is slow to establish but persists well after initial growth stage, even during hot dry summer weather and on infertile and poorly drained soils.
- **Sanfoin** – a good forage crop that provides a nutritious feed for livestock. It contains 25% protein and high levels of minerals. Sanfoin does not yield as well as alfalfa but it is more drought resistant and has higher levels of protein. It is recommended that a nurse crop be seeded with sanfoin when it is planted because it is slow to establish. Stands of sanfoin can last three to four years.
- **Annual Forage Grasses and Cereals** – include oats, triticale, wheat and annual ryegrass. Winter cereals can be grazed in the early spring and if the grazing pressure is light, still produce a grain crop. Cereals are easily made into silage and when used for forage can easily fit into a rotation because of their short growing season (6-8 weeks).
- **Corn** – a high yielding, heavy feeding, warm season grass. In an organic rotation it can be difficult to provide enough nitrogen to maximize corn yields, but using long rotations where corn is only planted once every five years helps. Corn can be grown for silage or used as a pasture crop to finish beef cattle or overwinter beef cows.

Rotations in Vegetable Production

Crops also need to be rotated in organic vegetable and fruit production systems. In developing a vegetable crop rotation, start by dividing your potential crops by family, since crops of the same family should not be grown in the same location successively. Then group together crops of the same general horticulture type. The crops in each group share some of the same cultural practices so that you could organize your rotations based on things like fertility needs or harvesting techniques. Some vegetable crops benefit from being planted near other vegetable crops. The practice of **companion planting** asserts that

Vegetable Family	Type	Compatible	Incompatible	Nitrogen use
Bean *Leguminosae*	Legume	Most vegetables and Herbs		Neutral
Beet *Chenopodiaceae*	Root Crop			Heavy Feeder
Broccoli *Cruciferae*	Brassica	Aromatic Herbs, Celery, Beets, Chard Onions, Spinach,	Dill, Strawberries, Pole Beans, Tomato	Heavy Feeder
Brussels Sprouts *Cruciferae*	Brassica	Aromatic Herbs, Celery, Beets, Chard Onions, Spinach,	Dill, Strawberries, Pole Beans, Tomato	Heavy Feeder
Cabbage *Cruciferae*	Brassica	Aromatic Herbs, Celery, Beets, Chard Onions, Spinach,	Dill, Strawberries, Pole Beans, Tomato	Heavy Feeder
Carrot *Umbelliferae*	Root Crop	Lettuce, Rosemary, Onion, Tomato, Sage	Dill	Light Feeder
Cauliflower *Cruciferae*	Brassica	Aromatic Herbs, Celery, Beets, Chard Onions, Spinach,	Dill, Strawberries, Pole Beans, Tomato	Heavy Feeder
Celery *Umbelliferae*	Greens	Onion, Brassicas, Tomato, Bush Beans		Heavy Feeder
Chard *Chenopodiaceae*	Greens			Light Feeder
Corn *Gramineae (Poaceae)*	Grain Crop	Potato, Beans, Pea, Cucumber, Squash	Tomato	Heavy Feeder
Cucumber *Cucurbitaceae*	Vine Crop	Beans, Corn, Pea, Sunflowers, Radish	Potato, Aromatic Herbs	Heavy Feeder
Eggplant *Solanaceae*	Fruit Crop	Beans, Marigold		Heavy Feeder
Garlic *Amaryllidaceae*	Root Crop			Light Feeder
Kale *Cruciferaee*	Greens			Heavy Feeder
Lettuce *Compositae*	Greens	Carrot, Strawberry, Radish, Cucumber		Heavy Feeder
Onion *Amaryllidaceae*	Root Crop	Beets Carrot, Lettuce, Brassicas	Beans, Peas	
Parsley *Umbelliferae*	Greens	Tomato, Asparagus		Heavy Feeder
P s *Umbelliferae*	Root Crop			Light Feeder
Pea *Leguminosae*	Legume	Carrots, Radish, Turnip, Cucumber, Corn, Bean	Onions, Potato	Neutral
Pepper *Solanaceae*	Fruit Crop			Light Feeder
Potato *Solanaceae*	Root crop	Beans, Brassicas, Corn, Horseradish	Pumpkin, Tomato, Squash, Cucumber, Sunflower	Light Feeder
Pumpkin *Cucurbitaceae*	Vine Crop	Corn	Potato	

Vegetable Family	Type	Compatible	Incompatible	Nitrogen use
Radish *Brassicaceae*	Root Crop	Pea, Lettuce, Cucumber		Heavy Feeder
Spinach *Chenopodiaceae*	Greens	Strawberry		Heavy Feeder
Squash *Cucurbitaceae*	Vine Crop	Corn	Potato	
Tomato *Solanaceae*	Fruit Crop	Onions, Asparagus, Carrot, Parsley, Cucumber	Potato, Brassicas	Heavy Feeder

Source: Companion Planting: Basic Concept and Resources, George Kuepper & Mardi Dodson, ATTRA (www.attra.org/attra-pub/complant.html)

certain combinations of crops are compatible and some incompatible. Avoiding the latter should be kept in mind when developing your vegetable crop rotation. Finally, learn the fertility needs of each crop so that you do not follow a heavy feeder plant like cabbage by another heavy feeder. The chart on page 62 lists many of the common vegetable crops, their family names, general horticulture type, the crops each is known to be compatible or incompatible with, and nitrogen use.

Rotations in Fruit Production

Crop rotations in organic orchards, vineyards and brambles do not involve switching the economic crop itself since all are trees or perennial plants that can bear fruit for many years. Crop rotations in organic fruit production involve diversifying the plants that grow around the crop. A diversity of plants grown on the orchard floor, between rows around the perimeter of the field can help to attract a wide range of beneficial insects to the area.

Legume cover crops can help improve soil fertility and structure. Cuttings from grasses grown between rows can serve as a weed suppressing mulch for the fruit crop and as it decays, organic matter and nutrients too. For instance, in apple orchards grasses are used as a cover crop because they go dormant during the heat of the summer, minimizing competition with the fruit crop for water and with proper fertility management, these grasses can also provide plentiful mulch. Grasses are also a good choice in apple orchards since the excess nitrogen provided by legumes can actually reduce fruit yields. A rotation of cover crops done for a year or more before the establishment of the fruit crop can improve soil quality and help to eliminate weeds.

Where to Start the Rotation in Your Fields

There are many ways to start your rotation during transition, or build upon your existing crop rotation, depending on the current use for the

field, the results of your soil tests, potential markets, and your long-term goals. No matter what you are currently growing in your transitional fields it is a good idea at some point during the first year to apply compost to stimulate biological activity.

Crop rotations are a key element in any organic production system. Developing the one that works best for you farm will take some experimenting and planning. Furthermore the sequence of crops you use during your transition period will probably not be the same once you become certified.

NOP Standards

§205.205 Crop Rotation Standard

The producer must implement a crop rotation including but not limited to sod, cover crops, green manure crops, and catch crops that provide the following functions that are applicable to the operation:

(a) Maintain or improve soil organic matter content;

(b) Provide for pest management in annual and perennial crops;

(c) Manage deficient or excess plant nutrients; and

(d) Provide erosion control.

CROP PEST, WEED, AND DISEASE MANAGEMENT

§205.206 Crop Pest, Weed, and Disease Management Practice Standard

Explanation of the Standards

A well-designed and healthy organic production system will do much to reduce most pest, weed and disease problems. However, when additional methods are needed, options including cultural, mechanical, and biological practices are available for use in an organic production system. When all other methods fail, there are substances approved for use as inputs for pest, weed and disease control.

Pest, Weed, and Disease Practices

Fostering a balanced agroecosystem is your best defense against pest problems in organic production. Few problems arise because things like insect pests, weeds and disease causing organisms are kept in check. Therefore, system practices like crop rotation and nutrient management are important tools to manage your pest problems. A good crop rotation increases the biodiversity on your farm and will be more likely to support a useful pest predator or parasite population. Crop rotations break up insect pest, weed and disease life cycles because the same crop is not planted year after year. For instance, oats grown after spelt and before barley or wheat can break up disease cycles common to spelt, wheat, and barley. Planting field peas before potatoes has resulted in less scab and few potato beetles for the potato crop. Planting mustard before onions or garlic minimizes nematode damage. Soybeans are a good crop to break the weed cycle in grain crops. A healthy crop which has received all the necessary nutrients is better able to withstand competition from weeds and attacks from insect pests and disease causing organisms (Phelen et al., 1995). Using the methods discussed in earlier sections to design a good crop rotation and to maintain a healthy and fertile soil which provides all of the necessary nutrients for your crop are two important steps in your pest, weed and disease management efforts.

Sanitation is another preventive measure important in your pest, weed and disease management plan. By cleaning equipment between fields, you can reduce the chance of transferring weed seeds or weed stolons and rhizomes that might be attached to cultivators. Most weed seeds in manure can be killed by composting the manure. Removing diseased or infested plants or fruits from the fields helps to prevent the spread of disease or insect pests. Additionally, removing or destroying potential overwintering or breeding sites can reduce the potential for some insect pests and diseases, especially in vining crops.

Cultural methods are another category of important pest, disease and weed practices. §205.206 lists choosing the most appropriate species of a crop for your site conditions and for resistance to any pest, weed or disease problems as an example of a cultural pest management practice. By choosing a species of crop that grows well in your area and is resistant to the most prevalent pest problems, you'll have fewer concerns during the growing season. There are other cultural practices to help you manage any potential pest problems you might have in your organic production system.

- Changing the date that you plant your crop from the norm can give the crop a competitive edge against weeds, allow time for tillage to control early season weed species, or make the crop be out of sync with the periods of time when pest and disease problems are most severe.
- Changing the distance between crop plants and rows can affect the incidence of disease and weeds. Wider spaces increase airflow around the plants, lessening the amount of time leaves stay wet from rain or dew and the chance that infection can occur. However, wider space will expose more soil to sunlight and increase weed seed germination. So additional weed control measures may be required if plant or row spacing is increased to help prevent disease. If diseases are not a problem, then decreasing row and plant spacing can be employed as weed control measures.
- Monitoring the fertility levels in your fields with annual soil tests and making sure you do not provide excess nutrients in the soil are also cultural pest management methods. Excess nutrients in the soil encourage weed growth while plants provided too much of the essential nutrient nitrogen can be more attractive to insect pests (Altieri & Nicholls, 2003)
- The careful use of water is a cultural weed management practice. If you irrigate the crop you grow, strategically providing it water during critical growth stages will help give the crop an advantage against weeds. Furthermore, a light irrigation before planting can be used to encourage weed germination and growth so that the weeds can be easily eliminated using cultivation or flaming.
- Incorporating and encouraging diversity in your farming system is also an important cultural pest management practice. It is harder in a diverse system for one species of insect pest or disease-causing organism to gain a strong foothold and wreak havoc on your system. Ways to introduce greater diversity into your cropping system include using:
    - **Crop rotations** – Planting a sequence of different crops over time in the same field;

- **Intercropping** – Growing two or more crops together in the same field at the same time. Different methods of intercropping include:
  - **Row intercropping** – Growing two or more different crops in alternating rows;
  - **Strip cropping** – Alternating strips of different crops in the same field. The strips are usually at least as wide as a tractor pass;
  - **Mixed intercropping** – Growing two or more crops mixed together in the same field. The two crops are usually harvested together for the same use such as livestock feed;
  - **Relay planting** – Planting a second crop into an existing crop.
- **Shelterbelts** – Rows of hedges or trees that border a field can provide habitat for many beneficial organisms;
- **Trap crops** – Plants that attract insect pests keeping them from the crop plants. Trap crops work best when the insect is eliminated while on the trap crop by mowing or disking;
- **Barrier crops** – Plants that are sown around a field that are known to be disliked by a common pest of the crop plant and so serve to repel the pest.

Biological Pest Control

The recommended mechanical and physical methods listed in the standards to manage pest problems are actually ways of introducing or aiding pest predators and parasites. Both of the processes of introducing non-native species or adding to the existing predator and parasite populations in your farming system must be carefully considered. First, make sure that the predator or parasites you choose will prey on or parasitize your target pest. Purchase the predators and parasites you intend to use from a reputable source that uses careful shipping methods so that your insects arrive healthy and ready to apply to the field. Remember that predators and parasites, once released, are mobile and will only stay in your fields if enough food sources are available. Plants that provide alternate food sources such as nectar and pollen can be planted near the field to help keep insect predators and parasites in the field. Introducing or augmenting a predator or parasite species is usually more efficient when done using smaller numbers of insects and in a targeted area, rather than broadcasting the insects over many acres.

It's important to scout your fields regularly for pests and disease issues. Identifying pest species but also the beneficial insects and maintaining a balance in populations is the goal. The idea is not to eliminate the pests entirely, but to minimize insect damage that affects the

marketability of crops. Using predators or parasites in a greenhouse can also be effective since the introduced species cannot escape. The chart below lists common types of insect predators and parasites that can be purchased to introduce into or augment existing populations in an organic farming system.

The three mechanical/physical methods listed in the standards to manage pest problems are the use of lures, traps and repellants. None of these methods are commonly used in a large scale grain operation but they can be useful in organic fruit and vegetable production. **Lures** are compounds that will attract the target pest. The most common substances used as lures are sex pheromones, chemicals produced by an organism that elicit a response in another individual of the same species, but of the opposite sex. Sex pheromones are commercially available to manage or monitor a wide variety of pests such as codling moth, squash vine borer, corn earworm, pink bollworm, diamond-back moth and European corn borer. Sex pheromones can help you manage an insect pest population because the pheromone will mask the insect's own attractant and prevent the males from finding the unmated females leaving them unfertilized and incapable of laying eggs. Pheromones used in this way work best when the insect pest populations are relatively low and the target pest is not very mobile. Pheromones combined with a trapping device are used to monitor pest populations. By baiting traps with the appropriate pheromone, an increase in a pest population can be spotted early.

There are many different types and styles of insect **traps** available commercially. A little research will tell you if a given trap is appropriate for the

Predator/Parasite	Scientific Name	Target Pests
Lady Beetle	*Hippodamia convergens*	Aphids, mealy bugs, scales
Green Lacewings	*Chrysoperla carnea & C. rufilabris*	Aphids, mealy bugs, scales, white fly,mites, thrips
Minute Pirate Bug	*Orius insidiosus*	Thrips, spider mites, leafhoppers, corn earworms, small caterpillars
Predatory Mites	*Phytoseiulus persimilis*	
Amblysius cucumeris	*Pest mites*	
Thrips, spider mites		
Spined Soldier Bug	*Podisus maculiventris*	Cabbage loopers, Colorado potato beetle, Tobacco Hornworm, Beet armyworm, etc
Trichogramma Wasps	*T. pretiosum, T. minutum, T. brassicae, T. platneri*	Parasitizes caterpillars – corn earworm, cabbage worm, loopers, coddling moth, etc.
Bracyonid Wasps	*Aphidius matricariae, A. colemani, A. ervi*	Green peach aphid, melon aphid, soybean aphid

insect pest you need to control and if others have had success using it. **Another important issue is to make sure that the lure or trap is not treated with a synthetic substance not allowed by the standards.**

Repellants are any substance or objects used to keep a pest away from your crops. In this category, there are commercially available products and lots of homemade recipes. Repellants are used primarily to keep animals (deer, rodents, raccoons, etc.) out of high value fruit or vegetable crops. **The main concern is to make sure that all of the ingredients of your repellant or the purchased product are allowed by the organic standards.**

Other mechanical/physical methods used in organic pest management not mentioned in the standards include the use of **row covers, screens or other physical barriers**. Sometimes the easiest way to prevent pest damage to your crop is to deny access to the pest. In greenhouses all access points should be screened. In the field, row covers which let air and moisture in but not insect pests are commonly used in vegetable production. The latter is especially effective if the possible pest infestation occurs during a limited amount of time, after which the covers can be removed. Another tool that can be used to manage pest problems is a vacuum. Suction devices can be outfitted to remove pests from the crop. The time-honored tradition of hand-picking pests and crushing eggs can be effective if done early in the emerging populations and life-cycles. These can be a time consuming endeavors and so it may only be practical for high value crops grown in small acreage and should be employed whenever scouting the fields.

Larger mammal pests like deer, rabbits and ground hogs can be controlled through predators such as dogs, fencing, both traditional wire and 3-dimentional electric, and hunting. Some argue that these pests may be seeking a water source from your crops. Some pest pressure may be limited by providing a free-choice water source.

Weed Management

The standards have already listed many system- level methods you may use for weed management. A good crop rotation, building and maintaining a healthy soil, and providing just the right amount and balance of nutrients will get you on the right track to effective weed management. However, other practices, specifically targeting weeds, may be necessary to manage the weeds in your fields.

Mulch

The next level of weed management includes mechanical and physical practices. The methods listed in this section of the standards begin with mulching with fully biodegradable material. Plastic or other synthetic mulches can be used but they must be removed from the field

at the end of the season. Mulches work by preventing weed seed germination or by physically suppressing weed seedling emergence. Mulch is often used for weed suppression by organic producers of horticultural crops. Common types of material used as mulch include straw, hay, compost, paper, cardboard and sawdust. Timing of your mulch application and depth of mulch used are important considerations. Mulch applied before the soil has had a chance to thoroughly warm may slow plant growth. The thickness of mulch applied will vary with the type. For example, a 4- to 6-inch layer of sawdust will suppress weeds as well as 8 or more inches of hay, straw or a similar loose, "open" material, but high carbon materials can effect nutrient uptake in crops if incorporated into the soil. On larger row crop farms and in orchards, living mulches, also known as cover crops, are also used for weed control. Careful management and proper selection of type of living mulch are important for the success of this practice. Care must be taken so that the living mulch does not grow unrestricted and become a competitor of the crop, especially in limited resource situations like drought. It may take some experimentation to find the best combination of crop and living mulch for your system.

Mowing

Mowing is a mechanical weed control method used in many systems. The most important aspect of mowing is timing so that you cut back the weeds during their most vulnerable stage. Mowing perennial weeds between the full leaf and flowering stage can deplete their energy reserves. Annual weeds should also be cut before first flowering to prevent the weeds from going to seed, a key strategy for reducing the weed seed bank in your soil. Mowing can be used to manage weeds in areas around fields and in-between crop rows if accessible.

Livestock Weeders

If you have chosen to incorporate livestock in your organic production system, they can be used to help manage weed problems. Grazing sheep, goats, cattle or horses can control weed growth. On pastureland, livestock grazing is an effective weed management tool when you combine the right species of grazing animal at the appropriate stocking rate in the right season so that weeds are consumed. To be successful, the targeted weeds should be palatable to the livestock, grazing should be done when it will cause damage during a vulnerable time of weed growth, and the livestock are managed so that they do minimal harm to the desired plant species and its environment. Other types of livestock are used in weed management. Weeder geese and runner ducks are good choices, because they like to eat grasses and avoid most broadleaf plants, and have been used for weed management in crops such as cotton, potatoes, and mint. The geese should

be placed in the fields early in the season when grass and other weeds first start to appear. Under normal conditions, 2-4 geese per acre are enough in row crops. More geese may be needed if crops are grown in beds, since beds have a larger area where grass and weeds can grow. Place water troughs for the geese at the ends of the rows to ensure weeding the full length of the row. It is necessary to closely monitor their grazing and rotate areas frequently to minimize browsing of crops. Some supplemental feed may be required, especially if you intend to sell the geese for meat at the end of the season.

Hand Weeding

Hand weeding can accurately and thoroughly remove weeds from your organic fields and beds. However, it is an expensive option because of all the labor involved. For some perennial, deep-rooted species, like Burdock and Johnson grass, this may be the most economically effective choice. For this reason it is not a method used commonly in row crop production except to remove patches of difficult-to-kill weeds or to remove weeds within rows after inter-row cultivation has been done. Hand weeding is much more common in high value horticultural crops where its cost can be justified. There are many types of hand tillage tools available. Stirrup hoes are best for removing young weeds and tend to be safer to use around young crop plants. Chipping-type hoes are best suited for heavier work. Timing is important to hand weeding. If it is done too early in the season then the weeds that have not germinated are not controlled. But waiting too long will leave you with weeds too large to kill without great effort.

Cultivating and Tillage

Mechanical cultivation and tillage usually comprise the greatest portion of an organic farmer's weed management program. It has been argued that there is an over-reliance on mechanical cultivation in organic production. This can be problematic because certain types of tillage can cause erosion and loss of nutrients and organic matter. Furthermore, excessive tillage increases the amount of non-renewable inputs like fossil fuel needed for your operation. No-till practices have been applied in organic production systems with some degree of success.

After cultivating for seedbed preparation, the first tillage done before the crop emerges is called blind harrowing. This type of pre-emergent tillage, done 3-4 days after planting, is designed to help control shallow germinating, small seeded broadleaf weeds and grasses. To be most effective the weed seedlings should be at the "white thread" stage, no more than ¾ to 1 inch long. The entire field is worked very shallow (2 inches) using a rotary hoe, flex-tine cultivator or tine weeder. Blind harrowing works best on warm days when the surface of the soil is dry but not crusted or covered with heavy stubble. Timing is important because if the tillage is done too early it will stimulate weed growth. If it is done

too late the weeds will have grown too large to dislodge and the sprouting crop will be damaged. However some damage is expected even when blind harrowing is done in a timely manner. To compensate for potential damage, growers usually increase seeding rates by 5-10% and plant the seed at a depth of at least 2 inches (5cm). Blind harrowing is an important weed management practice because it breaks up the soil surface encouraging crop seed germination, increases water absorption and gives the crop a competitive edge against further weed growth.

Weeds that emerge shortly after the crop can also be controlled by harrowing. This type of post-emergent tillage is generally done 5-7 days after the crop emerges. The specific timing depends upon the relative competitiveness of the crop. For vegetables, this is a successful technique for root crops and even beans, but less so for Brassicas and transplants. For wheat and barley, the recommendation is during the 2-4 leaf stage. For corn it is when the plants are 2-6 inches (5-15 cm) tall and for soybeans when the crop is 3-6 inches (7-10 cm) tall. Oats are very vulnerable at the seedling stage so post-emergent tillage is not recommended. Post-emergent tillage is most effective on small weed seedlings that have emerged from a shallow depth on hot days when the soil and plants are dry. Flex-tine harrows, rotary hoes or finger weeders work well for this type of tillage. Harrowing should be done in the direction of seeding to minimize any damage to the crop.

Later in the growing season cultivation can still be used to manage weed problems. The most effective tools will allow you to get close to the crop without causing damage while uprooting small weeds and cutting off larger ones. Inter-row cultivation is usually reserved for row crops grown in rows wide enough to accommodate the tillage equipment. Inter-row cultivation can be done any time after the crop is 4 inches (10 cm) high until it is approximately 2 feet high, after which there is a greater risk of crop damage. Beans can be cultivated earlier if shields are used. It is recommended that a light cultivation across the rows using a flex-tine harrow, rotary hoe, or finger weeder be done first for the inter-row cultivation to be most effective. Under ideal conditions, inter-row cultivation kills all between-row weeds, while soil thrown into the row smothers in-row weeds. As the crop grows, this soil tossing action can be made more aggressive through implement adjustments and speed.

There are many different kinds of equipment available to conduct inter-row cultivation. These implements vary in their level of weed control and potential for crop damage because each has a different depth of tillage, travel speed, and distance from the crop row. Choose the right tool based upon the type of crop and your current growing conditions. In general, rear-mounted cultivators are less precise than front or mid-mounted cultivators. Ridge-till cultivators, straddle row cultivators, or regular cultivators (with the shovels removed) can all be used for this

type of cultivation. In less hardy or high value crops, shallow cultivators such as basket weeders, beet-hoes or small sharp sweeps are used. In more vigorous crops, soil is thrown into the row to bury weeds using rolling cultivators, spider wheels, large sweeps or hilling disks. Some of these tools can be angled to pull soil away from the row when the crop is small and later rotated to throw soil back onto the row in subsequent cultivations. Usually 2-3 passes with the cultivator will give you adequate control.

Proper timing of cultivation is also important for success in managing weeds. The considerations for timing include weather (early on a hot day is better than late in the day following a rain) and when the weeds are at the most vulnerable stage for the type of equipment you will use. Cultivators that bury weeds work best on small weeds, while large weeds are better controlled by cultivators that sever the roots from the shoots by slicing or cutting, or by turning the soil to prevent the root system of the weed coming into contact with the soil. The effectiveness of precision cultivation stems from precision seeding. The key to success is having straight crop rows and relatively uniform stands because this will allow you to till the maximum amount of inter-row space without damaging the crop. Therefore, the ability to make precise adjustment to your equipment will be important. Many growers consider the use of mirror systems and electronic guidance systems essential to improve accuracy and cultivation speed.

Disease Management

Depending upon what type of crops you decide to grow, you may or may not have serious plant disease problems. All crop plants can be affected by disease to varying degrees, though field crop plants tend to have fewer disease problems than fruit and vegetable crops. Many of the organic crop management practices you will practice like crop rotations, tillage and composting can help you reduce the incidence of disease in your fields. The following are management practices to use to successfully manage disease problems.

Cultivar Selection

As with other aspects of organic production, prevention is the key to good disease management. Try to find crop cultivars that are resistant to the prevalent diseases for the crop in your area. Resistance is the ability of the plant to suppress or retard the activity and progress of a disease-causing organism that results in the absence or reduction of symptoms. You will also be able to find plant cultivars that are tolerant of a disease. This is a slightly different term that means the host plant can endure severe disease without suffering significant losses in quality or yield. A tolerant plant does not inhibit the disease and if infected, increases the number of pathogens overwintering that may, in turn, infect subsequent crops. The use of resistant cultivars is particularly

helpful when crop rotation is of limited use as a disease management tool. This is usually the case when the pathogen has any of the following properties:

- A wide range of hosts (common root rots, seedling blights);
- A long lived resting stage or persists in the soil for a long period of time (fusarium wilt);
- Airborne spores (cereal grain rusts), or is carried by insects (aster yellows, Stewart wilt) that are spread over long distances;
- A very high rate of spread (powdery mildew);
- Is seed-borne (smut).

Source: Organic Crop Production: Disease Management, Saskatchewan Agriculture and Food.

There are some shortcomings to consider when using resistant varieties. Some resistant cultivars, especially for horticultural crops, can have less than desirable characteristics like poor quality, color or yield. So you may be able to reduce the incidence of disease by using a resistant variety but the quality of the crop is so poor that it is unmarketable. In this case, the use of the resistant variety probably does not make sense. Another problem with resistant cultivars is that resistance, depending upon the pathogen, may be short-lived. Disease causing organisms mutate easily. When the pathogen mutates, the host plant loses its resistance and a new resistant variety must be bred. Using resistant cultivars is a good disease management tool while the resistance holds up and the variety has no detrimental characteristics.

Location

Next, choose the best location to grow your crop or at least try to avoid fields known to have had disease problems in the past. Other areas that can be a problem include riparian zones, grasslands and pastures that contain significant populations of weeds and natural vegetation. These areas can serve as reservoirs of pathogens (weeds) or vectors (insects) that carry pathogens. In these cases the disease causing organisms can be easily transferred to nearby crop fields. Keep in mind the different environmental factors associated with each field or the different parts of a large field. The amount of rainfall, humidity level, soil type, etc. also will help you choose the best location to plant your crops. Keeping accurate records of this type of information also will be useful.

Tillage

The amount and type of tillage for field preparation can help reduce the incidence of disease. Proper field preparation can minimize soil conditions that favor pathogens like poorly drained soil or pooling of water. Ideally, tillage will also reduce plant residues left from the previous crop

by burying them beneath the surface of the soil. When using tillage as a weed management tool, minimum tillage techniques will help prevent spreading soil dwelling pathogens throughout the field.

Seed and Seeding Rate

Make sure when you purchase seed for your organic crops that it comes from a reputable source and is certified to be disease-free. Additionally, the planting date and seeding rate you use can affect the incidence of disease in your organic crop. In a field with known disease problems, altering the planting date can help avoid exposure to inoculum and thus infection. For instance, if you suspect white mold will be a problem in your soybean fields, then delaying planting will be beneficial because it decreases the overlap between soybean flowering and the release of white mold spores. The seeding rate used is also important. A higher seeding rate will increase the density of plants and the amount of leaf area in the field. Dense foliage can increase the chance for leaf disease because larger surface area is provided for infection to occur. Additionally, the denser leaf canopy restricts airflow amongst the plants in the field, keeping plant surfaces moist for longer periods of time and creating favorable conditions for infection to occur. However, it should be noted that reducing the leaf canopy with a lower seeding rate can expose more soil and therefore increase the incidence of weeds.

Fertility

Making sure that your crop plants receive the proper amounts of nutrients as they grow is important for healthy growth and protection from disease. Plants that receive the adequate amounts of nutrients are better able to defend themselves against disease. Too much nitrogen results in lush canopy growth and increased susceptibility to some diseases. Too little nutrients such as phosphorus, zinc or copper can increase the incidence of other diseases in some crops. Using soil tests to determine the levels of essential nutrients is important, then, for disease management, too.

Manure and compost are good fertility inputs and can help in your disease management program. The addition of livestock manure to your soil stimulates populations of soil microbes that can compete with or destroy soil plant pathogens. The incorporation of a green manure cover crop can have a similar effect, reducing or controlling root rot pathogens and other diseases. The decomposition of the plant material stimulates soil microbes that can be antagonistic to plant pathogens. Compost provides disease control benefits too because it increases the diversity and populations of soil microorganisms.

Cultural Practices

Other cultural practices important to your disease management program include crop rotation, weed and insect control, sanitation

and water management. Using a diversity of crops, including resistant and non-resistant varieties, cover crops, and periods of fallow in your crop rotation can contribute to the reduction of many soil-borne diseases. An effective crop rotation can reduce the number of soil borne pathogens, but significant decreases in pathogen populations will take many seasons. Insect and weed control can greatly influence the incidence of plant disease. For example, the management of viral diseases is more effective when weeds (pathogen reservoirs) and insects (vectors) are controlled. Mulch, commonly used in organic fruit and vegetable production to manage weeds, also helps with disease management because it reduces the amount of water that splashes up from the soil which could potentially carry pathogens.

Field sanitation measures are important disease management strategies. These methods include:

- Removing and destroying diseased plants and residues;
- Plowing down plant residues;
- Deep plowing diseased plant residues;
- Excluding infested soil and water from uninfested areas;
- Cleaning tractors and other equipment when going between fields.

Water Management

Finally, good water management is important to your disease management program since so many plant pathogens are dependant upon moist conditions for infection to occur. So, if you are planning to use irrigation in your organic production system, the timing and length of irrigation should meet crop water requirements without providing excess water. Bacterial foliar diseases are dependant on rain and sprinkler irrigation for their spread.

Products for Pest, Disease, and Weed Control

Your final defense against pests, weeds and disease are pesticides that are:

- derived from natural materials or living organisms, and do not contain synthetic additives;
- or are not specifically dis-allowed on the National List *(§205.602)*.

Most synthetic pesticides are prohibited. Natural pesticides should only be counted on as a last resort, to be used when all other methods fail. Furthermore, your organic system plan must include the conditions when you may need to use any of these inputs.

If you anticipate the need for natural pesticides you will have to make certain that all substances included in the pesticide are

acceptable for organic production. Of particular concern are the inert ingredients included in the product. These substances do not contribute to the activity of the product as a pesticide but will do things like help the pesticide stick to the plant or increase the product's shelf life. The Environmental Protection Agency provides four classifications of inert ingredients: List 1 (known to be toxic), List 2 (potentially toxic), List 3 (unknown toxicity), and List 4 (minimal concern). Currently, the National Organic Standard only allows the use of List 4 inert ingredients. Products that are listed by the Organic Material Review Institute (OMRI) contain only List 4 inert ingredients and should be considered safe for you to purchase and use. If you wish to use a product not listed by OMRI, get prior approval from your certifier and obtain documentation from the manufacturer that the product contains only allowed inert and active ingredients.

Most of the materials permitted in organic production fall into several general groups: botanicals, biologicals, oils, fatty acids, minerals, and pheromones. Botanical pesticides are derived from plants, and include substances like pyrethrum, rotenone, sabadilla, neem, and garlic. Strychnine and nicotine are also included in this group, but their use is prohibited in organic production. Botanical pesticides should be used carefully because they are relatively non-selective so they can kill pest organisms but also have a negative effect on predator, parasite and other non-target organisms. Biological pesticides contain microorganisms or toxins derived from microorganisms. Some of the commonly used biologicals include Bacillus thuringiensis (Bt), Beauveria bassiana, Trichoderma harzianum, and Spinosad. Biologicals are generally more selective and so safer to use than botanical insecticides. However, resistance to biological pesticides has been known to develop when they are over-used. By targeting your use of biological pesticides you will be more likely to preserve them as tools for the long term. Spray oils can be either vegetable- or animal-derived and are commonly used to control scale and mite pests. Oils are commonly used as suffocating (stylet) oils, summer oils, dormant oils, and surfactants. Also, some petroleum-derived oils, referred to as narrow-range oils, are allowed for the same purposes. Fatty acid insecticidal soaps are synthetic pesticides specifically allowed in organic production [§205.601(e)(6)]. Insecticidal soaps should be used with caution because they can be hard on beneficial predatory mites and are mildly toxic to plants. Another group includes substances called pheromones which are chemicals produced by an organism that elicit a response in another individual of the same species but of the opposite sex. Pheromones are used as lures in traps and work to disrupt the mating process of the insect pest. One word of caution – pheromone products can contain List 3 inert substances that are not allowed in organic production. Be sure to ask your certifier if you have any questions about whether a pheromone product is permitted for use in your organic production system.

The final group of allowed inputs for pest, weed and disease control in organic production system is mineral-based pesticides. Included in this group are products containing sulfur, copper, diatomaceous earth, and kaolin clay. Other minerals such as arsenic, lead, and sodium fluoaluminate are specifically prohibited in the standards. Caution is always suggested when using mineral-based pesticides. For instance, sulfur can have a negative effect on some beneficial insects and if used during hot weather may burn crop plants. If not handled properly, diatomaceous earth can cause respiratory problems in people and animals. As with all other pest control inputs, it is a good idea to check with your certifier to make sure that any mineral-based pesticide product you plan to use is permitted.

NOP Standards

§205.206 Crop pest, weed, and disease management practice standard

(a) The producer must use management practices to prevent crop pests, weeds, and diseases including but not limited to:

(1) Crop rotation and soil and crop nutrient management practices, as provided for in §205.203 and §205.205;

(2) Sanitation measures to remove disease vectors, weed seeds, and habitat for pest organisms; and

(3) Cultural practices that enhance crop health, including selection of plant species and varieties with regard to suitability to site-specific conditions and resistance to prevalent pests, weeds, and diseases.

(b) Pest problems may be controlled through mechanical or physical methods including but not limited to:

(1) Augmentation or introduction of predators or parasites of the pest species;

(2) Development of habitat for natural enemies of pests;

(3) Nonsynthetic controls such as lures, traps, and repellents.

(c) Weed problems may be controlled through:

(1) Mulching with fully biodegradable materials;

(2) Mowing;

(3) Livestock grazing;

(4) Hand weeding and mechanical cultivation;

(5) Flame, heat, or electrical means; or

(6) Plastic or other synthetic mulches: Provided, That, they are removed from the field at the end of the growing or harvest season.

…

(d) Disease problems may be controlled through:

(1) Management practices which suppress the spread of disease organisms; or

(2) Application of nonsynthetic biological, botanical, or mineral inputs.

(e) When the practices provided for in paragraphs (a) through (d) of this section are insufficient to prevent or control crop pests, weeds, and diseases, a biological or botanical substance or a substance included on the National List of synthetic substances allowed for use in organic crop production may be applied to prevent, suppress, or control pests, weeds, or diseases: Provided, That, the conditions for using the substance are documented in the organic system plan.

(f) The producer must not use lumber treated with arsenate or other prohibited materials for new installations or replacement purposes in contact with soil or livestock.

WILD CROPPING

§205.207 Wild-crop harvesting practice standard

Explanation of Standards

According to the Standards, a wild crop is "any plant or portion of a plant that is collected or harvested from a site that is not maintained under cultivation (digging up or cutting the soil to prepare a seed bed; control weeds; aerate the soil; or work organic matter, crop residues, or fertilizers into the soil) or other agricultural management." The possibilities for wild crops are endless. It is important to be able to demonstrate that the plant is harvested in a manner that is not harmful to the surrounding environment and allows the plant to continue to grow and produce in that area. Some of the products that are marketed as wild crops include fruits and nuts like pinon pine nuts, persimmons, gooseberries and wild greens like dandelion, lamb's quarters and shepherd's purse.

NOP Standards

§205.207 Wild-crop harvesting practice standard

(a) A wild crop that is intended to be sold, labeled, or represented as organic must be harvested from a designated area that has had no prohibited substance, as set forth in §205.105, applied to it for a period of 3 years immediately preceding the harvest of the wild crop.

(b) A wild crop must be harvested in a manner that ensures that such harvesting or gathering will not be destructive to the environment and will sustain the growth and production of the wild crop.

CHAPTER 4

Livestock Standards

The rules for organic livestock production will relate to your intended use of the animal. Are you selling the animal for meat, or do you plan to sell the animal's product such as milk or eggs? Most of the standards regarding livestock production apply generally to management of all livestock; however, there are also some specific rules that only apply to certain types of animals. For instance, while many aspects of managing an organic dairy herd are the same as managing an organic beef herd, some requirements apply just to the dairy herd. (*Adapted from *MOSES Guidebook for Organic Certification*)

ORIGIN OF ORGANIC LIVESTOCK

§205.236 Origin of livestock

Explanation of Standards

This section of the organic standards addresses an important question: Where did your livestock come from? Were your animals born organic, transitioned to organic production, or some combination of these two scenarios?

All organic animals must have been managed organically (fed organic feed, grazed on organic pasture, etc.) from the last third of gestation period (inside the mother) or hatching, There are two exceptions:

1) Poultry or poultry products must have been managed organically since the second day of life, and;

2) Milk or milk products must be from dairy animals that were managed organically for a year (12 months) prior to the sale of the product.

There are two other important exceptions:

1) For transitioning dairy farms (including cow, goat, and sheep dairies): The transition process lasts three years for cropland. The crops and forage on a transitioning farm that is in its third year of transition (some like to call this T-3 crops or forage), may be fed to dairy animals during their 12-month transition period to organic management. It's also important to note that once a distinct group of animals or herd has transitioned to organic management, they have to continue that organic management on an ongoing basis.

2) An exception also exists for breeder stock: Non-organic breeder stock may be brought onto an organic operation as needed. If a breeder stock mother is pregnant with an animal intended for organic production, however, she must be managed as an organic animal (fed organic feed, grazed on organic pasture, bedded and cared for according to the organic standards) during the last third of her gestation period in order for her offspring to be "born organic." If an animal is "born organic," it is eligible for organic slaughter unless, at some point during its life, a healthcare product or management practice should disqualify it for this end use.

NOP Standards

§205.236 Origin of livestock

(a) Livestock products that are to be sold, labeled, or represented as organic must be from livestock under continuous organic management from the last third of gestation or hatching: Except, That:

(1) ***Poultry.*** *Poultry or edible poultry products must be from poultry that has been under continuous organic management beginning no later than the second day of life;*

(2) ***Dairy animals.*** *Milk or milk products must be from animals that have been under continuous organic management beginning no later than 1 year prior to the production of the milk or milk products that are to be sold, labeled, or represented as organic, Except,*

(i) That, crops and forage from land, included in the organic system plan of a dairy farm, that is in the third year of organic management may be consumed by the dairy animals of the farm during the 12-month period immediately prior to the sale of organic milk and milk products; and

(ii) [No longer applicable- expired June 9, 2007]

(iii) Once an entire, distinct herd has been converted to organic production, all dairy animals shall be under organic management from the last third of gestation.

(3) ***Breeder stock.*** *Livestock used as breeder stock may be brought from a nonorganic operation onto an organic operation at any time: Provided, That, if such livestock are gestating and the offspring are to be raised as organic livestock, the breeder stock must be brought onto the facility no later than the last third of gestation.*

(b) The following are ***prohibited****:*

(1) Livestock or edible livestock products that are removed from an organic operation and subsequently managed on a nonorganic operation may be not sold, labeled, or represented as organically produced.

(2) Breeder or dairy stock that has not been under continuous organic management since the last third of gestation may not be sold, labeled, or represented as organic slaughter stock.

(c) The producer of an organic livestock operation must maintain records sufficient to preserve the identity of all organically managed animals and edible and nonedible animal products produced on the operation.

FEEDING ORGANIC LIVESTOCK

§205.237 Livestock Feed

Explanation of the Standards

The standards require that organic livestock must be provided a total feed ration composed of all certified organic agricultural products, including pasture and forage. The only exception to this rule is that third year transitioning crops used for feed may be fed to transitioning animals. (See the previous standards on pages 81 and 82 regarding origin of livestock for more information on transitioning dairy animals.) Feed additives and supplements that are not specifically prohibited are also allowed. Pasture is mandated for all ruminants. They must be allowed to graze certified organic land that offers feed value when seasonally appropriate. A pasture plan (as part of your Organic System Plan) and a minimum of 30% dry-matter intake from pasture during the grazing season are required. The grazing season may vary regionally; however, it must consist of at least 120 days, recognizing there may be breaks in the grazing season for extreme weather. Since all agricultural feed, including pasture and forage, is required to be certified organic, animals must only graze on land that is currently certified. (*Adapted from MOSES Organic Fact Sheet: Transitioning to Organic Beef Production)

Substances prohibited for feed

According to the standards, an organic livestock producer **must not**:

- Feed animal drugs, including hormones, to promote growth;
- Provide feed supplements or additives in amounts above those needed for adequate nutrition and health maintenance for the species at its specific stage of life;
- Feed plastic pellets for roughage;
- Feed formulas containing urea or manure;
- Feed mammalian or poultry slaughter by-products to mammals or poultry;
- Use feed, feed additives or supplements in violation of the Federal Food, Drug and Cosmetic Act;
- Provide feed or forage to which any antibiotic including ionophores has been added.

Dry matter intake

Dry matter intake (DMI) is the amount of feed a cow consumes per day on a moisture-free basis. Most producers are used to dealing with feed on an as-fed basis (pounds of feed actually fed to animal with water in it); however, in order to determine an accurate estimate of the nutrient intake and to compare feeds, an animal's diet must be analyzed on a moisture-free basis.

The pasture rule

The NOP established regulations for pasture grazing of ruminant livestock. Not only does this provision require that all ruminants receive at least 30% dry matter intake (DMI) from pasture during the grazing season (of at least 120 days), but it also implemented several recordkeeping requirements.

The rule requires that the 30% DMI is met from "grazing" during the grazing season or from forage that has been cut and is still in the pasture as "residual forage." Grazing is the act of animal breaking off forage from a living plant whose roots are still attached to the soil. Fresh green chopped forage transported anywhere else for the animal to consume is not considered pasture. Animals should be allowed out on pasture for enough hours each day to graze.

The minimum time of the grazing season in a calendar year is 120 days. Some regions have grazing seasons that last 150 or 180 days and in these cases, organic ruminants need to be provided the 30% dry matter intake from pasture during this time even though it exceeds the 120 day minimum. The grazing season, however, does not need to be continuous.

Under the rule, ruminants can only be denied outdoor access according to the allowances under §205.239(b)(1) - (8) and §205.239(c)(1) - (3) (explained in more detail on pages 93 and 94) as long as they continue to meet the 30% DMI from pasture during the grazing season during the time they are on pasture. Breeding bulls, rams, and bucks are exempt from the 30% DMI rule, however, cannot not be sold, labeled, used, or represented as organic slaughter stock if they are maintained under this exemption.

Recordkeeping and compliance with the pasture rule

Recordkeeping for your organic livestock will need to include the following information:

- Total feed ration for each type and class of animal, including:
  - all feed produced on farm;
  - all feed purchased from off-farm sources;
  - the percentage of each feed type, including pasture, in the total ration;
  - all feed supplements and additives.
- Amount and type of feed actually fed to each type and class of animal;
- Changes made to the rations throughout the year in response to the seasonal grazing changes;
- The method used to calculate dry matter demand and dry matter intake.

There are many resources for calculating dry matter intake from pasture. While these calculations only need to be done throughout the grazing season, it is important to learn how to accurately measure this information to ensure the animals are receiving enough dry matter intake from pasture. Note that feed ration records should be maintained throughout the entire year, not just during the grazing season, to verify that organic feed and allowed additives or supplements are being fed at all times.

The following are some important considerations prior to calculating dry matter from pasture:

- What are the different groups of animals (classes & types) on the farm, and for how many groups do these calculations need to be done?
- Does the ration change for some or all groups during the grazing season?
- Calculate the percent dry matter intake from pasture for each group.
- For groups whose rations change, multiple percent dry matter intake calculations will need to be done and averaged over the grazing season.

The following are basic steps used to calculate dry matter intake from pasture:

- Determine the **Dry Matter Demand (DMD)** – You may already know this for your animals or you may consult the NOP DMD Tables.
- Determine **dry matter fed** –This is the dry matter intake from feed sources (grain, hay, silage,etc) other than pasture.
- Determine **dry matter intake (DMI) from pasture** – Subtract dry matter fed from DMD.
- Calculate **percentage of DMI from pasture** – The **DMI from pasture** divided by the DMD and multiplied by 100
- Average the DMI from pasture over the whole grazing season. How?
  - Calculate the percent DMI from pasture each time there is a significant ration change.
  - Calculate the day-weighted average based on the number of days each pasture DMI% was fed. For example, if a 42% DMI was fed for 40 days, 55% fed for 89 days then you would end up with the following averaged % DMI:
    0.42 x 40 = 1680
    0.55 x 89 = 4895
    1680 + 4895 = 6575
    40 days + 89 days = 129 days
    6575/129 = **50.97% average DMI for the entire grazing season**

NOP Standards

§205.237 Livestock feed

(a) The producer of an organic livestock operation must provide livestock with a total feed ration composed of agricultural products, including pasture and forage, that are organically produced and handled by operations certified to the NOP, except as provided in §205.236(a)(2)(i), except, that, synthetic substances allowed under §205.603 and nonsynthetic substances not prohibited under §205.604 may be used as feed additives and feed supplements, Provided, That, all agricultural ingredients included in the ingredients list, for such additives and supplements, shall have been produced and handled organically.

(b) The producer of an organic operation must not:

(1) Use animal drugs, including hormones, to promote growth;

(2) Provide feed supplements or additives in amounts above those needed for adequate nutrition and health maintenance for the species at its specific stage of life;

(3) Feed plastic pellets for roughage;

(4) Feed formulas containing urea or manure;

(5) Feed mammalian or poultry slaughter by-products to mammals or poultry;

(6) Use feed, feed additives, and feed supplements in violation of the Federal Food, Drug, and Cosmetic Act;

(7) Provide feed or forage to which any antibiotic including ionophores has been added; or

(8) Prevent, withhold, restrain, or otherwise restrict ruminant animals from actively obtaining feed grazed from pasture during the grazing season, except for conditions as described under §205.239(b) and (c).

(c) During the grazing season, producers shall:

(1) Provide not more than an average of 70 percent of a ruminant's dry matter demand from dry matter fed (dry matter fed does not include dry matter grazed from residual forage or vegetation rooted in pasture). This shall be calculated as an average over the entire grazing season for each type and class of animal. Ruminant animals must be grazed throughout the entire grazing season for the geographical region, which shall be not less than 120 days per calendar year. Due to weather, season, and/or climate, the grazing season may or may not be continuous.

(2) Provide pasture of a sufficient quality and quantity to graze throughout the grazing season and to provide all ruminants under the organic system plan with an average of not less than 30 percent of their dry matter intake from grazing throughout the grazing season: Except, That,

(i) Ruminant animals denied pasture in accordance with §205.239(b)(1) through (8), and §205.239(c)(1) through (3), shall be provided with an average of not less than 30 percent of their dry matter intake from grazing throughout the periods that they are on pasture during the grazing season;

…

(ii) Breeding bulls shall be exempt from the 30 percent dry matter intake from grazing requirement of this section and management on pasture requirement of §205.239(c)(2); Provided, That, any animal maintained under this exemption shall not be sold, labeled, used, or represented as organic slaughter stock.

(d) Ruminant livestock producers shall:

(1) Describe the total feed ration for each type and class of animal. The description must include:

(i) All feed produced on-farm;

(ii) All feed purchased from off-farm sources;

(iii) The percentage of each feed type, including pasture, in the total ration; and

(iv) A list of all feed supplements and additives.

(2) Document the amount of each type of feed actually fed to each type and class of animal.

(3) Document changes that are made to all rations throughout the year in response to seasonal grazing changes.

(4) Provide the method for calculating dry matter demand and dry matter intake.

[65 FR 80637, Dec. 21, 2000, as amended at 75 FR 7193, Feb. 17, 2010]

LIVESTOCK HEALTH CARE

§205.238 Livestock health care practice standard

Explanation of the Standards

Prevention is Key in Organic Livestock Health Management

The standards clearly state that livestock producers should implement preventive livestock healthcare practices in order to maintain the health of the animals and to avoid synthetic inputs as much as possible. This section of the standards identify several important practices that can be used for preventive healthcare including:

- Selection of species and types that are suitable for specific conditions and resistance to diseases and parasites for that animal and location;
- Providing sufficient nutrition through feed including vitamins, minerals, protein and/or amino acids, fatty acids, energy sources, and fiber (ruminants);
- Housing, pasture conditions and sanitation practices should minimize the occurrence and spread of diseases and parasites. This includes keeping barns, lane ways, and feeding areas clean of manure build-up;
- Providing environments that allow for exercise, freedom of movement and reduction of stress. This may include large enough housing with access to the outdoors and specifically environments that allow for natural behaviors to be carried out by the animal (such as dusting and scratching by poultry);
- Carrying out physical alterations (such as dehorning, beak trimming, castration and tail docking) in a way that promotes animal welfare and in a manner that minimizes pain and stress on the animal. This may involve alterations done early in life and/or use of approved local anesthetics;
- Using vaccines and other veterinary biologics.

The use of approved inputs for healthcare or treatment purposes

When such practices listed above do not adequately prevent sickness, then synthetic medications allowed under §205.603 may be used to treat the animals. This list is categorized by the intended use of the product or substance. Note that each listing has a corresponding standard which is not listed here. Also note that sanitizing substances are also listed here, which are only allowed for equipment and facility uses as indicated, but are also useful in preventing the spread of diseases and promote the

overall cleanliness of the operation. While there are many approved non-synthetic substances, the following synthetics have been approved based on their listing use:

The following lists correspond with and further explain materials on the National List related to livestock healthcare. Please see pages 106-118 of this guide for the full text of the *National List §206.600 - §205.606.*

Allowed disinfectants, sanitizers and medical treatments:

- Alcohols: Ethanol can be used as a disinfectant and sanitizer only and is prohibited as a feed additive. Ispropanol can be used as a disinfectant only.
- Aspirin: Approved for health care and reduced inflammation.
- Atropine: Used to treat poisoning. Restricted in use by federal law (see annotation on National List) and must be used by or on written order of a licensed veterinarian. Additionally, the product requires a meat withdrawal of 56 days for animals intended for slaughter and a milk discard period of at least 12 days.
- Biologics: Also knowns as vaccines.
- Butorphanol: Used as an anesthetic. Restricted in use by federal law (see annotation on list) and must be used by or on written order of a licensed veterinarian. Additionally, the product requires a meat withdrawal of 42 days for animals intended for slaughter and a milk discard period of at least 8 days.
- Chlorhexidine: This may be used for surgical procedures done by a vet and also as a teat dip when other germicidal agents are no longer effective.
- Chlorine materials: Calcium hypochlorite, chlorine dioxide and sodium hypochlorite **may be used for disinfecting and sanitizing facilities and equipment only**, as long as the final rinse of the chlorine does not exceed the Safe Drinking Water Act allowance of 4 parts per million. This means that when using chlorine products, you may need to use test strips to verify that the final rinse water meets these limits.
- Electrolytes: Must not contain antibiotics. Keep in mind that some electrolyte products may contain other non-active ingredients that also may need to be reviewed by your certifier.
- Flunixin – Used an an anti-inflammatory. The withdrawal period for this is at least two-times the amount required on the label.
- Furosemide – Used commonly to treat udder edema. The withdrawal period for this is at least two-times the amount required on the label.
- Gluclose – Used commonly to treat ketosis or other metabolic disorders.

- Glycerine – Allowed as livestock teat dip and must be produced through the hydrolysis of fats or oils. While this is often sold just as glycerine it can be difficult to be sure how it is produced just by the label. If you are unsure whether an individual product is allowed, it is best to check with your certifier.
- Hydrogen peroxide
- Iodine
- Magnesium hydroxide – Used commonly for GI or indigestion complications. Federal law restricts the use of this by requiring a written order of a licensed veterinarian.
- Oxytocin – Allowed for use in postpartuition therapeutic applications.
- Parasiticides –Fenbendazole – only for use by or on written order of licensed veterinarian; Ivermectin and Moxidectin – for control of internal parasites only.

  Note that these also have annotation on the National List that prohibits them in slaughter stock and allows only as an emergency treatment in dairy or breeder stock when other such preventive measures do not work. Milk must be discarded for 90 days following the treatment of the animal and cannot be labeled as organic during this period. If used in breeder stock, the treatment cannot occur during the last third of gestation if the progeny is to be considered organic and must not be used during the lactation period for breeding stock.
- Peroxyacetic acid/peracetic acid – **Allowed only for sanitizing facility and processing equipment.**
- Phosphoric acid – **Allowed as an equipment cleaner only.**
- Poloxalene – Only allowed for use in the emergency treatment of bloat.
- Tolazoline – Used for reversal of anesthesia by Xylazine. Federal law restricts the use of this by or on written order of a licensed veterinarian. Additionally, the product requires a meat withdrawal of 8 days for animals intended for slaughter and a milk discard period of at least 4 days.
- Xylazine – Used for anesthesia in the existence of an emergency. Federal law restricts the use of this by or on written order of a licensed veterinarian. Additionally, the product requires a meat withdrawal of 8 days for animals intended for slaughter and a milk discard period of at least 4 days.

Allowed topical treatments, external parasiticides or local anesthetics:

- Copper sulfate - Commonly used for hairy wart and foot rot complications.
- Iodine
- Lidocaine – Used as a local anesthetic. The product requires a meat withdrawal of 90 days for animals intended for slaughter and a milk discard period of at least 7 days.
- Lime, hydrated – Allowed as an external pest control but cannot be used to cauterize physical alterations or deodorize animal wastes.
- Mineral oil – Allowed for topical use and lubricant. Mineral oil cannot be fed to animals.
- Procaine – Used as a local anesthetic. The product requires a meat withdrawal of 90 days for animals intended for slaughter and a milk discard period of at least 7 days.
- Sucrose octanoate esters – Typically used to control mites and soft-bodied insects. Allowed to be used in accordance with their labeling.

Livestock inputs and practices NOT ALLOWED:

According to the rule, livestock producers cannot sell, label or represent as organic any animal or edible product derived from an animal treated with any of the following:

- Antibiotics
- Synthetics not listed on the National List (*§*205.603) or nonsynthetics prohibited (*§*205.604)
- Animal drugs, other than vaccines, in the absence of illness. Drugs cannot be used preventatively.
- Adminster hormones for growth.
- Administer synthetic parasiticides on a routine basis. What is routine basis? The regular planned or periodic use of parasiticides.
- Administer synthetic parasiticides to slaughter stock.
- Administer animal drugs in violation of their approved labeling requirements or restrictions. The Label is the law!
- Withhold medical treatment from a sick animal in an effort to preserve its organic status. If all approved medications do not restore the animal's health and it is treated with a prohibited substance then the animal must be clearly identified and cannot be sold, labeled or represented as organically produced.

NOP Standards

§205.238 Livestock health care practice standard

(a) The producer must establish and maintain preventive livestock health care practices, including:

(1) Selection of species and types of livestock with regard to suitability for site-specific conditions and resistance to prevalent diseases and parasites;

(2) Provision of a feed ration sufficient to meet nutritional requirements, including vitamins, minerals, protein and/or amino acids, fatty acids, energy sources, and fiber (ruminants);

(3) Establishment of appropriate housing, pasture conditions, and sanitation practices to minimize the occurrence and spread of diseases and parasites;

(4) Provision of conditions which allow for exercise, freedom of movement, and reduction of stress appropriate to the species;

(5) Performance of physical alterations as needed to promote the animal's welfare and in a manner that minimizes pain and stress; and

(6) Administration of vaccines and other veterinary biologics.

(b) When preventive practices and veterinary biologics are inadequate to prevent sickness, a producer may administer synthetic medications: Provided, That, such medications are allowed under §205.603. Parasiticides allowed under §205.603 may be used on:

(1) Breeder stock, when used prior to the last third of gestation but not during lactation for progeny that are to be sold, labeled, or represented as organically produced; and

(2) Dairy stock, when used a minimum of 90 days prior to the production of milk or milk products that are to be sold, labeled, or represented as organic.

(c) The producer of an organic livestock operation must not:

(1) Sell, label, or represent as organic any animal or edible product derived from any animal treated with antibiotics, any substance that contains a synthetic substance not allowed under §205.603, or any substance that contains a nonsynthetic substance prohibited in §205.604.

(2) Administer any animal drug, other than vaccinations, in the absence of illness;

(3) Administer hormones for growth promotion;

(4) Administer synthetic parasiticides on a routine basis;

(5) Administer synthetic parasiticides to slaughter stock;

(6) Administer animal drugs in violation of the Federal Food, Drug, and Cosmetic Act; or

(7) Withhold medical treatment from a sick animal in an effort to preserve its organic status. All appropriate medications must be used to restore an animal to health when methods acceptable to organic production fail. Livestock treated with a prohibited substance must be clearly identified and shall not be sold, labeled, or represented as organically produced.

LIVESTOCK LIVING CONDITIONS

§205.239 Livestock living conditions

Explanation of Standards

The organic standards provide instructions regarding the living conditions of organic animals. Many of these requirements are general good management practices that you may already be following if you raise non-organic livestock.

First of all, organic animals must be able to engage in natural behaviors. This means, if they are ruminants, they must have access to pasture to graze (there are more details on this piece in §205.237 and §205.240). If they are poultry, they must be able to go outside to scratch, peck at the ground, and dust themselves. All organic animals must have year-round access to the outdoors, as well as shade, shelter, space to exercise, fresh air, sunlight, and clean drinking water. All animals must have access to enough clean, dry bedding. If the bedding is agricultural roughage, such as straw, it must be organic. Shelter must be designed so that it provides for an appropriate temperature, space to move around, and prevents animal injury. Similarly, outdoor areas such as yards and laneways must be kept in good condition so they are well-drained and do not contaminate neighboring properties or water. Special attention is given to manure, pasture, and outdoor access areas. The management of these areas must work to recycle nutrients, and must not contaminate crops, soil, or water with nutrients, heavy metals, or pathogens in the process.

The standards also allow for some situations when animals might need to be confined. These include:

- bad weather;
- the animal's stage of life (age or situation such as a newborn calf);
- a situation which could endanger the animal's health or safety;
- risk to soil or water quality;
- health reasons- preventative or treatment of illness or injury;
- sorting or shipping for sale (note that animals have to continue to be managed according to all organic standards during this time);
- breeding (though bred animals must then be allowed back outside and on pasture);
- 4-H, FFA, and fairs (for up to 1 week before the fair and 24 hours after the animal is back on the farm after the event; organic management (feed, bedding, etc.) must continue throughout the event).

Pasture is allowed to be withheld for these reasons:

- 1 week at the end of lactation for dry off; 3 weeks before birthing; birthing; and one week after birthing;
- newborn dairy cattle for up to 6 months, after which they need to be on pasture during the grazing season and not individually housed (even in individual housing, animals must be able to move about freely- stand, lie, extend limbs, etc.);
- for fiber animals, for short periods of time for shearing;
- for dairy animals, during milking (so long as animals maintain access to pasture in order to meet the dry matter intake requirements of 30% from grazing).

Slaughter stock must also meet some additional requirements during the finishing period:

- must be maintained on pasture during finishing if the finishing period is during the grazing season;
- yards, feeding pads, and feedlots may be used to provide finish feed rations (typically grain), so long as the animals can occupy the area with enough space to feed simultaneously without competing for the food;
- during this finishing period, the slaughter stock does not need to meet the 30% dry matter intake requirement from grazing;
- the finishing period may not exceed 1/5 of the animal's life or 120 days- whichever is shorter.

NOP Standards

§205.239 Livestock living conditions

(a) The producer of an organic livestock operation must establish and maintain year-round livestock living conditions which accommodate the health and natural behavior of animals, including:

(1) Year-round access for all animals to the outdoors, shade, shelter, exercise areas, fresh air, clean water for drinking, and direct sunlight, suitable to the species, its stage of life, the climate, and the environment: Except, that, animals may be temporarily denied access to the outdoors in accordance with §205.239(b) and (c). Yards, feeding pads, and feedlots may be used to provide ruminants with access to the outdoors during the non-grazing season and supplemental feeding during the grazing season. Yards, feeding pads, and feedlots shall be large enough to allow all ruminant livestock occupying the yard, feeding pad, or feedlot to feed simultaneously without crowding and without competition for food. Continuous total confinement of any animal indoors is prohibited. Continuous total confinement of ruminants in yards, feeding pads, and feedlots is prohibited.

(2) For all ruminants, management on pasture and daily grazing throughout the grazing season(s) to meet the requirements of §205.237, except as provided for in paragraphs (b), (c), and (d) of this section.

(3) Appropriate clean, dry bedding. When roughages are used as bedding, they shall have been organically produced in accordance with this part by an operation certified under this part, except as provided in §205.236(a)(2)(i), and, if applicable, organically handled by operations certified to the NOP.

(4) Shelter designed to allow for:

(i) Natural maintenance, comfort behaviors, and opportunity to exercise;

(ii) Temperature level, ventilation, and air circulation suitable to the species; and

(iii) Reduction of potential for livestock injury;

(5) The use of yards, feeding pads, feedlots and laneways that shall be well-drained, kept in good condition (including frequent removal of wastes), and managed to prevent runoff of wastes and contaminated waters to adjoining or nearby surface water and across property boundaries.

(b) The producer of an organic livestock operation may provide temporary confinement or shelter for an animal because of:

(1) Inclement weather;

(2) The animal's stage of life: Except, that lactation is not a stage of life that would exempt ruminants from any of the mandates set forth in this regulation;

(3) Conditions under which the health, safety, or well-being of the animal could be jeopardized;

(4) Risk to soil or water quality;

…

(5) Preventive healthcare procedures or for the treatment of illness or injury (neither the various life stages nor lactation is an illness or injury);

(6) Sorting or shipping animals and livestock sales: Provided, that, the animals shall be maintained under continuous organic management, including organic feed, throughout the extent of their allowed confinement;

(7) Breeding: Except, that, bred animals shall not be denied access to the outdoors and, once bred, ruminants shall not be denied access to pasture during the grazing season; or

(8 4-H, Future Farmers of America and other youth projects, for no more than one week prior to a fair or other demonstration, through the event and up to 24 hours after the animals have arrived home at the conclusion of the event. These animals must have been maintained under continuous organic management, including organic feed, during the extent of their allowed confinement for the event.

(c) The producer of an organic livestock operation may, in addition to the times permitted under §205.239(b), temporarily deny a ruminant animal pasture or outdoor access under the following conditions:

(1) One week at the end of a lactation for dry off (for denial of access to pasture only), three weeks prior to parturition (birthing), parturition, and up to one week after parturition;

(2) In the case of newborn dairy cattle for up to six months, after which they must be on pasture during the grazing season and may no longer be individually housed: Provided, That, an animal shall not be confined or tethered in a way that prevents the animal from lying down, standing up, fully extending its limbs, and moving about freely;

(3) In the case of fiber bearing animals, for short periods for shearing; and

(4) In the case of dairy animals, for short periods daily for milking. Milking must be scheduled in a manner to ensure sufficient grazing time to provide each animal with an average of at least 30 percent DMI from grazing throughout the grazing season. Milking frequencies or duration practices cannot be used to deny dairy animals pasture.

(d) Ruminant slaughter stock, typically grain finished, shall be maintained on pasture for each day that the finishing period corresponds with the grazing season for the geographical location: Except, that, yards, feeding pads, or feedlots may be used to provide finish feeding rations. During the finishing period, ruminant slaughter stock shall be exempt from the minimum 30 percent DMI requirement from grazing. Yards, feeding pads, or feedlots used to provide finish feeding rations shall be large enough to allow all ruminant slaughter stock occupying the yard, feeding pad, or feed lot to feed simultaneously without crowding and without competition for food. The finishing period shall not exceed one-fifth (1⁄5) of the animal's total life or 120 days, whichever is shorter.

(e) The producer of an organic livestock operation must manage manure in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, heavy metals, or pathogenic organisms and optimizes recycling of nutrients and must manage pastures and other outdoor access areas in a manner that does not put soil or water quality at risk.

PASTURE FOR RUMINANTS

§205.240 Pasture practice standard

Explanation of the Standards

All organic producers raising ruminants are required to have a pasture management plan that ensures the pasture (as a crop) is being managed according to the organic crop standards, and that the animals' access to the pasture is enough for the animals to receive 30% of their dry matter intake (DMI) from pasture, on average, during the grazing season. Pasture must also be managed so as to minimize diseases and parasites, and prevent risks to soil and water quality – a common theme throughout the organic standards. The organic certifier will set up the OSP forms to collect the necessary information for you to demonstrate how you're meeting these requirements. The pasture plan, which is part of the Organic System Plan, must cover the following eight points:

- the type of pasture provided;
- management practices to ensure the quality and quantity of pasture provided;
- the grazing season that is appropriate for the farm's region;
- location, size, and maps with clear identification of pastures;
- location and types of fences (except temporary fences), shade, and water;
- soil fertility and seeding of pasture;
- erosion control and protection of natural wetlands and riparian areas.

NOP Standards

§205.240 Pasture practice standard

The producer of an organic livestock operation must, for all ruminant livestock on the operation, demonstrate through auditable records in the organic system plan, a functioning management plan for pasture.

(a) Pasture must be managed as a crop in full compliance with §205.202, §205.203(d) and (e), §205.204, and §205.206(b) through (f). Land used for the production of annual crops for ruminant grazing must be managed in full compliance with §205.202 through §205.206. Irrigation shall be used, as needed, to promote pasture growth when the operation has irrigation available for use on pasture.

…

(b) Producers must provide pasture in compliance with §205.239(a)(2) and manage pasture to comply with the requirements of: §205.237(c)(2), to annually provide a minimum of 30 percent of a ruminant's dry matter intake (DMI), on average, over the course of the grazing season(s); §205.238(a)(3), to minimize the occurrence and spread of diseases and parasites; and §205.239(e) to refrain from putting soil or water quality at risk.

(c) A pasture plan must be included in the producer's organic system plan, and be updated annually in accordance with §205.406(a). The producer may resubmit the previous year's pasture plan when no change has occurred in the plan. The pasture plan may consist of a pasture/rangeland plan developed in cooperation with a Federal, State, or local conservation office: Provided, that, the submitted plan addresses all of the requirements of §205.240(c)(1) through (8). When a change to an approved pasture plan is contemplated, which may affect the operation's compliance with the Act or the regulations in this part, the producer shall seek the certifying agent's agreement on the change prior to implementation. The pasture plan shall include a description of the:

(1) Types of pasture provided to ensure that the feed requirements of §205.237 are being met.

(2) Cultural and management practices to be used to ensure pasture of a sufficient quality and quantity is available to graze throughout the grazing season and to provide all ruminants under the organic system plan, except exempted classes identified in §205.239(c)(1) through (3), with an average of not less than 30 percent of their dry matter intake from grazing throughout the grazing season.

(3) Grazing season for the livestock operation's regional location.

(4) Location and size of pastures, including maps giving each pasture its own identification.

(5) The types of grazing methods to be used in the pasture system.

(6) Location and types of fences, except for temporary fences, and the location and source of shade and the location and source of water.

(7) Soil fertility and seeding systems.

(8) Erosion control and protection of natural wetlands and riparian areas practices

CHAPTER 5

Handling Standards

Most farmers do some sort of minimal processing of their crop, especially high value crops, before they are sold. However, it has become increasingly common for organic farmers to engage in on-farm processing in order to add more value to their crops. This section of the standards lists many of the common processing methods used, but leaves the door open for others. If you engage in value added processing for products to be marketed as organic, work with your certifier to obtain and fill out an organic handling system plan detailing the methods and products you will use.

ORGANIC HANDLING: ADDING VALUE TO ORGANIC PRODUCTS

§205.270 Organic handling requirements

Explanation of the Standards

General Organic Handling

This standard establishes the processes by which organically grown crops can be processed from the minimal, post-harvest handling steps like chilling or washing, to value-added processing methods like preserving and grinding that increase the value of the product before it is sold.

The standards address the restrictions or qualifications on the substances that can be used on or added to an organic crop. There is also a list of allowed and prohibited substances for organic handling in sections §205.605 and §205.606 of the organic standards. The Organic Material Review Institute (OMR) list can be helpful too. Products with an OMRI seal are generally acceptable for use in organic processing. **If you are interested in doing value added processing of organic products, make sure to read and learn about organic labeling requirements in sections §205.300-§205.311.** Most certifiers have some staff that specialize in organic handling. Make contact with these individuals and ask questions early on in the transition process before you engage in organic handling.

NOP Standards

§205.270 Organic handling requirements

(a) Mechanical or biological methods, including but not limited to cooking, baking, curing, heating, drying, mixing, grinding, churning, separating, distilling, extracting, slaughtering, cutting, fermenting, eviscerating, preserving, dehydrating, freezing, chilling, or otherwise manufacturing, and the packaging, canning, jarring, or otherwise enclosing food in a container may be used to process an organically produced agricultural product for the purpose of retarding spoilage or otherwise preparing the agricultural product for market.

(b) Nonagricultural substances allowed under §205.605 and nonorganically produced agricultural products allowed under §205.606 may be used:

(1) In or on a processed agricultural product intended to be sold, labeled, or represented as "organic," pursuant to §205.301(b), if not commercially available in organic form.

(2) In or on a processed agricultural product intended to be sold, labeled, or represented as "made with organic (specified ingredients or food group(s))," pursuant to §205.301(c).

(c) The handler of an organic handling operation must not use in or on agricultural products intended to be sold, labeled, or represented as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))," or in or on any ingredients labeled as organic:

(1) Practices prohibited under paragraphs (e) and (f) of §205.105.

(2) A volatile synthetic solvent or other synthetic processing aid not allowed under §205.605: Except, That, nonorganic ingredients in products labeled "made with organic (specified ingredients or food group(s))" are not subject to this requirement.

MANAGING PESTS IN ORGANIC FACILITIES

§205.271 Facility pest management practice standard

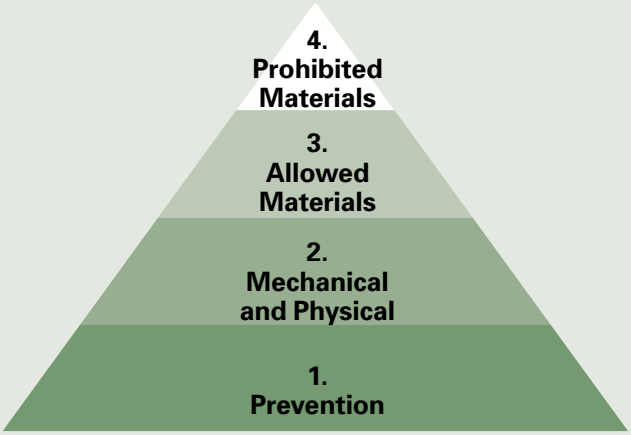
Explanation of the Standards

Pests can cause serious problems for the management of organic facilities. Complications range from economic hardship to health concerns. It is important to practice pest management strategies in order to maintain pest populations below economically damaging levels, as well as minimize the harmful effects that come with pest control on human health and environmental resources. Under organic management, facilities must use a tiered approach, trying certain methods of

1. Prevention
Pest management for organic producers and handlers who have storage and/or processing facilities is a multi-tiered system. The first step is using management practices to prevent problems before they occur. Keeping facilities sanitary, removing exterior habitat and food sources, mowing, sealing doors and windows, and creating physical barriers to prevent pests from entering are some examples of pest prevention practices.

2. Mechanical & Physical Controls
If problems persist in spite of the operator's best prevention efforts, pest controls such as sticky, mechanical, or pheromone traps may be used. However, rodent snap traps may NOT be used in the production area of a processing facility. Lures and repellents using nonsynthetic or synthetic substances consistent with the National List may also be used.

3. Allowed Materials –
When prevention and mechanical/physical control methods are not enough, nonsynthetic and synthetic pest control materials that are consistent with the National List of Approved and Prohibited Substances may be used. To determine if a substance is consistent with the National List, or check with your certifier. Even though a substance is allowed, it may not be approved to come into direct contact with certified organic products, land, or livestock. **It is therefore important that the operator discuss their plan and methods of using these substances with your certifier ahead of time. Some certifiers allow the use of bait boxes outside the facility, if there is no risk of contamination of organic products.**



4. Prohibited Materials –
Pesticide Controls Not Consistent with The National List

If steps 1-3 are not effective in preventing or controlling pests, a synthetic substance not on the National List may be used, provided that the certified operator and certifier agree on the substance, method of application, and measures to be taken to prevent contamination of certified products. Prior to using a pest management substance not on the National List, you must first:

- Document the need to use that substance. Include the specific preventative measures you have taken, any relevant pest monitoring results, allowed materials you have tried, etc.
- Document your plan to protect organic integrity while using the substance, including the substance's name, where the substance will be applied, for how long, method of application, how organic product will be protected, and other important details.

pest management prior to using others. All pest management activities should be described in the Organic System Plan (OSP) and documented on an ongoing basis. Following these steps will help you to make sure that you're following the pest management hierarchy that meets the organic standards.

NOP Standards

Facility pest management practice standard (§205.271)

(a) The producer or handler of an organic facility must use management practices to prevent pests, including but not limited to:

(1) Removal of pest habitat, food sources, and breeding areas;

(2) Prevention of access to handling facilities; and

(3) Management of environmental factors, such as temperature, light, humidity, atmosphere, and air circulation, to prevent pest reproduction.

(b) Pests may be controlled through:

(1) Mechanical or physical controls including but not limited to traps, light, or sound; or

(2) Lures and repellents using nonsynthetic or synthetic substances consistent with the National List.

(c) If the practices provided for in paragraphs (a) and (b) of this section are not effective to prevent or control pests, a nonsynthetic or synthetic substance consistent with the National List may be applied.

(d) If the practices provided for in paragraphs (a), (b), and (c) of this section are not effective to prevent or control facility pests, a synthetic substance not on the National List may be applied: Provided, That, the handler and certifying agent agree on the substance, method of application, and measures to be taken to prevent contact of the organically produced products or ingredients with the substance used.

(e) The handler of an organic handling operation who applies a nonsynthetic or synthetic substance to prevent or control pests must update the operation's organic handling plan to reflect the use of such substances and methods of application. The updated organic plan must include a list of all measures taken to prevent contact of the organically produced products or ingredients with the substance used.

(f) Notwithstanding the practices provided for in paragraphs (a), (b), (c), and (d) of this section, a handler may otherwise use substances to prevent or control pests as required by Federal, State, or local laws and regulations: Provided, That, measures are taken to prevent contact of the organically produced products or ingredients with the substance used.

ENSURING ORGANIC INTEGRITY

§205.272 Commingling and contact with prohibited substance prevention practice standard

Explanation of the Standards

This section of the standards is important to help keep the harvested organic crop from being contaminated with prohibited substances or mixed with non-organic crops (commingled). Considering all of the effort taken to raise an organic crop, care must be taken post-harvest to ensure that it remains organic.

Commingling or contamination can occur more easily on farms that produce both organic and conventional crops. However, such issues can also arise on a farm that is dedicated to only organic production. It's good to be aware of where these contaminations can accidentally occur.

- **Drift** of prohibited substances or genetic material from adjoining land
    - If you manage conventional fields, chemicals should be applied in your conventional fields in a manner that minimizes any potential for drift.
    - Grain commodities which can be grown using GMO seed varieties can lead to genetic drift if planted at the same time as your crops.
    - Additionally, neighboring land (GMO or non-GMO) may be sprayed with prohibited substances, such as non-approved synthetic herbicides which can drift to your crops if they are close enough.
    - For information on preventing these issues, see the section about buffers covered under §205.202. Buffer zones around your organic fields will help reduce the chance of prohibited substances or genetic material drifting into organic fields from your conventional fields or your neighbors'.
    - Furthermore, informing your neighbor of your organic fields and asking for their cooperation can help to minimize chemical and genetic material drift.
- **Equipment use** – If you have a split operation producing both organic and non-organic crops, you will need to clean out equipment that might be used on both these areas of your operation and document the cleaning.
    - If you share equipment with neighboring farmers who are not certified organic or who may have split operations, you will

have to take measures to be sure the equipment is cleaned properly.

- Examples of equipment that may need to be cleaned include: tractors and any seeding, tillage, weed control, spray, harvest and transport equipment.

- **Harvest** – In addition to equipment cleaning, operations growing both organic and non-organic crops must ensure that containers or temporary storage units like gravity wagons used during harvest have been adequately cleaned prior to transporting or storing organic crops.
- **Storage** – When storing crops after harvest, it is essential to have a system in place that adequately separates and labels organic crops and non-organic crops. While you may know your operation well, without labeling storage units or areas, a farmworker or helper may easily confuse the organic and non-organic storage areas by accident. To best avoid such a scenario, label all storage areas.
  - Also, if you have organic approved inputs and conventional inputs, store such products away from each other. Distinct separation makes accidental contamination near impossible.
- **Transport** – Some growers have crops picked up on-farm and others may have to transport their products themselves. Always perform a clean-out of such transportation vehicles when previously used with non-organic products.
- **Packaging** – If you decide to process any of your organic crops, you will not be able to use packing material or store your product in containers treated with synthetic fungicides, preservatives or fumigants.
  - If you are a vegetable grower considering re-using boxes for transport, note that you cannot use boxes that may have previously been treated with a fungicide wax. Check with your certifier if you are considering re-using any boxes that may have previously been treated with prohibited substances.

NOP Standards

§205.272 Commingling and contact with prohibited substance prevention practice standard

(a) The handler of an organic handling operation must implement measures necessary to prevent the commingling of organic and nonorganic products and protect organic products from contact with prohibited substances.

(b) The following are prohibited for use in the handling of any organically produced agricultural product or ingredient labeled in accordance with subpart D of this part:

(1) Packaging materials, and storage containers, or bins that contain a synthetic fungicide, preservative, or fumigant;

(2) The use or reuse of any bag or container that has been in contact with any substance in such a manner as to compromise the organic integrity of any organically produced product or ingredient placed in those containers, unless such reusable bag or container has been thoroughly cleaned and poses no risk of contact of the organically produced product or ingredient with the substance used.

THE NATIONAL LIST OF ALLOWED AND PROHIBITED SUBSTANCES

These substances have all been reviewed and subsequently added to the National List as either allowed or prohibited substances. Some of these materials have been allowed or prohibited for specific uses only and others may be used more generally. Always be aware of the intended purpose for your input. It's important to note that the National List is subject to change. The most up-to-date version is always available online in the e-CFR for 7 CFR Part 205. Most certifiers also notify clients of changes to the National List. For a summary of the decision making process for the National List, please refer to the Allowed & Prohibited Substances section on page 30.

§205.600 Evaluation criteria for allowed and prohibited substances, methods, and ingredients.

The following criteria will be utilized in the evaluation of substances or ingredients for the organic production and handling sections of the National List:

(a) Synthetic and nonsynthetic substances considered for inclusion on or deletion from the National List of allowed and prohibited substances will be evaluated using the criteria specified in the Act (7 U.S.C. 6517 and 6518).

(b) In addition to the criteria set forth in the Act, any synthetic substance used as a processing aid or adjuvant will be evaluated against the following criteria:

(1) The substance cannot be produced from a natural source and there are no organic substitutes;

(2) The substance's manufacture, use, and disposal do not have adverse effects on the environment and are done in a manner compatible with organic handling;

(3) The nutritional quality of the food is maintained when the substance is used, and the substance, itself, or its breakdown products do not have an adverse effect on human health as defined by applicable Federal regulations;

(4) The substance's primary use is not as a preservative or to recreate or improve flavors, colors, textures, or nutritive value lost during processing, except where the replacement of nutrients is required by law;

(5) The substance is listed as generally recognized as safe (GRAS) by Food and Drug Administration (FDA) when used in accordance with FDA's good manufacturing practices (GMP) and contains no residues of heavy metals or other contaminants in excess of tolerances set by FDA; and

(6) The substance is essential for the handling of organically produced agricultural products.

(c) Nonsynthetics used in organic processing will be evaluated using the criteria specified in the Act (7 U.S.C. 6517 and 6518).

§205.601 Synthetic substances allowed for use in organic crop production.

In accordance with restrictions specified in this section, the following synthetic substances may be used in organic crop production: Provided, That, use of such substances do not contribute to contamination of crops, soil, or water. Substances allowed by this section, except disinfectants and sanitizers in paragraph (a) and those substances in paragraphs (c), (j), (k), and (l) of this section, may only be used when the provisions set forth in §205.206(a) through (d) prove insufficient to prevent or control the target pest.

(a) As algaecide, disinfectants, and sanitizer, including irrigation system cleaning systems.

(1) Alcohols.

(i) Ethanol.

(ii) Isopropanol.

(2) Chlorine materials—For pre-harvest use, residual chlorine levels in the water in direct crop contact or as water from cleaning irrigation systems applied to soil must not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act, except that chlorine products may be used in edible sprout production according to EPA label directions.

(i) Calcium hypochlorite.

(ii) Chlorine dioxide.

(iii) Sodium hypochlorite.

(3) Copper sulfate—for use as an algaecide in aquatic rice systems, is limited to one application per field during any 24-month period. Application rates are limited to those which do not increase baseline soil test values for copper over a timeframe agreed upon by the producer and accredited certifying agent.

(4) Hydrogen peroxide.

(5) Ozone gas—for use as an irrigation system cleaner only.

(6) Peracetic acid—for use in disinfecting equipment, seed, and asexually propagated planting material. Also permitted in hydrogen peroxide formulations as allowed in §205.601(a) at concentration of no more than 6% as indicated on the pesticide product label.

(7) Soap-based algaecide/demossers.

(8) Sodium carbonate peroxyhydrate (CAS #-15630-89-4)—Federal law restricts the use of this substance in food crop production to approved food uses identified on the product label.

(b) As herbicides, weed barriers, as applicable.

(1) Herbicides, soap-based—for use in farmstead maintenance (roadways, ditches, right of ways, building perimeters) and ornamental crops.

(2) Mulches.

(i) Newspaper or other recycled paper, without glossy or colored inks.

(ii) Plastic mulch and covers (petroleum-based other than polyvinyl chloride (PVC)).

(iii) Biodegradable bio based mulch film as defined in §205.2. Must be produced without organisms or feedstock derived from excluded methods.

(c) As compost feed stocks—Newspapers or other recycled paper, without glossy or colored inks.

(d) As animal repellents—Soaps, ammonium—for use as a large animal repellant only, no contact with soil or edible portion of crop.

(e) As insecticides (including acaricides or mite control).

(1) Ammonium carbonate—for use as bait in insect traps only, no direct contact with crop or soil.

(2) Aqueous potassium silicate (CAS #-1312-76-1)—the silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand.

(3) Boric acid—structural pest control, no direct contact with organic food or crops.

(4) Copper sulfate—for use as tadpole shrimp control in aquatic rice production, is limited to one application per field during any 24-month period. Application rates are limited to levels which do not increase baseline soil test values for copper over a timeframe agreed upon by the producer and accredited certifying agent.

(5) Elemental sulfur.

(6) Lime sulfur—including calcium polysulfide.

(7) Oils, horticultural—narrow range oils as dormant, suffocating, and summer oils.

(8) Soaps, insecticidal.

(9) Sticky traps/barriers.

(10) Sucrose octanoate esters (CAS #s—42922-74-7; 58064-47-4)—in accordance with approved labeling.

(f) As insect management. Pheromones.

(g) As rodenticides. Vitamin D3.

(h) As slug or snail bait. Ferric phosphate (CAS # 10045-86-0).

(i) As plant disease control.

(1) Aqueous potassium silicate (CAS #-1312-76-1)—the silica, used in the manufacture of potassium silicate, must be sourced from naturally occurring sand.

(2) Coppers, fixed—copper hydroxide, copper oxide, copper oxychloride, includes products exempted from EPA tolerance, Provided, That, copper-based materials must be used in a manner that minimizes accumulation in the soil and shall not be used as herbicides.

(3) Copper sulfate—Substance must be used in a manner that minimizes accumulation of copper in the soil.

(4) Hydrated lime.

(5) Hydrogen peroxide.

(6) Lime sulfur.

(7) Oils, horticultural, narrow range oils as dormant, suffocating, and summer oils.

(8) Peracetic acid—for use to control fire blight bacteria. Also permitted in hydrogen peroxide formulations as allowed in §205.601(i) at concentration of no more than 6% as indicated on the pesticide product label.

(9) Potassium bicarbonate.

(10) Elemental sulfur.

(11) Streptomycin, for fire blight control in apples and pears only until October 21, 2014.

(12) Tetracycline, for fire blight control in apples and pears only until October 21, 2014.

(j) As plant or soil amendments.

(1) Aquatic plant extracts (other than hydrolyzed)—Extraction process is limited to the use of potassium hydroxide or sodium hydroxide; solvent amount used is limited to that amount necessary for extraction.

(2) Elemental sulfur.

(3) Humic acids—naturally occurring deposits, water and alkali extracts only.

(4) Lignin sulfonate—chelating agent, dust suppressant.

(5) Magnesium sulfate—allowed with a documented soil deficiency.

(6) Micronutrients—not to be used as a defoliant, herbicide, or desiccant. Those made from nitrates or chlorides are not allowed. Soil deficiency must be documented by testing.

(i) Soluble boron products.

(ii) Sulfates, carbonates, oxides, or silicates of zinc, copper, iron, manganese, molybdenum, selenium, and cobalt.

(7) Liquid fish products—can be pH adjusted with sulfuric, citric or phosphoric acid. The amount of acid used shall not exceed the minimum needed to lower the pH to 3.5.

(8) Vitamins, B1, C, and E.

(9) Sulfurous acid (CAS # 7782-99-2) for on-farm generation of substance utilizing 99% purity elemental sulfur per paragraph (j)(2) of this section.

(k) As plant growth regulators. Ethylene gas—for regulation of pineapple flowering.

(l) As floating agents in postharvest handling.

(1) Lignin sulfonate.

(2) Sodium silicate—for tree fruit and fiber processing.

(m) As synthetic inert ingredients as classified by the Environmental Protection Agency (EPA), for use with nonsynthetic substances or synthetic substances listed in this section and used as an active pesticide ingredient in accordance with any limitations on the use of such substances.

(1) EPA List 4—Inerts of Minimal Concern.

(2) EPA List 3—Inerts of unknown toxicity—for use only in passive pheromone dispensers.

(n) Seed preparations. Hydrogen chloride (CAS # 7647-01-0)—for delinting cotton seed for planting.

(o) As production aids. Microcrystalline cheese wax (CAS #'s 64742-42-3, 8009-03-08, and 8002-74-2)-for use in log grown mushroom production. Must be made without either ethylene-propylene co-polymer or synthetic colors.

(p)-(z) [Reserved]

[65 FR 80637, Dec. 21, 2000, as amended at 68 FR 61992, Oct. 31, 2003; 71 FR 53302 Sept. 11, 2006; 72 FR 69572, Dec. 10, 2007; 75 FR 38696, July 6, 2010; 75 FR 77524, Dec. 13, 2010; 77 FR 8092, Feb. 14, 2012; 77 FR 33298, June 6, 2012; 77 FR 45907, Aug. 2, 2012; 78 FR 31821, May 28, 2013; 79 FR 58663, Sept. 30, 2014]

§205.602 Nonsynthetic substances prohibited for use in organic crop production

The following nonsynthetic substances may not be used in organic crop production:

(a) Ash from manure burning.

(b) Arsenic.

(c) Calcium chloride, brine process is natural and prohibited for use except as a foliar spray to treat a physiological disorder associated with calcium uptake.

(d) Lead salts.

(e) Potassium chloride—unless derived from a mined source and applied in a manner that minimizes chloride accumulation in the soil.

(f) Sodium fluoaluminate (mined).

(g) Sodium nitrate—unless use is restricted to no more than 20% of the crop's total nitrogen requirement; use in spirulina production is unrestricted until October 21, 2005.

(h) Strychnine.

(i) Tobacco dust (nicotine sulfate).

(j)-(z) [Reserved]

[68 FR 61992, Oct. 31, 2003]

§205.603 Synthetic substances allowed for use in organic livestock production

In accordance with restrictions specified in this section the following synthetic substances may be used in organic livestock production:

(a) As disinfectants, sanitizer, and medical treatments as applicable.

(1) Alcohols.

(i) Ethanol-disinfectant and sanitizer only, prohibited as a feed additive.

(ii) Isopropanol-disinfectant only.

(2) Aspirin-approved for health care use to reduce inflammation.

(3) Atropine (CAS #-51-55-8)—federal law restricts this drug to use by or on the lawful written or oral order of a licensed veterinarian, in full compliance with the AMDUCA and 21 CFR part 530 of the Food and Drug Administration regulations. Also, for use under 7 CFR part 205, the NOP requires:

(i) Use by or on the lawful written order of a licensed veterinarian; and

(ii) A meat withdrawal period of at least 56 days after administering to livestock intended for slaughter; and a milk discard period of at least 12 days after administering to dairy animals.

(4) Biologics—Vaccines.

(5) Butorphanol (CAS #-42408-82-2)—federal law restricts this drug to use by or on the lawful written or oral order of a licensed veterinarian, in full compliance with the AMDUCA and 21 CFR part 530 of the Food and Drug Administration regulations. Also, for use under 7 CFR part 205, the NOP requires:

(i) Use by or on the lawful written order of a licensed veterinarian; and

(ii) A meat withdrawal period of at least 42 days after administering to livestock intended for slaughter; and a milk discard period of at least 8 days after administering to dairy animals.

(6) Chlorhexidine—Allowed for surgical procedures conducted by a veterinarian. Allowed for use as a teat dip when alternative germicidal agents and/or physical barriers have lost their effectiveness.

(7) Chlorine materials—disinfecting and sanitizing facilities and equipment. Residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act.

(i) Calcium hypochlorite.

(ii) Chlorine dioxide.

(iii) Sodium hypochlorite.

(8) Electrolytes—without antibiotics.

(9) Flunixin (CAS #-38677-85-9)—in accordance with approved labeling; except that for use under 7 CFR part 205, the NOP requires a withdrawal period of at least two-times that required by the FDA.

(10) Furosemide (CAS #-54-31-9)—in accordance with approved labeling; except that for use under 7 CFR part 205, the NOP requires a withdrawal period of at least two-times that required that required by the FDA.

(11) Glucose.

(12) Glycerine—Allowed as a livestock teat dip, must be produced through the hydrolysis of fats or oils. (13) Hydrogen peroxide.

(14) Iodine.

(15) Magnesium hydroxide (CAS #-1309-42-8)—federal law restricts this drug to use by or on the lawful written or oral order of a licensed veterinarian, in full compliance with the AMDUCA and 21 CFR part 530 of the Food and Drug Administration regulations. Also, for use under 7 CFR part 205, the NOP requires use by or on the lawful written order of a licensed veterinarian.

(16) Magnesium sulfate.

(17) Oxytocin—use in postparturition therapeutic applications.

(18) Parasiticides—Prohibited in slaughter stock, allowed in emergency treatment for dairy and breeder stock when organic system plan-approved preventive management does not prevent infestation. Milk or milk products from a treated animal cannot be labeled as provided for in subpart D of this part for 90 days following treatment. In breeder stock, treatment cannot occur during the last third of gestation if the progeny will be sold as organic and must not be used during the lactation period for breeding stock.

(i) Fenbendazole (CAS #43210-67-9)—only for use by or on the lawful written order of a licensed veterinarian.

(ii) Ivermectin (CAS #70288-86-7).

(iii) Moxidectin (CAS #113507-06-5)—for control of internal parasites only.

(19) Peroxyacetic/peracetic acid (CAS #-79-21-0)—for sanitizing facility and processing equipment.

(20) Phosphoric acid—allowed as an equipment cleaner, Provided, That, no direct contact with organically managed livestock or land occurs.

(21) Poloxalene (CAS #-9003-11-6)—for use under 7 CFR part 205, the NOP requires that poloxalene only be used for the emergency treatment of bloat.

(22) Tolazoline (CAS #-59-98-3)—federal law restricts this drug to use by or on the lawful written or oral order of a licensed veterinarian, in full compliance with the AMDUCA and 21 CFR part 530 of the Food and Drug Administration regulations. Also, for use under 7 CFR part 205, the NOP requires:

(i) Use by or on the lawful written order of a licensed veterinarian;

(ii) Use only to reverse the effects of sedation and analgesia caused by Xylazine; and

(iii) A meat withdrawal period of at least 8 days after administering to livestock intended for slaughter; and a milk discard period of at least 4 days after administering to dairy animals.

(23) Xylazine (CAS #-7361-61-7)—federal law restricts this drug to use by or on the lawful written or oral order of a licensed veterinarian, in full compliance with the AMDUCA and 21 CFR part 530 of the Food and Drug Administration regulations. Also, for use under 7 CFR part 205, the NOP requires:

(i) Use by or on the lawful written order of a licensed veterinarian;

(ii) The existence of an emergency; and

(iii) A meat withdrawal period of at least 8 days after administering to livestock intended for slaughter; and a milk discard period of at least 4 days after administering to dairy animals.

(b) As topical treatment, external parasiticide or local anesthetic as applicable.

(1) Copper sulfate.

(2) Formic acid (CAS # 64-18-6)—for use as a pesticide solely within honeybee hives.

(3) Iodine.

(4) Lidocaine—as a local anesthetic. Use requires a withdrawal period of 90 days after administering to livestock intended for slaughter and 7 days after administering to dairy animals.

(5) Lime, hydrated—as an external pest control, not permitted to cauterize physical alterations or deodorize animal wastes.

(6) Mineral oil—for topical use and as a lubricant.

(7) Procaine—as a local anesthetic, use requires a withdrawal period of 90 days after administering to livestock intended for slaughter and 7 days after administering to dairy animals.

(8) Sucrose octanoate esters (CAS #s-42922-74-7; 58064-47-4)—in accordance with approved labeling.

(c) As feed supplements—None.

(d) As feed additives.

(1) DL-Methionine, DL-Methionine-hydroxy analog, and DL-Methionine-hydroxy analog calcium (CAS #'s 59-51-8, 583- 91-5, 4857-44-7, and 922-50-9)—for use only in organic poultry production at the following maximum levels of synthetic methionine per ton of feed: Laying and broiler chickens—2 pounds; turkeys and all other poultry—3 pounds.

(2) Trace minerals, used for enrichment or fortification when FDA approved.

(3) Vitamins, used for enrichment or fortification when FDA approved.

(e) As synthetic inert ingredients as classified by the Environmental Protection Agency (EPA), for use with nonsynthetic substances or synthetic substances listed in this section and used as an active pesticide ingredient in accordance with any limitations on the use of such substances.

(1) EPA List 4—Inerts of Minimal Concern.

(2) [Reserved]

(f) Excipients, only for use in the manufacture of drugs used to treat organic livestock when the excipient is: Identified by the FDA as Generally Recognized As Safe; Approved by the FDA as a food additive; or Included in the FDA review and approval of a New Animal Drug Application or New Drug Application.

(g)-(z) [Reserved]

[72 FR 70484, Dec. 12, 2007, as amended at 73 FR 54059, Sept. 18, 2008; 75 FR 51924, Aug. 24, 2010; 77 FR 28745, May 15, 2012; 77 FR 45907, Aug. 2, 2012; 77 FR 57989, Sept. 19, 2012]

§205.604 Nonsynthetic substances prohibited for use in organic livestock production

The following nonsynthetic substances may not be used in organic livestock production:

(a) Strychnine.

(b)-(z) [Reserved]

§205.605 Nonagricultural (nonorganic) substances allowed as ingredients in or on processed products labeled as "organic" or "made with organic (specified ingredients or food group(s))."

The following nonagricultural substances may be used as ingredients in or on processed products labeled as "organic" or "made with organic (specified ingredients or food group(s))" only in accordance with any restrictions specified in this section.

(a) Nonsynthetics allowed:

Acids (Alginic; Citric—produced by microbial fermentation of carbohydrate substances; and Lactic).

Agar-agar.

Animal enzymes—(Rennet—animals derived; Catalase—bovine liver; Animal lipase; Pancreatin; Pepsin; and Trypsin).

Attapulgite—as a processing aid in the handling of plant and animal oils.

Bentonite.

Calcium carbonate.

Calcium chloride.

Calcium sulfate—mined.

Carrageenan.

Dairy cultures.

Diatomaceous earth—food filtering aid only.

Egg white lysozyme (CAS # 9001-63-2)

Enzymes—must be derived from edible, nontoxic plants, nonpathogenic fungi, or nonpathogenic bacteria.

Flavors, nonsynthetic sources only and must not be produced using synthetic solvents and carrier systems or any artificial preservative.

Gellan gum (CAS # 71010-52-1)—high-acyl form only.

Glucono delta-lactone—production by the oxidation of D-glucose with bromine water is prohibited. Kaolin.

L-Malic acid (CAS # 97-67-6).

Magnesium sulfate, nonsynthetic sources only.

Microorganisms—any food grade bacteria, fungi, and other microorganism.

Nitrogen—oil-free grades.

Oxygen—oil-free grades.

Perlite—for use only as a filter aid in food processing. Potassium chloride.

Potassium iodide.

Sodium bicarbonate.

Sodium carbonate.

Tartaric acid—made from grape wine. Waxes—nonsynthetic (Carnauba wax; and Wood resin).

Yeast—When used as food or a fermentation agent in products labeled as "organic," yeast must be organic if its end use is for human consumption; nonorganic yeast may be used when organic yeast is not commercially available. Growth on petrochemical substrate and sulfite waste liquor is prohibited. For smoked yeast, nonsynthetic smoke flavoring process must be documented.

(b) Synthetics allowed:

Acidified sodium chlorite—Secondary direct antimicrobial food treatment and indirect food contact surface sanitizing. Acidified with citric acid only.

Activated charcoal (CAS #s 7440-44-0; 64365-11-3)—only from vegetative sources; for use only as a filtering aid. Alginates.

Ammonium bicarbonate—for use only as a leavening agent.

Ammonium carbonate—for use only as a leavening agent.

Ascorbic acid.

Calcium citrate.

Calcium hydroxide.

Calcium phosphates (monobasic, dibasic, and tribasic).

Carbon dioxide.

Cellulose—for use in regenerative casings, as an anti-caking agent (non-chlorine bleached) and filtering aid.

Chlorine materials—disinfecting and sanitizing food contact surfaces, Except, That, residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water Act (Calcium hypochlorite; Chlorine dioxide; and Sodium hypochlorite).

Cyclohexylamine (CAS # 108-91-8)—for use only as a boiler water additive for packaging sterilization. Diethylaminoethanol (CAS # 100-37-8)—for use only as a boiler water additive for packaging sterilization. Ethylene—allowed for postharvest ripening of tropical fruit and degreening of citrus.

Ferrous sulfate—for iron enrichment or fortification of foods when required by regulation or recommended (independent organization).

Glycerides (mono and di)—for use only in drum drying of food.

Glycerin—produced by hydrolysis of fats and oils.

Hydrogen peroxide.

Magnesium carbonate—for use only in agricultural products labeled "made with organic (specified ingredients or food group(s))," prohibited in agricultural products labeled "organic".

Magnesium chloride—derived from sea water.

Magnesium stearate—for use only in agricultural products labeled "made with organic (specified ingredients or food group(s))," prohibited in agricultural products labeled "organic".

Nutrient vitamins and minerals, in accordance with 21 CFR 104.20, Nutritional Quality Guidelines For Foods.

Octadecylamine (CAS # 124-30-1)—for use only as a boiler water additive for packaging sterilization.

Ozone.

Peracetic acid/Peroxyacetic acid (CAS # 79-21-0)—for use in wash and/or rinse water according to FDA limitations. For use as a sanitizer on food contact surfaces.

Phosphoric acid—cleaning of food-contact surfaces and equipment only. Potassium acid tartrate.

Potassium carbonate.

Potassium citrate.

Potassium hydroxide—prohibited for use in lye peeling of fruits and vegetables except when used for peeling peaches.

Potassium phosphate—for use only in agricultural products labeled "made with organic (specific ingredients or food group(s)), " prohibited in agricultural products labeled "organic".

Silicon dioxide—Permitted as a defoamer. Allowed for other uses when organic rice hulls are not commercially available. Sodium acid pyrophosphate (CAS # 7758-16-9)—for use only as a leavening agent.

Sodium citrate.

Sodium hydroxide—prohibited for use in lye peeling of fruits and vegetables.

Sodium phosphates—for use only in dairy foods.

Sulfur dioxide—for use only in wine labeled "made with organic grapes," Provided, That, total sulfite concentration does not exceed 100 ppm.

Tetrasodium pyrophosphate (CAS # 7722-88-5)—for use only in meat analog products.
Tocopherols—derived from vegetable oil when rosemary extracts are not a suitable alternative.
Xanthan gum.

(c)-(z) [Reserved]

[68 FR 61993, Oct. 31, 2003, as amended as 68 FR 62217, Nov. 3, 2003; 71 FR 53302, Sept. 11, 2006; 72 FR 58473, Oct. 16, 2007; 73 FR 59481, Oct. 9, 2008; 75 FR 77524, Dec. 13, 2010; 77 FR 8092, Feb. 14, 2012; 77 FR 33298, June 6, 2012; 77 FR 45907, Aug. 2, 2012; 78 FR 31821, May 28, 2013; 78 FR 61161, Oct. 3, 2013]

§205.606 Nonorganically produced agricultural products allowed as ingredients in or on processed products labeled as "organic."

Only the following nonorganically produced agricultural products may be used as ingredients in or on processed products labeled as "organic," only in accordance with any restrictions specified in this section, and only when the product is not commercially available in organic form.

(a) Casings, from processed intestines.

(b) Celery powder.

(c) Chia (Salvia hispanica L.).

(d) Colors derived from agricultural products—Must not be produced using synthetic solvents and carrier systems or any artificial preservative.

(1) Beet juice extract color (pigment CAS #7659-95-2).

(2) Beta-carotene extract color—derived from carrots or algae (pigment CAS# 7235-40-7).

(3) Black currant juice color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3).

(4) Black/Purple carrot juice color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04- 3).

(5) Blueberry juice color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3).

(6) Carrot juice color (pigment CAS #1393-63-1).

(7) Cherry juice color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3).

(8) Chokeberry—Aronia juice color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04- 3).

(9) Elderberry juice color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3).

(10) Grape juice color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3).

(11) Grape skin extract color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3). (12) Paprika color (CAS #68917-78-2)—dried, and oil extracted.

(13) Pumpkin juice color (pigment CAS #127-40-2).

(14) Purple potato juice (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3).

(15) Red cabbage extract color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3). (16) Red radish extract color (pigment CAS #'s: 528-58-5, 528-53-0, 643-84-5, 134-01-0, 1429-30-7, and 134-04-3).

(17) Saffron extract color (pigment CAS #1393-63-1).

(18) Turmeric extract color (CAS #458-37-7). (e) Dill weed oil (CAS # 8006-75-5).

(f) Fish oil (Fatty acid CAS #'s: 10417-94-4, and 25167-62-8)—stabilized with organic ingredients or only with ingredients on the National List, §205.605 and §205.606.

(g) Fortified cooking wines.

(1) Marsala.

(2) Sherry.

(h) Fructooligosaccharides (CAS # 308066-66-2).

(i) Galangal, frozen.

(j) Gelatin (CAS # 9000-70-8).

(k) Gums—water extracted only (Arabic; Guar; Locust bean; and Carob bean). (l) Inulin-oligofructose enriched (CAS # 9005-80-5).

(m) Kelp—for use only as a thickener and dietary supplement.

(n) Konjac flour (CAS # 37220-17-0).

(o) Lecithin—de-oiled.

(p) Lemongrass—frozen.

(q) Orange pulp, dried.

(r) Orange shellac-unbleached (CAS # 9000-59-3).

(s) Pectin (non-amidated forms only).

(t) Peppers (Chipotle chile).

(u) Seaweed, Pacific kombu.

(v) Starches.

(1) Cornstarch (native).

(2) Sweet potato starch—for bean thread production only. (w) Tragacanth gum (CAS #-9000-65-1).

(x) Turkish bay leaves.

(y) Wakame seaweed (Undaria pinnatifida).

(z) Whey protein concentrate.

[72 FR 35140, June 27, 2007, as amended at 75 FR 77524, Dec. 13, 2010; 77 FR 8092, Feb. 14, 2012; 77 FR 33299, June 6, 2012; 77 FR 44429, July 30, 2012; 78 FR 31821, May 28, 2013; 79 FR 58663, Sept. 30, 2014]

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