Guide for Organic Crop Producers

By Pamela Coleman
National Center for Appropriate Technology (NCAT)
Agriculture Specialist

November 2012

Contents

Chapter 1
Introduction 1

Chapter 2
Organic Agriculture – Description and History 3

Chapter 3
The Certification Process 7

Chapter 4
Writing the Organic System Plan (OSP) 13

Chapter 5
Soil Fertility 18

Chapter 6
Seeds and Planting Stock 25

Chapter 7
Crop Rotation 29

Chapter 8
Managing Pests, Weeds, and Diseases 32

Chapter 9
The National List of Allowed and Prohibited Substances 37

Chapter 10
Greenhouse Production 43

Chapter 11
Preventing Contamination of Organic Crops 46

Chapter 12
Post-Harvest and Labeling 50

Chapter 13
Recordkeeping 54

Chapter 14
Structural Pest Management 57

Chapter 15
Resources 61

CHAPTER 1
INTRODUCTION

New farmers, and farmers experienced in conventional agriculture, often find that obtaining organic certification for their crops is quite challenging. This guide is intended to help lead farmers through the organic certification process. Chapters 1 through 4 explain the National Organic Program (NOP) and describe the process of organic certification. Later chapters explain specific USDA organic regulations that apply to planting, soil fertility, pest management, and other farm practices. In addition to interpreting the regulations, this guide explains the practices and materials that are allowed for organic production.

Who should read this guide?

- Conventional farmers who are considering organic certification for their crops.
- Farmers in the process of converting to organic practices.
- Farmers who are new to organic certification.
- Farmers who are exempt from certification because they sell less than $5,000 of organic produce per year.
- Extension personnel and other information providers.

This guide was designed to be read before completing an application for organic certification. This is not a required document; it is a helpful guide that you may use as you wish.

How to use this guide

To be certified organic by the U.S. Department of Agriculture (USDA), farms must be managed in accordance with the regulations in Title 7, Part 205 of the Code of Federal Regulations. Where the USDA organic seal appears, the text quotes from these Federal regulations. The verbatim text of the regulation language follows the section and paragraph (for example, § 205.203). The verbatim text is followed by an explanation of the regulation.

This guide uses the term "USDA organic regulations" to refer to the United States' Federal regulations that govern organic crop production, livestock production, handling, processing, and labeling. Different terminology is often used in other publications to refer to the same regulations: "National Organic Standards," "NOP Final Rule," or simply "standards," "Rules," or "requirements" are common examples. In this guide, some of the section titles in the regulations are referred to as "standards" to correspond with the actual text—for example, "§ 205.204 Seeds and planting stock practice standard."

The term "standard" is also commonly used in relationship to the National Organic Standards Board (NOSB). The NOSB is a citizen advisory board that helps the U.S. Department of Agriculture (USDA) determine which substances and practices may be used in certified organic production and handling. However, these recommendations are not part of the USDA organic regulations until the USDA decides the appropriate regulatory direction after completing a formal review and receiving public comments.

The book icon indicates publications available from ATTRA-National Sustainable Agriculture Information Service. ATTRA provides farmers and educators with information about sustainable agriculture via toll-free helplines, an extensive Web site, and hundreds of publications. These publications can be downloaded from the ATTRA Web site, or you can call the ATTRA helpline to request a print copy. ATTRA's Web site is www.attra.ncat.org. Its English-language helpline number is 800-346-9140; the Spanish-language helpline number is 800-411-3222.

Additional useful resources can be found at the end of this guide.

This icon indicates resources that are available on the Internet.

This icon precedes the questions at the end of each chapter. The questions serve as a checklist to help you evaluate your farm's eligibility for organic certification and identify areas where your practices may need to be changed.

Consider each of the questions carefully and place a check in the appropriate Yes, No, or Not Applicable box. Answers that accurately reflect your current circumstances will be the most helpful to you. Ideally, most of your checks will be in the Yes boxes. Negative answers may indicate a need to modify your farm practices to comply with the regulations.

When you have questions about whether a particular practice or product is allowed in organic production, consult a certifying agent.

This icon at the end of a chapter indicates a place where you can add your own notes.

Notes

CHAPTER 2
ORGANIC AGRICULTURE – DESCRIPTION AND HISTORY

The origins of organic farming

Contemporary American organic farming has its roots in the humus farming movements that spread across Great Britain and continental Europe from the 1920s through the 1950s. These movements evolved largely in response to the increasing use of synthetic fertilizers and pesticides. The proponents of humus farming believed that the highest quality food and the sustainability of agriculture were achieved by "feeding the soil," thereby building soil fertility. Their goal was to increase the humus—the fully decomposed organic matter that has reached a stable state in the soil. Humus farming was typified by mixed farms that included livestock, food crops, feed crops, and green manures. Humus farming made little or no use of soluble commercial fertilizers or pesticides, in part because the health of the soil rendered them unnecessary.

The 1960s and 1970s brought more visibility to organic farming in the United States, as public concern over pesticide use increased. In the minds of consumers, the non-use of pesticides was an important part of organic agriculture. The growth of the organic industry during this era led to the establishment of standards and third-party certification. Third-party certification is an assessment process carried out to verify compliance with standards. It involves the producer (farmer), the consumer (buyer), and a third party—the certifying agent who affirms that the product is produced in accordance with the organic regulations.

As the organic industry expanded during the 1980s, different certifiers developed their own standards and certification processes. As a result, some certifiers did not accept the validity of organic certification by other certifiers. These disparities among certifier standards resulted in barriers to trade, which led many to believe that a consistent set of standards was needed: a single set of U.S. standards for organic production, labeling, and marketing. Eventually, Congress passed the Organic Foods Production Act (OFPA) of 1990. This act mandated creation of the National Organic Program (NOP), which is part of the U.S. Department of Agriculture (USDA) and the National Organic Standards Board (NOSB).

The NOSB is an advisory board of 15 volunteers:

- Organic producers (farmers)
- Organic handlers (processors)
- Retailers
- Environmentalists
- Scientists
- Consumer advocates

After the NOSB makes a recommendation on a new regulation or standard, there is a review and comment period. The NOP then determines the appropriate regulatory action to carry forward. In addition to the setting of standards (rulemaking), the accreditation of organic certifiers and the enforcement of the regulations are important tasks of the NOP.

The definition of organic

With regulation came the need for more formal definitions of the term "organic." In 1995, the NOSB defined organic agriculture as "an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity."

Related ATTRA publications

www.attra.ncat.org

National Organic Program Compliance Checklist for Producers

Organic Standards for Crop Production: Highlights of the USDA's National Organic Program Regulations

In 2002, the NOP defined organic agriculture: "Organic production [is] a production system that…respond[s] to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biological diversity" [§ 205.2].

This definition conveys both what makes each organic farm unique and all organic farms alike. Each farm is unique because farmers must make management decisions based on the singular conditions found in their own operations. Soil types, crop varieties, fertility requirements, pest pressures—no two organic farmers will manage all the variables that impact their farms the same way. Nor will changes in annual conditions such as rainfall and frost date allow an organic farmer to operate the same way year in and year out. Each season, organic farmers encounter a one-of-a-kind set of natural resource and environmental conditions to which they must adapt and respond.

Organic agriculture as a production system

"Organic production [is] a production system that…respond[s] to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biological diversity" [§ 205.2].

Both definitions of organic agriculture above describe organic agriculture as a production system. This systems approach strives to understand how all parts of the system work together. In a systems approach, the farmer will consider how soil, water, plants, animals, insects, bacteria, fungi, and all other parts of the system can interact to cause problems or prevent them.

The farmer's management toolkit combines three types of techniques: cultural (e.g., planting disease-resistant varieties); biological (e.g., pheromone traps); and mechanical (e.g., appropriate tillage). Organic farmers combine these practices into a productive management system that minimizes the impact to the off-farm environment. All organic farmers share this approach, though their specific objectives determine how they implement it.

Since its beginning, organic agriculture has also been based on the principle of sustainability. Sustainability can be defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs. In practice, this means that sustainable farming includes a focus on building the soil with farm-generated fertility, which will be covered in more detail in Chapter 5. Many farmers who convert from conventional to organic systems find that over time, as they add organic matter, populations of soil microbes and soil invertebrates will naturally increase, resulting in a rich, productive soil. This process can take several years. In time, the healthy, biologically active soil will produce healthy plants. The farmers then need fewer off-farm inputs because their crops are better able to resist drought, diseases, and insects.

In addition to building healthy soil, successful organic farmers focus on preventing problems, rather than reacting to them. For example, organic farmers prevent insect problems by providing habitat for beneficial insects that keep populations of harmful insects in check. This guide provides many more examples in later chapters.

The importance of soil building and the need for a systems approach to organic production are sometimes overlooked or underestimated. For example, a standard practice in conventional agriculture is to plant large acreages in a single crop, which is very attractive to insect pests. The farmer monitors insect populations, and when the populations get so high that they might damage the plants, the farmer sprays insecticides. When farmers approach organic agriculture with an "input substitution" mentality, they react to high insect populations in the same way— search the list of allowed insecticides and choose which one to spray. This approach can be frustrating to the farmer. When it comes to broad-spectrum insecticides, there are fewer tools in the organic toolbox than in the conventional toolbox,

and the tools approved for organic use can be more expensive. From this perspective, farmers might view organic production as a very limiting approach to farming.

"Input substitution," however, is not the approach encouraged by the organic regulations. This guide explains many techniques available to build soil, grow healthy crops, and prevent pest outbreaks. Many farmers who converted from conventional to organic practices found that this approach contributed to their success.

Another approach to organic farming is sometimes referred to as "organic by neglect." In this approach, essentially no inputs are used. The farmer avoids the use of prohibited chemicals but also neglects the farm-management practices needed to build soil fertility and prevent pest and disease outbreaks. This often results in poor crop quality and productivity and is in contrast to the organic philosophy of active management to build soil organic matter and enhance biodiversity.

The National Organic Program

Sustainability can be defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

The NOP began in 1990 to develop regulations applicable to organic certification. These regulations—known as the NOP Final Rule at the time—went into effect in October 2002 and govern organic crop production, livestock production, handling, processing, and labeling. The regulations can be found under Title 7, Part 205, of the Code of Federal Regulations. Title 7 deals with agriculture, one of 50 broad topic areas that are subject to Federal regulation.

The regulations include certification requirements, which producers must meet to sell their products as organic. Organic certification is the process of verifying compliance with organic regulations. The assessment process is carried out by a third-party certifier—an independent body that is not linked to either the seller (the farmer) or the buyer. Products to be sold as organic in the United States must be certified organic to the regulations and must be certified by a USDA-accredited certifying agent (ACA). There are about 100 such ACAs currently operating worldwide. Some certified organic products may be labeled with the USDA organic seal.

Many other countries, including Japan and members of the European Union (EU), have their own standards for organic products. Organic producers planning to export their products (or sell them to distributors who may export them) should ask their buyers whether they need to be certified to additional standards as well as USDA organic regulations. The United States has equivalence arrangements with Canada and, beginning June 1, 2012, with the EU. Organic products certified to the USDA organic regulations may be sold, labeled, and represented as organic in Canada and EU member countries. This arrangement eliminates the need for U.S. organic operations to have a separate certification to the Canadian or EU standards and vice versa. There are a few exceptions to this equivalence, called "critical variances." For example, a critical variance for EU-bound food is that crops produced using antibiotics (streptomycin for fire blight control in apples and pears) may not be sold as organic in the EU under the arrangement. Check the NOP Web site for current information regarding critical variances.

The USDA organic regulations also include general requirements for accreditation, which establish the requirements that certifiers must meet in order to issue organic certificates. The processes for farm certification and certifier accreditation are similar: an application that describes the operation's procedures, an onsite inspection, and a report that indicates any changes that must be made to comply with the regulations. This accreditation process ensures that all certifiers apply the regulations in the same way. The NOP maintains a list of ACAs on its Web site.

Organic certification

§ 205.100 What has to be certified

Under the regulations, most operations or portions of operations that produce or handle agricultural products that are intended to be sold, labeled, or represented as organic must be certified. Producers who illegally represent their products as organic may be subject to prosecution and fines of up to $11,000 for each violation.

> *During the application process, many certifiers will require farmers to sign an agreement that they will comply with the organic production and handling regulations in accordance with Title 7 CFR Part 205 National Organic Program Rule.*

§ 205.101 Exemptions and exclusions from certification

Producers who market less than $5,000 of organic products annually are not required to apply for organic certification. They must, however, comply with the organic production and handling requirements of the regulations, including recordkeeping. The products from non-certified operations cannot be used as organic ingredients in processed products produced by another operation, cannot be used as feed for organic animals, and may not display the USDA organic seal.

Online Resources

USDA National Organic Program, www.ams.usda.gov/nop

U.S.–European Union Organic Equivalence Arrangement Questions and Answers, www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5097061

Notes

CHAPTER 3

THE CERTIFICATION PROCESS

Certification under the National Organic Program (NOP) is required to label, represent, and market qualifying products as organic. Organic regulations are covered in Title 7, Part 205 of the Code of Federal Regulations. Subpart C is entitled "Organic Production and Handling Requirements." The full text of the organic regulations is available on the NOP Web site and key portions of the text are excerpted in ATTRA's "Organic Standards for Crop Production." The regulations are arranged in outline format, using letters, numbers, and Roman numerals to indicate the levels, as follows— § 205.203 (a)(1)(i).

This guide does not include the full text of the regulations; rather, it provides excerpts from the text and an interpretation of the regulations that apply to fruits, vegetables, field crops, herbs, and greenhouse operations. If you raise mushrooms, sprouts, or livestock, you'll need to consult additional references.

There are two categories of organic operations: producers and handlers. Organic producers may grow crops, collect plants from the wild, or raise livestock. These farming operations receive an organic producer certificate. Organic handlers may buy food for resale or may process foods (slicing, freezing, drying, mixing, blending, etc.). These operations receive an organic handler certificate. The organic certificate verifies that the producer or handler has complied with organic regulations and allows her or him to sell or represent the product as organic. Producer certificates include the type of crop (e.g., carrots, apples) and may include other information as well. Sometimes crop varieties are listed (Fuji apples), as well as farm acreage and the name of the field from which the crop has been harvested.

This guide covers only the regulations for crop producers. Producers who are processing their products—into jams, bread, or juice, for example—need to ask their certifier if a handler certificate is required for those products. In some cases, certifiers will allow farmers to do some minor processing, such as freezing or drying, without applying for a separate certification.

The process of getting certified has several steps and often requires 3 to 6 months to complete. In applying for certification, the farmer agrees to understand the regulations, be available for inspection, allow the certifier access to the farm, and answer all of the certifier's questions. The certifier reads the application, assigns an inspector, reviews the inspection report, and makes the certification decision.

Before beginning the certification process, it is important to consider whether your land is eligible for organic status, as explained below.

Related ATTRA publications

www.attra.ncat.org

Organic Certification Process

Organic Field Crops Documentation Forms

Organic Market Farm Documentation Forms

Organic Standards for Crop Production

Transitioning to organic production

A field is eligible for organic status if no prohibited materials have been applied for a period of 36 months. For example, if an apple orchard was last sprayed with a synthetic fungicide on August 1, 2010, then a crop harvested September 1, 2013, may be sold as organic, but only if you have a certificate verifying the organic status. You will need to be able to document all land use and material applications during the transitional time period. See Chapter 4 "Writing the Organic System Plan" for more information about documentation needed for new sites.

Many of the fertilizers, insecticides, herbicides, and fungicides used by conventional farmers are prohibited in organic production. This includes the fungicides present on treated seeds. Chapter 9 "The National List of Allowed and Prohibited Substances" explains how to determine if a product is allowed or prohibited. Certain practices, while not allowed in organic production, would not constitute application of a prohibited material, and so

would not render land ineligible for certification during the transition period. Examples include the use of nonorganic seed or planting stock, application of manure to a food crop within 90 days of harvest, and cultivation of genetically modified crops.

The certification process

If you understand the regulations and your land is eligible for transitional or organic status, you're ready to begin the certification process. The steps are as follows:

1. The farmer submits an application to a certifier

Producers obtain certification from state or private certifiers who are accredited by the NOP. Farmers may apply to any accredited certification agent (ACA). A list of all ACAs can be found on the NOP Web site listed at the end of this chapter.

The cost of organic certification is borne by the certified operations and is paid directly to the certifying agent. Certification fees may vary significantly among certifiers. Most certifiers charge a one-time fee to new applicants to cover the administrative and review costs. Annual renewal fees, usually based on the sales of organic products, are assessed each year. The NOP currently operates a cost-share program to help defray the cost of certification for organic farmers. The program is explained below under Funding Opportunities.

To allow time for the entire certification process, submit your application at least 3 to 4 months before the harvest of your first organic crop. If you need a certificate more quickly, some certifiers will expedite your application for an additional fee.

The documents sent to a certifier are often collectively called the "application," but in reality there are several separate documents required:

- Application
- Organic System Plan
- Farm map
- Field histories for new fields
- Operator agreement or affirmation
- Report of organic yields and sales

The Organic System Plan (OSP) is your opportunity to describe your farm and farming operation to a person who has never seen it. Understanding what is needed and why it is needed makes the process easier. The next chapter will provide more detail about how to develop the OSP.

The person who signs the operator agreement agrees to adhere to the regulations and affirms that the information supplied to the certifier is correct. This agreement must be signed by the person who has responsibility for making decisions about the operation—typically the farm owner.

New applicants will be asked to estimate their projected organic sales. Upon renewal of certification, farmers are required to report the yield and sales of organic products. Ordinarily, the sales are reported in the calendar year during which the money is collected. For example, the income from apples harvested in September, stored, and sold the following January will be reported as income in January. There are several reasons for collecting information on yield and sales. This information can serve as a basis for conducting an audit, which can then be used to discover fraud—for example, conventional produce sold as organic. Sales also are used to determine annual certification fees; typically, larger operations pay higher fees.

2. The certifier reviews the application

The certifier will read the farm plan and determine whether the practices are described in sufficient detail and whether the farm appears to meet organic regulations. There are cases where an application is denied or delayed. For example, if a farmer sprayed herbicides in March 2010 and applied for certification in April 2010, the application would be denied for 2010. In this case, the land may be eligible for transitional status after March 2011 (if the certifier offers transitional certification) but would not be eligible for organic certification until April 2013.

To achieve organic status, a 3-year transition period is required. In other words, no prohibited substances may be applied to the land for 36 months prior to the harvest of any crop that will be represented as organic. The first organic crop may be planted at any time prior to or during the conversion period. One purpose for this transition period is to allow the farmer to build healthy soil by adding natural soil amendments, rather than fertilizers, and restore biodiversity by avoiding pesticides.

If you are purchasing or renting land that is not currently certified and you wish to document that it has not had prohibited substances applied, you must obtain verification from the previous landowner or manager. Some certifiers require documentation by the local county Agricultural Commissioner, who keeps pesticide-use records in States that require 100 percent reporting of materials registered by the U.S. Environmental Protection Agency (EPA).

3. The inspector visits the farm

Every organic farm must be inspected each year. The individual who conducts the inspection—the organic inspector—represents the certifying agent. It is the inspector's responsibility to verify that the system plan accurately reflects the operation and that the farmer is following the plan, as well as to look for any violations. Organic inspectors are trained to look critically at all aspects of an organic operation and to maintain strict confidentiality. Information you provide about yield, sales, or farm practices will not be shared with anyone except the certifier.

During the inspection, you must allow the inspector complete access to your operation, including all production facilities and offices. Additional inspections may be announced or unannounced at the discretion of the certifier or the State organic program.

One of the most important responsibilities of the inspector is to examine records that document your farming practices. Specifically, the inspector will look at invoices, records of material applications, organic sales, harvest, and yield. Chapter 13 "Recordkeeping" provides examples of the type of documentation forms that inspectors may wish to examine. The inspector can explain the organic regulations but is not allowed to provide advice on how to farm or how to overcome identified barriers to certification. This separation between the farmer and the certifier maintains the "independent third party" nature of the transaction. Similarly, inspectors are not allowed to accept gifts because it may appear to compromise their independent status.

As a representative of the certifier, the inspector may request samples for residue testing. Results of the test will be provided to you. If the levels of pesticide residue exceed 5 percent of EPA tolerance levels, the product may not be sold, labeled, or represented as organic [§ 205.671]. Residue testing is not an acceptable substitute for strategies to prevent contamination. It can, however, serve as an indicator that selected strategies are effective.

During the inspection, the inspector will ask questions about your operation, visit each field, look at paperwork, and point out any areas where the farm may not comply with regulations. At the conclusion of the inspection, there will be an exit interview during which

the inspector will review any areas of concern. After the inspection, the inspector will write a report and send it to the certification agency, typically within 2 weeks.

4. The certifier reviews the inspection report

The certifier reviews the inspection report and decides whether the farm meets the requirements of the organic regulations. The reviewer will pay particular attention to any issues mentioned in the exit interview and will decide the seriousness of those issues. If your farm is in compliance, you will receive a letter along with an organic certificate. More commonly, especially for a first inspection, there will be some issues that need to be addressed. In this case, certification would be delayed until these problems are corrected. The specific areas of concern should not be a surprise to the farmer because the inspector should have discussed them in the exit interview. One thing that is often a surprise is the formal language of the letter, which can be written as a Notice of Noncompliance. Often the specific issues are easily corrected, and you can receive organic certification once you resolve them.

If you receive a letter (from your certifier) and do not understand the technical language, call your certifier for clarification. You can also call ATTRA for advice on how to resolve an issue and bring your operation into compliance.

There are several types of letters that new applicants may receive from their certifiers:

- If the operation is in compliance with the regulations, the certifier issues an organic certificate.
- If the operation needs to provide additional information or correct minor practices, the certifier issues a certificate with conditions.
- If there is something that threatens the organic integrity of the product, but it can be corrected, the certifier issues a Notice of Noncompliance.
- If there are major noncompliance issues that cannot be corrected, the certifier issues a Notice of Denial of Certification to new applicants. For example, if a crop duster accidentally applies a synthetic fungicide to your organic field, that would be considered an application of a prohibited material, and the application for organic certification would be denied.
- If there are major noncompliance issues during renewal of certification, the certifier issues a Notice of Noncompliance, which may be followed by or sent at the same time as a Notice of Proposed Suspension or Notice of Proposed Revocation. The producer is provided an opportunity to appeal; otherwise, the organic certification will be suspended or revoked. This happens only rarely.

If you receive a letter and do not understand the technical language, call your certifier for clarification. You can also call ATTRA for advice on how to resolve an issue and bring your operation into compliance.

5. The certifier issues the organic certificate

Once certification is granted, it remains in effect until surrendered, suspended, or revoked. Any action to suspend or revoke certification must be handled in the manner prescribed in regulations § 205.660 through § 205.664. If the status of your certification is threatened and you wish to dispute the charge, a formal grievance process exists.

Every organic operation is required to renew its certification each year or surrender it. Certification may be suspended if it is not renewed.

The renewal process is comprised of the following steps:

- Update the Organic System Plan
- Sign an operator agreement
- Address all noncompliance issues that have not been resolved
- Pay the annual certification fees
- Undergo an annual inspection

Funding opportunities

As of this writing, there are two Federal programs that reimburse farmers for some of the costs of organic production. The NOP administers a certification assistance cost-share program available to certified organic operators. The program reimburses farmers and handlers for a percentage of their certification fees. More information is available at the NOP Web site listed below. The application process is simple. More information can be obtained from your certifier, your State department of agriculture, the NOP, or ATTRA.

In addition to the NOP, the USDA Natural Resources Conservation Service (NRCS) provides funding to farmers as they implement practices that conserve natural resources. This program, the Environmental Quality Incentives Program (EQIP), has a special section for organic farmers because many organic practices focus on soil conservation. This program offers an opportunity for organic producers to receive substantial grant funding, but the application process can be lengthy. More information is available at your local NRCS office.

The meaning of organic certification

It is important to recognize that organic certification addresses the process involved in producing and handling a product. Organic certification is a process claim, not a product claim, and the OSP is the principal document that describes the production process on a specific farm. Organic certification assures the consumer that the organic farmer followed the requirements and restrictions spelled out in the regulations. Organic certification does not guarantee that the product is completely free of all pesticide residues or genetically modified organism (GMO) contamination.

Online Resources

National Organic Program, www.ams.usda.gov/nop

New Farm Guide to U.S. Organic Certifiers, www.rodaleinstitute.org/certifier_directory

Questions

- Do you have easy access to the USDA organic regulations? ☐ Yes ☐ No ☐ N/A
- If you are now selling crops as organic, do they all come from land that has been free of prohibited substances for a minimum of 36 months prior to harvest? ☐ Yes ☐ No ☐ N/A
- Did you advise your certifier of any previous applications for certification? ☐ Yes ☐ No ☐ N/A
- If you are renewing your certification, have you addressed all noncompliance issues and conditions previously noted by the certifier? ☐ Yes ☐ No ☐ N/A
- Are you documenting the harvest, yield, and sale of all organic crops? ☐ Yes ☐ No ☐ N/A
- Are you saving purchase receipts for all inputs? ☐ Yes ☐ No ☐ N/A
- Are you documenting the applications of fertilizers and pest-control materials? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 4

WRITING THE ORGANIC SYSTEM PLAN (OSP)

§ 205.201 Organic production and handling system plan

Under the USDA organic regulations, each certified organic farm must have an Organic System Plan (OSP). The OSP is a detailed outline that explains how you intend to operate your farm or ranch to satisfy the requirements of the regulations.

According to § 205.201(a), the OSP must contain the following:

- A description of farm practices, including the frequency with which they will be performed
- A list of each substance to be used as a production input
- A description of monitoring practices, including the frequency with which they will be performed, to verify that the plan is effectively implemented
- A description of the recordkeeping system implemented to comply with the requirements established in § 205.103 (see Chapter 13)
- A description of the management practices and physical barriers established to prevent commingling of organic and conventional products and to prevent contamination of organic products with prohibited substances
- Any additional information deemed necessary by the certifying agent to evaluate compliance with the regulations

Related ATTRA publications

www.attra.ncat.org

Organic System Plan Templates for Certifiers

Organic System Plans: Market Farms and Greenhouses

Organic System Plans: Field and Row Crops and Pasture and Range Systems

Developing and then maintaining the OSP is an essential part of the initial and ongoing certification process. The OSP must be written by the producer and approved by the certifier. Taking care to write clearly and thoroughly can save time later. The OSP provides a description of your farm to a person who has never seen it. It must be sufficiently detailed so that the certifier can get a clear picture of your farm's crops, harvest, sales, recordkeeping, soil-building practices, pest management, and any other practices related to organic production. The plan must allow the certifier to assess whether you can meet the requirements for organic certification.

The OSP covers many aspects of your organic farm:

- Crops to be grown
- Farm acreage — organic
- Source of seeds or plants
- Maintaining soil fertility
- Preventing pest outbreaks
- Controlling weeds
- Managing diseases
- Sales and marketing

Producers should use the OSP to explain the practices they use to manage their farms. It is particularly important to describe all management practices used to prevent problems rather than merely reacting to them. For example, apple growers should have plans to monitor codling moth, and asparagus growers should have plans to manage asparagus aphids. Having these monitoring and management practices in place will enable an organic farmer to address pest pressure before an infestation becomes severe. The time spent to ensure accuracy and completeness on your OSP is worthwhile because the OSP is vital for managing your farm and assuring compliance with the regulations.

It is standard practice for the OSP to be incorporated in the application materials that are required by certifiers. In other words, you are completing your OSP at the same time that you are filling out your application for certification. There may be some instances in which plans submitted to qualify for Federal aid or assistance programs may satisfy the requirement for an OSP.

Some useful definitions

- ***Buffer zones***—the boundary between conventional crops and organic crops. Buffer zones are established to prevent organic crops from being contaminated by spray drift.
- ***Commingling***—the mixing of an organic product with a similar conventional product.
- ***Contamination***—contact with a prohibited substance (conventional pesticides, for example). This includes physical contact with conventionally grown products.
- ***Parallel production***—a subset of split production. The term is used to describe a situation in which the same crop (and often the same crop variety) is produced both organically and conventionally on the same farm operation.
- ***Split production*** *or* ***mixed operations***—those operations that produce both organic and nonorganic products. (The nonorganic category includes transitional products.)

The materials list

The OSP includes a list of each substance to be used as a production input, sometimes called a Materials List. This is simply a list of composts, fertilizers, insecticides, fungicides, or other materials that might be used. Certifiers realize that farmers are not able to predict every eventuality and that unforeseen problems will occur. If there is a need to apply a pest control or other material that was not originally listed in the system plan, contact your certifier to add it to your OSP. Many certifiers will accept notifications by telephone, fax, or email. Do not wait until inspection to update your OSP.

There have been unfortunate instances of farmers who applied a material without receiving approval from their certifier, only to discover later that the material was prohibited. If this happens, the certifier must revoke certification from the fields to which the prohibited material was applied. The land is not eligible for organic status again for 36 months from the last application of the prohibited material.

Split operations

Many conventional farmers choose to explore organic production by converting only a small portion of their land to organic practices, while continuing to farm the rest of land in a conventional manner. Production of both organic and nonorganic products is called split production. Crops grown during the 36-month transition period are considered conventional. Parallel production, a subset of split production, refers to a situation where the same crop is produced both organically and conventionally on the same farm operation.

In parallel operations, it is particularly important that the OSP address all hazards of contamination and commingling that may arise. *Contamination* can be defined as contact with a prohibited substance (for example, conventional pesticides). This includes physical contact with conventionally grown products. *Commingling* is the mixing of an organic product with a similar conventional product (for example, mixing organic and conventional grain in the same grain bin). For split operations, many certifiers request information on both conventional and organic crops. The certifier and the inspector will want to ensure that procedures are well documented to ensure the integrity of organic products. Chapter 11 "Preventing Contamination of Organic Crops" provides additional information.

§ 205.202 Land requirements

Fields from which organic crops are harvested must have distinct, defined boundaries and buffer zones. No prohibited materials can be applied to the land for a period of 36 months prior to harvest of the organic crop. Prohibited materials include synthetic fertilizers and seeds treated with fungicides, as well as most synthetic (chemical) herbicides, pesticides, and fungicides.

The farm map

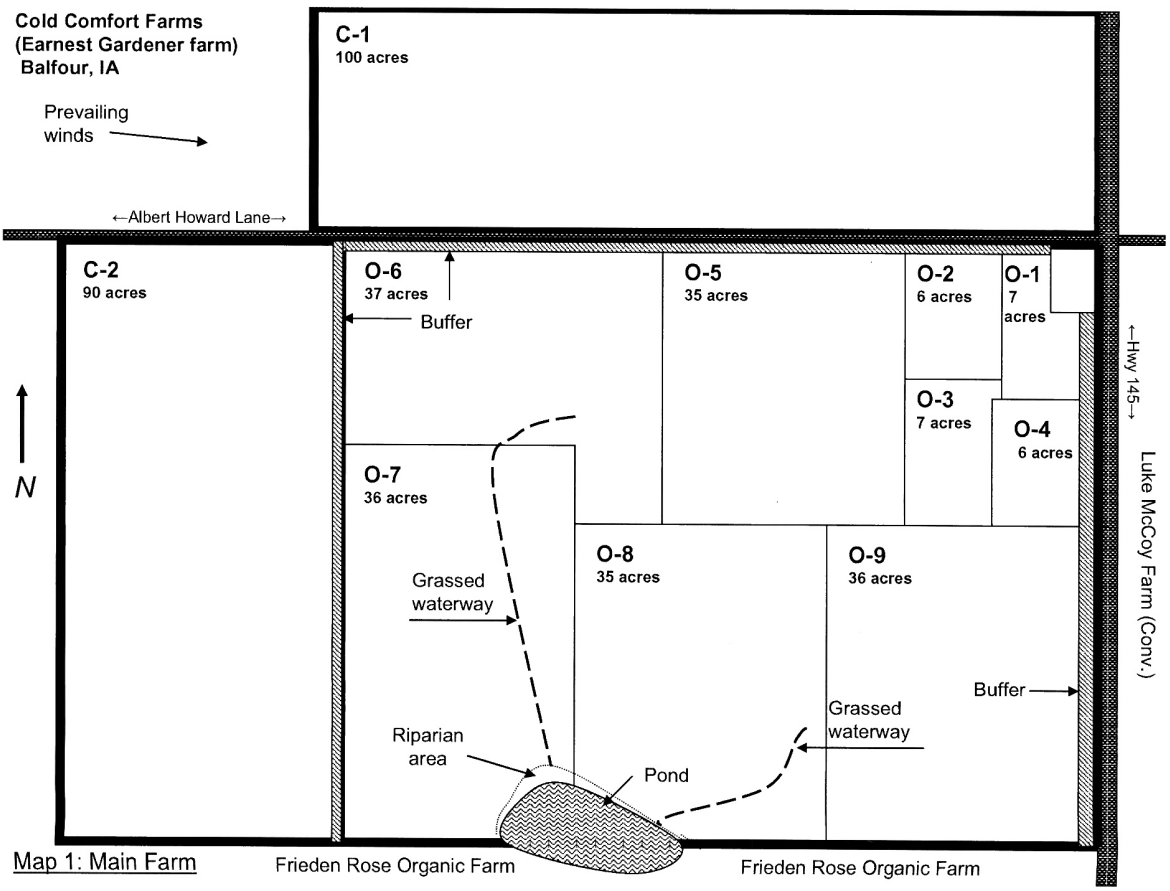
An accurate map of all farm acreage and production units is typically required as part of the OSP. Important map features include the following:

- Consistent scale
- Permanent field numbers or names
- Buildings, roads, and permanent features
- Streams, ponds, irrigation ditches
- Field boundaries
- Adjoining land use: conventional, organic, or fallow
- Buffer zones

Organic crops must be protected from contamination by prohibited substances, such as pesticides and fertilizers, used on adjoining lands. Preventing contamination usually requires a multi-pronged approach for organic systems.

Strategies may include one or more of the following:

- *Isolation*. Fields located at substantial distances from conventional production or roadside spraying are considered to be adequately protected.
- *Barriers*. Tall plants and trees serve as barriers to airborne contaminants.
- *Buffer zones*. Buffers are used to separate adjoining crops that are conventionally managed. Crops harvested from buffer zones must be sold as conventional.



- *Drainage diversion*. Water runoff from conventional fields is diverted.
- *Posting of property*. Signage reading "Organic Farm: Do Not Spray" is placed at field boundaries. You may need to assume responsibility for weed control on roadsides and post signs reading "Owner Will Maintain."
- *Formal notification*. Written notification of your organic status is provided to neighbors who manage adjoining lands. Copies of formal notification letters must be kept on file.

Regulations do not specify the required width for a buffer zone, but they state that buffers must be "sufficient to prevent contamination." It is the farmer's responsibility to assess the risks and take appropriate measures to minimize contamination. Therefore, the width of buffers must be adjusted for individual circumstances. For example, a more significant buffer is needed where adjacent land is sprayed by plane or airblast sprayer or where there are prevailing winds that blow across nonorganic fields onto the organic farm. A smaller buffer may be needed if a row of tall trees provides a barrier to drift. Regardless of the size of the buffer, any crops harvested from buffer zones must be sold as conventional. Sale must be documented and available for review at inspection.

Water runoff from conventional fields can contaminate organic crops. If the possibility of contamination exists, a drainage ditch will be needed.

Field histories for new fields and new farms

Field histories will be required the first time you request to have a field certified organic. To obtain organic certification for a field, you must be able to document all materials applied to that field for 36 months prior to the harvest of a first organic crop.

Field histories for new fields should document the following:

- Field size (You may use square footage for greenhouse/production beds.)
- Crops, including cover crops, for the past 36 months
- All inputs used for the past 36 months

Online Resources

Rodale Institute's Organic System Plan Tool, www.tritrainingcenter.org/code/osp_index.php

Questions

- Have you completed your Organic System Plan (OSP)? ☐ Yes ☐ No ☐ N/A
- Is your farm map complete and accurate? ☐ Yes ☐ No ☐ N/A
- Have you completed a field history for each new field? ☐ Yes ☐ No ☐ N/A
- Are the numbers/names used on your map consistent with those used on field histories, audit documents, and other records? ☐ Yes ☐ No ☐ N/A
- Do all fields have buffers that are adequate to prevent contamination? ☐ Yes ☐ No ☐ N/A
- If there is danger of contamination from adjoining land or conventional crops, are you taking steps to minimize the risk? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 5
SOIL FERTILITY

§ 205.203 Soil fertility and crop nutrient management practice standard

Section (a) of this regulation states that the producer must "maintain or improve the physical, chemical, and biological condition of the soil and minimize erosion." Section (c)(1) regulates the application of raw manure to organic crops, and Section (c)(2) regulates the process of making of composts from animal manures.

Related ATTRA publications
www.attra.ncat.org

Federal Conservation Resources for Sustainable Farming and Ranching

Sustainable Soil Management

Healthy soil is the basis for organic agriculture. Healthy soil can provide an abundant crop of healthy plants, which in turn provide healthy food and feed. When grown in good soils, crops are better able to resist disease, survive drought, and tolerate insects.

This chapter provides a brief overview of building and conserving the soil. For more detailed information, consult additional references tailored to your climatic region and soil type. The materials listed in the Further Resources section are a good place to start.

Soil building

Adding organic matter is a fundamental way to build soils. Organic matter provides food for microorganisms such as fungi and bacteria and macroorganisms such as earthworms. As these diverse soil organisms decompose organic matter, they convert nutrients into forms that are available to plants. Soils high in organic matter also have improved water-holding capacity, helping plants resist drought.

For centuries before the advent of chemical fertilizers, farmers supplied all the nutrients for their crops solely by adding organic matter to the soil. As fresh organic matter, such as crop residues, decomposes, it forms a stable substance called humus. Organic matter can be added to soils with compost, animal manures, or green manures.

Green manures

Green manures are crops grown specifically for soil improvement. They are typically incorporated into the soil after they have produced a large amount of biomass, or fixed a significant amount of nitrogen in the case of legumes. Managing green manure crops to increase organic matter and provide the maximum amount of nitrogen to the following crop is both an art and a science.

Annual grasses, small grains, legumes, and other useful plants like buckwheat can be inserted into the cropping sequence to serve as green manures. Their roots pull nutrients from deeper soil layers, and the tops are plowed into the soil to add organic matter and a stable source of nutrients. In particular, deep tap-rooted crops such as alfalfa, sweet clover, rape, and mustard are known to extract and use minerals from the deeper layers of soil.

Legumes add nitrogen to the soil. Nitrogen accumulations by leguminous cover crops can range from 40 to 200 pounds of nitrogen per acre. The amount of nitrogen captured by legumes depends on the species of legume grown, the total biomass produced, and the percentage of nitrogen in the plant tissue. Cultural and environmental conditions that limit legume growth—such as a delayed planting date, poor stand establishment, and drought—will reduce the amount of nitrogen produced. Conditions that favor high nitrogen

production include a good stand, optimum soil nutrient levels and soil pH, good nodulation, and adequate soil moisture.

Animal manures

Conservation of manure and its proper application are key means of recycling nutrients and building soil. Farms without livestock often buy manure or compost because they are considered to be among the best fertilizers available, though sole reliance on fertilizers from other farms can have its drawbacks.

Manures from conventional systems are allowed in organic production, including manure from livestock grown in confinement and from those that have been fed genetically engineered feeds. Manure sources containing excessive levels of pesticides, heavy metals, or other contaminants may be prohibited from use. Such contamination is likely present in manure obtained from industrial-scale feedlots and other confinement facilities. Certifiers may require testing for these contaminants if there is reason to suspect a problem.

When grown in good soils, crops are better able to resist disease, survive drought, and tolerate insects.

Herbicide residues have been found in manures and manure-based composts. One type—aminopyralid—is used in pastures for control of broadleaf weeds. Grass and corn are not affected by the herbicide, and cows are not affected when they eat the grass or silage. However, the herbicide can be present in their manure in concentrations high enough to stunt the growth of tomatoes, peppers, and other susceptible broadleaf crops.

If a manure source is suspected of being contaminated with excessive amounts of prohibited substances, appropriate testing should be conducted. If test results indicate that the manure is free of excessive contamination, and it is subsequently used in production, the test results should be kept on file.

Used properly, manures can replace all or most needs for purchased fertilizer, especially when combined with a whole-system fertility plan that includes crop rotation and cover cropping with nitrogen-fixing legumes. Manure is typically applied just ahead of a crop requiring high fertility, such as corn or squash. Manures also can be applied just prior to a cover crop planting. Incorporating the manure as soon as possible after application, rather than allowing it to remain on the soil surface, will conserve the maximum amount of the nitrogen. Although manure is an excellent fertilizer for crops, and it has been used that way for centuries, manure may harbor microorganisms that are pathogenic to humans. To minimize the possibility of illness due to organic foods, there are strict regulations on the use of manure in organic crops.

The 90–120-day rule

Application of manure to organic crops is restricted by what is known as the 90–120-day rule, as described in § 205.203(c)(1). You may not apply raw, uncomposted livestock manure to food crops unless it is:

1. Incorporated into the soil a minimum of 120 days prior to harvest when the edible portion of the crop has soil contact; OR
2. Incorporated into the soil a minimum of 90 days prior to harvest of all other food crops.

Incorporation is generally assumed to mean mechanical tillage to mix the manure into the soil. Crops that have soil contact include leafy greens, melons, squash, peas, and many other vegetables. Any harvestable portion of a crop that can be splashed with soil during precipitation or irrigation might be considered to have soil contact. Crops that do not have soil contact include tree fruits and sweet corn.

Take note that the 90- and 120-day restrictions apply only to food crops; they do not apply to fiber crops, cover crops, or to crops used as livestock feed.

Compost

Perhaps no other process is more closely associated with organic agriculture than composting. Composting is one of the most reliable and time-honored means of conserving nutrients to build soil fertility. Because matured, well-made compost is a stable fertilizer that will not burn plants and because composting kills most human and plant pathogens, compost can safely be used as a side-dress fertilizer on food crops.

Animal manures used in organic crop production often are composted before use, in part because some types of raw manure will burn plants if applied directly to crops. Composting reduces the number of viable weed seeds, creates a uniform product with predictable nutrient levels, and eliminates worries about human pathogens. If manures are composted according to USDA organic regulations, then they are considered compost, not manure, and may be applied without restrictions. If manure is aged but not composted according to the regulations, then the material is still considered manure and must be applied in accordance with the 90–120-day rule explained above.

Composting is one of the most reliable and time-honored means of conserving nutrients to build soil fertility.

The regulations define compost as "the product of a managed process through which microorganisms break down plant and animal materials into more available forms suitable for application to the soil…" Compost used in organic production must be made according to the criteria set out in § 205.203(c)(2). This section of the regulations specifies that:

1. The initial carbon:nitrogen ratio of the blended feedstocks must be between 25:1 and 40:1.
2. The temperature must remain between 131 °F and 170 °F for 3 days when an in-vessel or a static-aerated-pile system is used.
3. The temperature must remain between 131 and 170°F for 15 days when a windrow composting system is used, during which period the windrow must be turned at least five times.

The composting procedures above are adapted from U.S. Environmental Protection Agency (EPA) and USDA's Natural Resources Conservation Service (NRCS) guidelines for composting biosolids. This policy was established to ensure the elimination of pathogens that cause illness in humans.

Organic farmers often maintain a compost pile on the farm as an efficient and cost-effective way to retain nutrients on the farm and build soil. If compost feedstocks include raw manure, they must be composted in the method detailed above. This composting process must be explained in your system plan and documented with temperature records. If those requirements are not met, then the resulting compost must be applied according to the 90-120-day raw manure rule. If compost feedstocks do not include raw animal manures, then the resulting compost is considered plant material and there are no restrictions on its use.

Compost tea

Some organic farmers apply compost teas to crops or soil to increase the populations of beneficial microbes. If compost tea will be applied to organic crops, it is critical that the compost used to produce the extract has been made according to USDA organic regulations. The procedures for making both the compost and the compost tea must be explained in your OSP. Applications of teas made from uncomposted manure must follow the 90-120-day rule. The tea extract may need to be tested to ensure that it is free of dangerous pathogens, particularly if the tea has been made with compost tea additives. The additives, such as molasses, provide nutrients for microbes and thereby increase their rate of growth. There is some concern that any human pathogens present will grow more abundantly in a tea made with these additives. Further details on the recommendations for the use of compost tea are available in the NOP publications listed at the end of this chapter.

Vermicompost

Vermicompost is compost that uses worms to digest the feedstocks. Since feedstocks may include animal manures, there has been debate as to whether the 90-120-day rule should apply to vermicompost. The NOP has issued the following guidance: feedstocks for vermicompost materials may include organic matter of plant or animal origin. Feedstocks should be thoroughly macerated and mixed before processing.

Vermicomposting systems depend upon regular additions of thin layers of organic matter at 1- to 3-day intervals. Doing so will maintain an aerobic environment and avoid temperature increases above 35 °C (95 °F), which will kill the earthworms. The composting process must be described in the OSP, reviewed by the certifier, and well documented on the farm. Further details are available in the NOP publications listed at the end of this chapter.

Processed animal manures

Heat-treated, processed manure products may be used in organic production. There is no required interval between application of processed manure and crop harvest. From the standpoint of the farmer, of course, these inputs would be applied well before harvest, so that the nutrients would be available to the crop. To be considered processed, the manure must be heated to 150 °F for 1 hour and dried to 12 percent moisture or less.

The key to soil conservation is to keep the ground covered for as much of the year as possible.

Soil conservation

Organic farmers have long recognized the value of basic soil conservation. There are many practices that help conserve soil, including cover crops, mulches, conservation tillage, contour plowing, and strip cropping.

Careful conservation and management of crop residues is part of organic soil management, since this residue plays a valuable role in improving and protecting the soil. The key to soil conservation is to keep the ground covered for as much of the year as possible. Since water erosion is initiated by raindrop impact on bare soil, any management practice that protects the soil from raindrop impact will decrease erosion and increase water entry into the soil. Mulches, cover crops, and crop residues all serve this purpose well. A major limitation of organic row-crop farming is that cultivation is used for weed control, since herbicides are not allowed. This cultivation creates and maintains bare ground, which increases the likelihood of soil erosion. By contrast, soil that is covered with an organic mulch of crop residue, such as that typically found in no-till fields, is less likely to erode. Organic no-till systems have yet to be perfected for annual row crops, but they work well for perennial fruit crops and pasture, allowing for year-round ground cover and virtually no soil erosion.

Cover crops

Cover crops are single species or mixtures of plants grown to provide a vegetative cover between perennial trees, vines, or bushes; between annual crop rows; or on fields between cropping seasons. The vegetative cover on the land prevents soil erosion by wind and water, builds soil fertility, suppresses weeds, and provides habitat for beneficial organisms. Cover crops also can help reduce insect pests and diseases, and legume cover crops fix nitrogen.

Any crop grown to provide soil cover is considered a cover crop, regardless of whether that crop is later incorporated into the soil as a green manure. Both green manures and other types of cover crops can consist of annual, biennial, or perennial herbaceous plants grown in a pure or mixed stand during all or part of the year. When cover crops are planted to reduce nutrient leaching following a cash crop, they are termed "catch crops." This type of cover crop is typically grown over the winter when the field would otherwise be unoccupied.

Organic mulches

Organic mulches cover the soil and provide many of the same benefits as cover crops, especially the prevention of soil erosion. Many organic materials, such as straw, leaves, pine needles, and wood chips, can be effective mulches. Straw and other materials that are easily decomposed are applied to strawberries and vegetables during the growing season. The mulch can be tilled in at the end of the season, where it will quickly decompose. Wood chips, because they decompose very slowly, are more commonly applied to perennial crops such as blueberries, where they will not be tilled in. Applying organic mulch can be labor-intensive. Tree fruit growers sometimes mow the drive rows and blow the green clippings into the tree rows, which automates the mulching process.

Heavy mulches can be a benefit by suppressing weed growth, or a nuisance by providing a haven for slugs. Organic mulches keep the soil cool, which may be a boon for blueberries in hot climates and a drawback for tomatoes in cool spring weather. Organic mulches have a beneficial long-term effect because they add nutrients to the soil as they decompose. Mulches of high-carbon material may have the opposite effect because they tie up nitrogen during the decomposition process. However, this should not be a problem if mulches are used properly—that is, placed on top of the soil, and not incorporated.

Conservation tillage

In conservation tillage, crops are grown with minimal soil cultivation. This is also known as no-till, minimum till, incomplete tillage, or reduced tillage. When the amount of tillage is reduced, the residues from the plant canopy are not completely incorporated into the soil after harvest. Crop residues remain on top of the soil and prevent soil erosion, a practice known as crop residue cover. The new crop is planted into this stubble or small strips of tilled soil within the stubble.

Contour cultivation and strip cropping

Slope plays a role in soil conservation, in that flat ground erodes less than sloping ground with equal amounts of ground cover. Contour plowing is the practice of plowing across a slope following its elevation contour lines, rather than straight up and down the slope. The cross-slope rows formed by contour plowing slow water runoff during rainstorms to prevent soil erosion.

Strip farming, also known as strip cropping, alternates strips of closely sown crops, such as hay or small grains, with strips of row crops, such as corn, soybeans, or cotton. Strip farming helps prevent soil erosion by creating natural dams for water, helping to preserve the soil.

Federal programs for sustainable agriculture

Sustainable and organic agricultural systems produce some of the best conservation results in the Nation, as they enhance the natural resource base and provide multiple environmental services. These systems can conserve biodiversity and improve soil quality, water quality, air quality, carbon sequestration, energy efficiency, and wildlife habitat. The adoption of sustainable and organic systems of production is directly in line with NRCS's mission of "helping people help the land."

In recognition of the benefits of sustainable farming systems, the 2008 Farm Bill authorized funding to encourage implementation of conservation practices. The bill led to implementation of specific provisions for organic and sustainable farmers:

- The Environmental Quality Incentive Program (EQIP) Organic Initiative

- The Conservation Stewardship Program (CSP)
- The Conservation Reserve Program Transition Option

To apply for these programs, contact your local NRCS office or visit its Web site.

Applications for these programs can be challenging, as these are competitive programs. Several organizations are working to help farmers, especially small and mixed-crop farmers, successfully compete for funds. Helpful publications are available from ATTRA or the National Sustainable Agriculture Coalition (NSAC). Web sites are listed at the end of this chapter.

Nutrient management: nitrogen and trace minerals

Although organic matter plays an important role in building productive soils, there are specific crops and soil types that will benefit from additional applications of specific nutrients. Organic farmers are allowed to use a variety of fertilizers to provide micronutrients to their crops. Before applying micronutrients, soil deficiencies must be documented through soil tests, plant tissue tests, observing the condition of plants, or evaluating crop quality at harvest.

Nitrogen is often a limiting nutrient, especially for vegetables and other row crops. Including legumes in the rotation can help to ensure sufficient nitrogen for the following crop. Biological nitrogen fixation in legumes results from a symbiotic relationship between the plant and *Rhizobium* bacteria. These bacteria "infect" the roots of legumes, forming nodules. The bacteria then fix nitrogen from the air, which results in sufficient nitrogen both for their own needs and for subsequent crops.

The inoculation of legume seed may be necessary to optimize nitrogen fixation. Be certain that you are purchasing an inoculant appropriate to the kind of legume you are planting and verify that it is not genetically modified. Genetically modified inoculants are prohibited in organic production.

Online Resources

Alternative Farming Systems Information Center, http://afsic.nal.usda.gov

Building Soils for Better Crops, www.sare.org/publications/soils.htm

Compost and Vermicompost in Organic Crop Production, NOP Program Handbook, www.ams.usda.gov/nopprogramhandbook

Farmers' Guide to the Conservation Stewardship Program, www.sustainableagriculture.net/wp-content/uploads/2011/09/NSAC-Farmers-Guide-to-CSP-2011.pdf

National Sustainable Agriculture Coalition publications list, www.sustainableagriculture.net/publications

Natural Resources Conservation Service, www.nrcs.usda.gov

NOP Program Handbook, www.ams.usda.gov/nopprogramhandbook

Processed Animal Manures in Organic Crop Production, NOP Program Handbook, www.ams.usda.gov/nopprogramhandbook

Sustainable Agriculture Research and Education, www.sare.org

The Rodale Institute, www.rodaleinstitute.org

Questions

- Do you keep your current and past soil test results on file as a means of monitoring the effects of your farming practices? ☐ Yes ☐ No ☐ N/A
- Do you make fertility management decisions based on soil tests, tissue tests, or observed nutrient deficiencies? ☐ Yes ☐ No ☐ N/A
- Are you using cultural practices to maintain or improve soil organic matter? ☐ Yes ☐ No ☐ N/A
  a) Green manures
  b) Animal manures
  c) Composts
- Are you using cultural practices to conserve soil? ☐ Yes ☐ No ☐ N/A
  a) Cover crops
  b) Organic mulches
  c) Conservation tillage
  d) Contour cultivation
  e) Strip cropping
- Are all the fertilizers and soil amendments you use allowed in organic production? See Chapter 9 "The National List of Allowed and Prohibited Substances" for assistance with choosing materials. ☐ Yes ☐ No ☐ N/A
- Do you keep records of all fertilizer and amendment purchases and applications, along with product labels? ☐ Yes ☐ No ☐ N/A
- If your compost contains animal manure, has it been prepared according to the requirements of § 205.203(c)(2)? ☐ Yes ☐ No ☐ N/A
- Are soil amendments, including compost and manure, applied according to soil and crop needs? ☐ Yes ☐ No ☐ N/A
- Are all your manure applications to food crops in compliance with the 90- and 120-day rules? ☐ Yes ☐ No ☐ N/A
- Are your sources of manure and compost free of contamination from excessive amounts of prohibited substances? ☐ Yes ☐ No ☐ N/A
- Are records kept of manure applications that include date, tonnage, and fields receiving application? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 6
SEEDS AND PLANTING STOCK

§ 205.204 Seeds and planting stock practice standard

1. Organic seeds must be used unless they are not commercially available.

2. Seeds may not be treated with prohibited substances.

3. Genetically engineered varieties are prohibited.

§ 205.204(a)(4) states: "[N]onorganically 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 one year…"

Related ATTRA publications
www.attra.ncat.org
Transgenic Crops

The USDA organic regulations address three basic categories of propagation materials: seeds, annual seedlings, and planting stock. The term "seeds" is self-explanatory. "Annual seedlings" are transplants of annual crops that have been removed from their original place of production and replanted elsewhere [§ 205.2]. "Planting stock" is defined as "[a]ny plant or plant tissue other than annual seedlings but including rhizomes, shoots, leaf or stem cuttings, roots, or tubers, used in plant production or propagation" [§ 205.2]. Ideally, only organic seed and planting stock would be used in organic production. When you purchase organic seeds, transplants, and planting stock, you are assured that the variety is not genetically engineered and that any seed treatments that may have been used are allowed for organic production. However, because the organic industry represents only a fraction of the total agriculture industry, organic seeds and planting stock may not be available. The applicable regulations are discussed below.

Seeds

Organic seeds must be used unless they are not commercially available. When an equivalent organic variety is not commercially available, conventionally grown seed may be used. The determination of "equivalent" is made by the farmer, who takes into account the plant variety, maturity dates, disease resistance, and other desired characteristics. In order to use conventional seed, the farmer must provide documentation to verify that: (1) the organic seed was not available; (2) the variety is not genetically engineered; and (3) the seed was not treated with prohibited materials. Each of these is discussed in more detail below.

Commercial availability

First, in order to document that organic seed was not commercially available, certifiers want clear indication that several (at least three) suppliers have been contacted in an attempt to locate organic seed sources. This usually entails records of phone calls, letters, or emails to and from seed suppliers documenting your attempts to find an organic source. If you are required to use a specific variety by the buyer of the crop, then the buyer must supply documentation to verify that the variety was not available in organic form.

A variety of seed is considered commercially unavailable if the farmer could not locate an organic supplier, if the organic supplier could not provide seed in the quantities needed, or if the seed quality was substandard. Seed quality may be substandard due to the presence of seed-borne disease, very low germination percentages, or high weed-seed content. The higher cost of organic seed is not considered an acceptable reason for using nonorganic seed.

Genetic engineering

Second, if conventional seed is planted, the certifier will request proof that it is not genetically engineered. This verification is becoming more important each year, as the number of genetically modified (GM) crops increases. The use of GM seeds is prohibited in organic agriculture, and it is the responsibility of organic growers to make certain that the crops they grow are not genetically engineered. GM crops that are now being planted or will soon be available include alfalfa, beets, corn, soybeans, papaya, plum, rapeseed, tobacco, potato, tomato, squash, cotton, and rice. This list is expected to change, as genetically engineered versions of several other crops have been developed but have not yet been released for commercial production. The most current information about GM crops is maintained by the USDA Animal and Plant Health Inspection Service (APHIS). The planting of GM crops is regulated—new varieties may not be widely planted until they've been approved by USDA. Seed companies that develop a new variety of genetically modified seeds must submit a petition to APHIS before that seed can be distributed to the public. These varieties are identified by APHIS on the list of Petitions for Nonregulated Status (see Online Resources at the end of this chapter).

Genetically modified crops that are now being planted or will soon be available include alfalfa, beets, corn, soybeans, papaya, plum, rapeseed, tobacco, potato, tomato, squash, cotton, and rice.

Genetic engineering is considered an excluded method and is defined as "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. Such methods include cell fusion, microencapsulation and macroencapsulation, and recombinant DNA technology (including gene deletion, gene doubling, introducing a foreign gene, and changing the positions of genes when achieved by recombinant DNA technology). Such methods do not include the use of traditional breeding, conjugation, fermentation, hybridization, in vitro fertilization, or tissue culture."

Again, if it is necessary to use conventional seeds, it is essential to verify that the variety has not been genetically engineered and to keep documentation of this verification, as your inspector will ask to see it. Seed companies that have taken the Safe Seed Pledge may be convenient sources of non-GMO seeds. The Safe Seed Pledge was developed by the Council for Responsible Genetics and has been signed by numerous seed companies.

The Safe Seed Pledge

"Agriculture and seeds provide the basis upon which our lives depend. We must protect this foundation as a safe and genetically stable source for future generations. For the benefit of all farmers, gardeners and consumers who want an alternative,

We pledge that we do not knowingly buy or sell genetically engineered seeds or plants.

The mechanical transfer of genetic material outside of natural reproductive methods and between genera, families, or kingdoms, poses great biological risks as well as economic, political, and cultural threats. We feel that genetically engineered varieties have been insufficiently tested prior to public release. More research and testing is necessary to further assess the potential risks of genetically engineered seeds. Further, we wish to support agricultural progress that leads to healthier soils, genetically diverse agricultural ecosystems and ultimately healthy people and communities."

Treatment with prohibited materials

Third, seed must not be treated with prohibited materials, such as conventional fungicides and inoculants made with GMO bacteria. Conventional seed treatments are usually fungicidal; most fungicides used for this purpose are prohibited in organic production. If fungicides are present on seeds it will be obvious, as the seeds must be tinted (commonly bright pink or green). The seed packets also will state that fungicides have been used.

Some seed treatments are allowed in organic production—the inoculation of legume seeds with beneficial bacteria, for example. However, since some inoculants might be genetically engineered, it is important to ensure that the product is approved. Labels for seed inoculant do not typically state whether or not the product contains genetically engineered materials. If the label does not clearly state the information, you can obtain written documentation from the manufacturer. Several inoculants are listed by the Organic Materials Review Institute (OMRI). Visit the OMRI Web site and search for "inoculants" to obtain the names of allowed materials.

Planting seeds treated with prohibited materials on land that is certified organic is considered an application of a prohibited material. The land where those seeds were planted will be removed from organic certification and will not be eligible for organic status again until 36 months after the seeds were planted.

Even if the seeds are purchased for the farmer, such as crops grown under contract for processors, the farmer will need verification that the variety is not available in organic forms, that the variety is not genetically engineered, and that the seeds are not treated with prohibited materials. That documentation should be provided to the farmer by the processor who supplies the seeds, and it should be available at inspection.

Many farmers ask whether the organic seed requirement also applies to cover crop seeds. Cover crop seed must be organic as well. Commonly, cover crops are chosen for being well adapted to the local growing area. If a nearby neighbor grows conventional cover crop seeds and you wish to plant them because they are locally adapted, you may claim that organic seeds of that variety are not commercially available. However, the cover crop seed must still be neither genetically engineered nor treated with a prohibited substance.

Annual seedlings

Transplants, starts, or seedlings used to produce an annual organic crop must have been organically grown. This section of the regulations applies to tomatoes, sweet potatoes, peppers, flowers grown from transplants (e.g., snapdragons sold as cut flowers) and similar crops. The farmer must have documentation that the transplants are organic. Documentation may be obtained by an organic certificate from the seller or an invoice on which the purchase is identified as organic. If large quantities of transplants will be needed, it will be necessary to order them well in advance.

A variance to use conventional seedlings to grow an organic crop may be granted only if the original transplants were destroyed through "…drought, wind, flood, excessive moisture, hail, tornado, earthquake, fire or other business interruption…" Contact your certifying agent to obtain a variance.

Planting stock

Whenever possible, organic planting stock should be used for organic production. At the time of this writing, many plant varieties are not commercially available in sufficient quantity, which may require the use of nonorganic planting stock. However, it is necessary to search for organic sources and to document that search.

Planting stock for annual crops is subject to the same requirements as seeds for annual crops. Note that this part of the rule applies to crops like garlic, white potatoes, and flowers grown from bulbs (e.g., daffodils or tulips sold as cut flowers).

Planting stock for perennial crops may be obtained from nonorganic sources but must be under organic management for at least 12 months before the first harvest of an organic crop. This rule applies to tree fruits (e.g., apples, peaches, pears), nuts (e.g., walnuts, pecans), berries (e.g., blueberries, caneberries, strawberries), grapes, asparagus, lavender (lavender

flowers, lavender plants), lilies, and others. Some perennial crops are managed as annuals in some climate regions (e.g., strawberries, caneberries). If this is the case, then the rules for annual planting stock apply.

Although the seeds, annual seedlings, and planting stock used in organic production must not be treated with prohibited substances, there is one exception. Treatment with prohibited substances is allowed when the application of those substances is a requirement of Federal or State phytosanitary regulations. For example, strawberry crowns may be required to be treated with fungicides prior to interstate shipments.

Online Resources

ATTRA Online Directory of Organic Seed Suppliers, www.attra.ncat.org/attra-pub/organic_seed

Organic Seed Alliance, www.seedalliance.org

Petitions for Nonregulated Status Granted or Pending by APHIS, www.aphis.usda.gov/biotechnology/not_reg.html

Questions

- Is all seed organically produced? ☐ Yes ☐ No ☐ N/A
- Have you retained invoices or empty seed packets to verify organic status of seeds? ☐ Yes ☐ No ☐ N/A
- If conventional seeds were purchased, have you documented your attempts to source organic seeds? ☐ Yes ☐ No ☐ N/A
- If conventional seeds were purchased, do you have verification that the varieties are not genetically modified? ☐ Yes ☐ No ☐ N/A
- If conventional seeds were purchased, do you have verification that no prohibited substances were applied to the seeds? ☐ Yes ☐ No ☐ N/A
- Are all annual seedlings and transplants acquired from organic sources? ☐ Yes ☐ No ☐ N/A
- Have you obtained a copy of the organic certificate from the supplier of transplants? ☐ Yes ☐ No ☐ N/A
- If annual seedlings and transplants are grown on-farm, are they produced using organic methods? ☐ Yes ☐ No ☐ N/A
- If seed or plant treatments are used, have you determined that they are allowed materials? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 7
CROP ROTATION

§ 205.205 Crop rotation practice standard

Farmers are required to implement a crop rotation that maintains or builds soil organic matter, works to control pests, manages and conserves nutrients, and protects against erosion. Producers of perennial crops that aren't rotated may utilize other practices, such as cover crops, to maintain soil health.

Crop rotation refers to the sequencing of crops over time on a field or planting bed. It is not unique to organic systems; it is practiced by many conventional farmers as well. Organic systems are unique in that crop rotation is specifically required in the USDA organic regulations.

Related ATTRA publications
www.attra.ncat.org

Overview of Cover Crops and Green Manures

Crop rotation in annual crops

For producers of annual crops, complying with NOP crop rotation standards is straightforward and often beneficial for crop health. Crop rotation can:

- Interrupt insect life cycles
- Suppress soilborne plant diseases
- Prevent soil erosion
- Build organic matter
- Fix nitrogen
- Increase biodiversity of the farm

Crop rotations are an important way to suppress insects and diseases. For example, farmers who raise potatoes will rotate the field out of solanaceous crops for at least 2 years before replanting potatoes. This helps reduce populations of insects such as the Colorado potato beetle and diseases such as late blight. Rotations typically mean that crops are not followed by a member of the same crop family. Rotations with 3 to 5 years between the same crop may be needed to effectively reduce insect and disease levels.

Rotations also can be designed to increase soil fertility. A crop sequence that features soil-improving crops can counterbalance soil-depleting crops. Soil-improving crops include sod crops dominated by perennial grasses and perennial legumes. Sod crops in rotation build soil organic matter and reverse the decline that typically occurs when cultivated annual crops are grown year after year. Legumes, such as alfalfa, clovers, beans, and peas, are especially beneficial because they fix nitrogen from the atmosphere and make it available to subsequent crops.

Even short-term, nonleguminous cover crops can provide benefits when used as part of the crop-rotation plan. The best cover crops are specific varieties adapted to the soil, climate, and season. They are sown at a fairly high rate to cover the soil quickly and prevent erosion.

When planning crop rotations, it is important to consider that cultivated row crops such as vegetables tend to degrade soil. Since the soil is open and cultivated between rows, microbes break down organic matter at a more rapid pace. Furthermore, row crops have modest root systems and consequently do not contribute enough new organic matter to replace that lost from the open soil between rows. In most cases, above-ground crop residues make only minor contributions to replacing lost organic matter.

In contrast, cereals and cover crops are more closely spaced and have more extensive root systems than row crops, greatly reducing the amount of soil exposed to degradation. In addition, these crops receive little or no cultivation after planting, which reduces organic-matter loss even more. As a result, cereals and green manures can be considered neutral crops, replacing soil organic matter at roughly the same rate at which it breaks down. Crops that make a perennial sod cover, such as grasses, clovers, and alfalfa, not only keep the soil entirely covered but also have massive root systems that produce far more organic matter than is lost.

Incorporating sod crops as a fundamental part of a crop rotation not only builds soil but also supports weed-control strategies. Weed control improves because the types of weeds encouraged by row-cropping systems are usually adapted to growing in a sod/hay crop.

To make the most efficient use of sod crops, it will be necessary to include livestock in the system or to find a market for the hay. Livestock will assist in transferring (via manure) nutrients from one part of the farm to another. The major drawback to selling hay is that the nutrients it contains are shipped off the farm.

Crop rotation in perennial crops

For producers of organic perennial crops, the requirement for crop rotation can be confusing. Section 205.205, the crop rotation practice standard, is meant to ensure that the farmer implements practices that will maintain soil organic matter, control pests, conserve nutrients, and protect the soil against erosion. For growers of annual crops, those practices typically include crop rotation, but other practices can be substituted if rotation is not practical. Some perennials will be part of a long-term crop rotation, which may last a few years or even decades. Asparagus, for example, is a perennial that can be productive for 15 years or more. When a field is taken out of asparagus production, it is typically planted with another crop to reduce the incidence of soilborne disease. That practice is considered a long crop rotation. Several other perennials, such as strawberries, Echinacea, and lavender, are not required to have a cover crop because they are typically part of a long crop rotation.

Other types of perennials—those that will not be part of a crop rotation—may require additional practices to ensure soil conservation and biodiversity in the cropping system. This is important with large perennials, such as trees, that have large drive rows between the crop rows. For example, organic farmers must have a cover crop (often grass) between the rows of trees in an orchard. Crops that are required to have a cover crop between crop rows include caneberries, grapevines, blueberries, tree fruits, and nut trees.

Some perennial crops, such as alfalfa, develop a canopy that covers the ground and prevents soil erosion. Such crops are not required to be rotated to other crops.

Biodiversity

Organic production is a system that "respond[s] to site-specific conditions by integrating … practices that …. conserve biodiversity." The regulations also mention that perennial cropping systems must introduce biological diversity in lieu of crop rotation.

Although farmers are encouraged to have diverse systems, there are no specific requirements, standards, or monitoring practices. Nonetheless, many organic farmers actively manage their farms to increase biodiversity, due to its many benefits.

Biodiversity plays a particularly crucial role in pest management. Diverse agricultural systems support strong populations of predators and parasites that help keep pest populations at manageable levels. This approach is proactive rather than reactive because a diverse system reaches an equilibrium that prevents pest outbreaks from becoming too severe. Birds and bats can keep insect populations low. Raptors can scare away fruit-eating birds. Coyotes, owls, and foxes can keep rodent populations under control. These animals can be encouraged by providing needed shelter, water, and habitat.

Organic producers increase biological diversity in the plant canopy by planting a diversity of crops and plant varieties in any given season. Use of cover crops and hedgerows also adds biodiversity. The diversity of vegetation, combined with reduced use of broad-spectrum pesticides, increases the diversity of insects and spiders in the plant canopy. Introducing beneficial insects and providing habitat for them to become established will increase biodiversity. To promote biodiversity in the soil, it is helpful to minimize tillage, introduce microorganisms in compost, and avoid broad-spectrum pesticides. These practices will increase the variety of bacteria, fungi, and invertebrates in the soil.

For helpful resources that expand on the idea of biodiversity, see materials on the Wild Farm Alliance Web site.

Online Resources

Crop Rotation on Organic Farms: A Planning Manual, www.sare.org/Learning-Center/Books/Crop-Rotation-on-Organic-Farms

Managing Cover Crops Profitably, www.sare.org/Learning-Center/Books/Managing-Cover-Crops-Profitably-3rd-Edition

Western SARE Farm Internship Curriculum and Handbook, www.attra.ncat.org/intern_handbook/crop_rotation.html

Wild Farm Alliance, www.wildfarmalliance.org/resources/organic_BD.htm

Questions

- If your crops are annuals, have you implemented a crop rotation that maintains soil organic matter, controls pests, minimizes diseases, and prevents erosion? ☐ Yes ☐ No ☐ N/A
- If your crops are perennials, have you established cover crops between the plant rows to prevent soil erosion? ☐ Yes ☐ No ☐ N/A
- Are you managing your cover crops to support beneficial insects and wildlife, as well as to preserve soil health? ☐ Yes ☐ No ☐ N/A
- Are you providing additional habitat for beneficial insects and wildlife? ☐ Yes ☐ No ☐ N/A
- Have you taken steps to maintain or increase biodiversity on your farm? ☐ Yes ☐ No ☐ N/A
- Do you apply approved fertilizers and manures so that runoff and leaching are prevented? ☐ Yes ☐ No ☐ N/A
- Do you manage all your fields to prevent soil erosion? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 8
MANAGING PESTS, WEEDS, AND DISEASES

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

This section of the USDA organic regulations requires that producers use a three-tiered approach in deciding how to deal with pest, weed, and disease problems. This can most easily be explained by designating these levels A, B, and C.

Level A, § 205.206 (a), is prevention of the problem.

Level B, § 205.206 (b, c, d), involves the use of mechanical or physical methods.

Level C, § 205.206 (e), is the application of allowed materials.

Each level is explained in more detail later in this section.

Related ATTRA publications
www.attra.ncat.org

Intercropping Principles and Production Practices

Farmscaping to Enhance Biological Control

Principles of Sustainable Weed Management for Croplands

Farmers who transition from conventional to organic production systems often find that pest, disease, and weed control are their biggest challenges. For insect control, conventional farmers can wait until they see an outbreak of insects and then choose a chemical to control the insect. This approach is workable for conventional farmers because they have a large toolbox of chemicals available. For disease prevention, conventional farmers can fumigate the soil with broad-spectrum pesticides. Fumigation also kills beneficial soil organisms, which has negative long-term consequences. Organic farmers have fewer chemical tools available because there are far fewer insecticides, fungicides, and herbicides allowed for application to organic crops. In order to successfully transition to an organic system, farmers should be willing to approach these challenges from a different perspective. The key difference is preventing problems by designing a system that prevents most of the pest problems. Preventing severe pest outbreaks will allow the farmer to avoid broad-spectrum pesticides that will lead to future imbalances in the ecosystem.

Three levels of pest management

The USDA organic regulations are written to require farmers to employ tactics to minimize pest and disease problems using a three-level hierarchical approach.

Level A

The first line of defense in managing weed, insect, and disease pests is a systems-based approach. It is based on the fact that a well-designed and healthy organic system will naturally have fewer pest problems. The system is designed to prevent pest and disease outbreaks.

Level B

The second line of defense is utilized if the practices of level A are not sufficient to control the weed, insect, or disease problem. Level B generally includes mechanical and physical practices that are traditional in organics, as well as the use of nonsynthetic or natural materials.

Level C

The third line of defense is used if the level of pest control required is not achieved after A and B control options are applied. Level C practices include the use of inputs such as biologicals and botanicals to control pests. This level also provides the option of using those

materials included on the National List under § 205.601 Synthetic substances allowed for use in organic crop production.

If you anticipate the need for level C control measures, be sure that you indicate this in your Organic System Plan. Be specific about the control materials you might be using and outline the indicators or thresholds you monitor that will trigger the use of those materials. See Chapter 9 "The National List of Allowed and Prohibited Substances" for information on choosing materials, verifying that they are allowed, and informing your certifier regarding their use.

The organic regulations prescribe the type of practices but allow farmers to choose the specific practices that will work best for their systems. The remainder of this chapter will discuss specific level A and level B practices. Since many practices control both diseases and arthropod pests (insects and mites), these will be discussed together, and weed management will be discussed separately.

Pest and disease management

Organic producers maintain that organic soil-building practices will result in crops that are properly nourished and thereby less susceptible to attack by pests and diseases. Natural biological pest control arises in a healthy organic system in the form of an active complex of natural predators and parasites that suppress pest populations. Incorporating habitat and food sources for beneficial insects into your farm, known as farmscaping, can provide long-term benefits.

Natural biological pest control arises in a healthy organic system in the form of an active complex of natural predators and parasites that suppress pest populations.

In many field crop and vegetable systems, maintaining a diverse, healthy ecosystem and using well-timed cultural practices are sufficient for pest management. Pests may not be eliminated, but damage levels are low enough to be tolerated.

Examples of Level A practices to manage pests and diseases

Cover crops: Some cover crops, including sudangrass, rapeseed, and mustard, are effective at suppressing nematodes.

Crop rotation: Solanaceous crops, including tomatoes and potatoes, are planted in rotation with other crops that are not in the same family. This minimizes the risk of late blight disease and Colorado potato beetle outbreaks. Grain crops, including wheat, barley, and corn, are susceptible to Fusarium head blight. Moving to a legume or oilseed in the rotation can help break this disease cycle by allowing the grain crop residues to decompose fully.

Cultural practices: Use of disease-resistant varieties is a common cultural control. In addition, delaying spring planting until the soil is warmer minimizes fungal diseases and allows the crop to establish a healthy stand.

Intercropping: Two or more crops grown in close proximity is known as intercropping, strip cropping, or companion planting. This approach increases biodiversity and decreases pest outbreaks.

Providing habitat for insect predators and parasites: In organic apple orchards, natural populations of predatory mites become high enough to control the plant-eating spider mites because the orchard provides a good habitat for the predatory mites. Conventional orchards, by contrast, are susceptible to outbreaks of spider mites because pesticides reduce the populations of beneficial predatory mites. Growing some plants that attract ladybugs or other beneficials will help reduce populations of plant pests.

Resistant varieties: As one example, tomato varieties advertised as VFN are resistant to Verticillium, Fusarium, and nematodes. Stem rust is a common grain disease that can be managed by selecting resistant varieties.

Sanitation: Sanitation entails the removal of sources of disease infection or insect pest infestation. For example, apple and pear growers remove branches infected with fire blight (strikes). The strikes are removed from the orchard and burned to kill the bacteria that cause fire blight. Mushroom growers pasteurize the compost to kill fungi that would compete with the mushroom crop.

Trap crops: These are small plantings of a crop or crop variety intended to draw a particular pest away from the main crop. For example, alfalfa planted in strips amid cotton attracts lygus bugs away from the cotton crop. Typically, trap crops must be destroyed to kill the pests that have been attracted to them. Use of trap crops requires a good understanding of the biology of the pest.

Examples of Level B practices to manage pests and diseases

Burning crop residues: In organic production, the burning of crop residues is allowed only for suppression of disease. Rice straw often is burned in the field. Before using this disease-control practice, it must be clearly stated in the organic system plan and approved by the certifier.

Canopy management: By training and pruning trees, orchardists can increase airflow and decrease disease pressure. Viticulturists practice leaf removal to control Botrytis bunch rot of grapes.

Introducing insect predators and parasites: Several types of insects can be purchased in large quantities and released on the farm. For example, to control aphids, release ladybugs and provide favorable conditions to encourage the ladybugs to stay and eat the aphids.

Mulching: Mulching can reduce disease on tomatoes and similar crops by reducing soil contact and maintaining an even soil moisture. However, organic mulches also can serve as habitat for certain pests, such as the squash bug and slugs.

Row covers: Floating row covers, made of lightweight fabric, can keep insects out of short-season crops. For example, they can prevent flea beetles in arugula and prevent cabbage root maggots in radishes.

Solarization: Soil solarization is achieved by covering the soil with plastic during the summer. This allows the soil to get hot enough to kill many pathogens, yet it allows microbial spores to survive. Survivors can re-establish the microbial populations needed for healthy soil.

Weed management

According to the USDA's Invasive Weed Management Unit, the most critical problem facing today's organic grower is weeds. Weeds compete with crops for moisture, nutrients, and sunlight. Weeds do not always need to be eliminated—short weeds in a tall corn crop may be harmless—but weeds do need to be managed. Fortunately, there are many classic ways to reduce the number of weed seeds, and new ways are being developed to remove weeds that compete with crops. The appearance of many difficult-to-control weeds may be an indication that the soil has nutritional or physical problems and nature is trying to restore health and balance.

Examples of Level A practices to manage weeds

Variety selection: Select grain varieties that emerge early and close the canopy as quickly as possible. This shades the soil so weeds are not as competitive.

High-crop seeding rates: Some crops can be planted at high rates to smother weeds. Another strategy is to increase the crop density by decreasing within-row distance or between-row distance. This is especially true when planting cover crops, forages, or grains.

Nurse crops: Companion crops can be sown with other crops to suppress weeds during the establishment year. A common example is planting oats to serve as the nurse crop for alfalfa.

Sanitation: For long-term weed control, it is important to avoid letting weeds go to seed. This keeps the field free of weed seeds for the next crop. Crops that go to seed also can become weeds the following year.

Cover crops: Rotations that include cover crops can provide some weed control, especially fast-growing cover crops, such as buckwheat. If cover crops are likely to self-seed, it will be necessary to mow them before seed sets.

Solarization: Clear plastic traps the sun's heat to raise the soil temperature.

Examples of Level B practices to manage weeds

Cultivation: Mechanical cultivation is effective in killing weeds, especially if done at the seedling stage. Hilling potatoes controls the weeds while covering the tubers with soil.

Flaming: Flamers kill the above-ground portions of plants. They do not kill the roots, nor do they prevent weeds from re-sprouting. Several types of flamers are available, including small hand-held propane flamers and tractor-mounted flamers typically used in orchards.

Grazing: Animals such as goats or geese can control the height of cover crops sown in the drive rows in orchards. Animals must be removed 90 days before harvest of the crop, in accordance with the 90-120-day rule on manure applications. Chickens in movable pens can remove all weeds from small areas.

Hand weeding: Organic growers are all too familiar with the expense (if you hire someone) and exhaustion (if you do the work yourself) of hand weeding. However, hand weeding is still an effective method of weed control.

Mowing: In orchards, the cover crops in the drive rows are kept mowed.

Mulching: A thick layer of mulch can smother weed seedlings. Mulch is less effective on perennial weeds because weeds that emerge from rhizomes, stolons, or tap roots may be able to grow through the mulch. Mulches are most commonly used when they can serve more than one purpose because applying mulch can be labor-intensive and therefore costly. For example, wood-chip mulches are commonly used in blueberry plantings to smother weeds, add organic matter, reduce soil pH, retain moisture near the soil surface, and keep the soil cool, all of which are important for shallow-rooted blueberry plants.

Transplanting: Transplanting onions rather than direct seeding gives the onions a head start on the weeds.

Weed cloth or black plastic: Weed cloth is often used in perennials, such as organic blueberry plantings, because the cloth controls weeds for several years. Black plastic is more commonly used in annual crops, such as tomatoes. Plastic mulches should not be allowed to photodegrade or deteriorate in the field; they may not be disced, plowed, or otherwise incorporated into the soil. In annual production systems, plastic mulch must be removed at the end of the growing season.

Online Resources

Biorationals: Ecological Pest Management Database, www.attra.ncat.org/attra-pub/biorationals

Organic IPM Field Guide, www.attra.ncat.org/attra-pub/summaries/summary.php?pub=148

Questions

- Does your production system keep insects and diseases at manageable levels? ☐ Yes ☐ No ☐ N/A

- Which of the following practices do you use?

  Beneficial insects ☐ Yes ☐ No ☐ N/A

  Canopy management ☐ Yes ☐ No ☐ N/A

  Companion planting ☐ Yes ☐ No ☐ N/A

  Cover crops ☐ Yes ☐ No ☐ N/A

  Crop rotation ☐ Yes ☐ No ☐ N/A

  Cultivation ☐ Yes ☐ No ☐ N/A

  Flaming ☐ Yes ☐ No ☐ N/A

  Grazing ☐ Yes ☐ No ☐ N/A

  Habitat for beneficial insects ☐ Yes ☐ No ☐ N/A

  Habitat for predators ☐ Yes ☐ No ☐ N/A

  Hand weeding or hoeing ☐ Yes ☐ No ☐ N/A

  High crop seeding rates ☐ Yes ☐ No ☐ N/A

  Intercropping ☐ Yes ☐ No ☐ N/A

  Mowing ☐ Yes ☐ No ☐ N/A

  Mulching ☐ Yes ☐ No ☐ N/A

  Resistant crop varieties ☐ Yes ☐ No ☐ N/A

  Row covers ☐ Yes ☐ No ☐ N/A

  Sanitation ☐ Yes ☐ No ☐ N/A

  Solarization ☐ Yes ☐ No ☐ N/A

  Trap crops ☐ Yes ☐ No ☐ N/A

  Weed cloth ☐ Yes ☐ No ☐ N/A

- Are all of the insect, pest, weed, and disease control materials you are using allowed in organic production? See Chapter 9 "The National List of Allowed and Prohibited Substances" for more information on choosing pest-control materials. ☐ Yes ☐ No ☐ N/A

CHAPTER 9
THE NATIONAL LIST OF ALLOWED AND PROHIBITED SUBSTANCES

The National List of Allowed and Prohibited Substances identifies substances that may or may not be used in organic crop production. In general, synthetic substances are prohibited unless specifically allowed and non-synthetic substances are allowed unless specifically prohibited.

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

There are two main criteria that determine whether a given substance, such as a fertilizer or pesticide, is allowed in organic crop production:

1. Synthetic substances are prohibited unless specifically allowed on the National List.
2. Nonsynthetic (natural) substances are allowed unless specifically prohibited on the National List.

In addition to these guidelines, genetically modified organisms are prohibited because they are produced by a prohibited method. Sewage sludge is prohibited because it usually contains prohibited substances.

§ 205.601 Synthetic substances allowed for use in organic crop production

The National List of synthetic substances includes materials that are specifically allowed in organic crop production. The list includes algaecides, disinfectants, sanitizers, irrigation system cleaners, herbicides, animal repellents, insecticides, miticides, pheromones, rodenticides, slug baits, plant disease controls, soil amendments, and plant growth regulators; in short, many of the materials needed for crop production. Any synthetic substance that is not on the National List is not allowed. For example, herbicides containing the synthetic material glyphosate are prohibited. Herbicides containing only natural substances, such as vinegar and clove oils, are allowed.

§ 205.602 Non-synthetic substances prohibited for use in organic crop production

This is the National List of natural, or nonsynthetic, materials that are specifically prohibited in organic crop production. This list includes natural—but highly toxic—materials, such as arsenic.

Related ATTRA publications
www.attra.ncat.org

Sources of Organic Fertilizers and Amendments

First, it's important to define a few terms. An "input" is any material applied to a crop, including compost, pheromones, and any pesticides. The term "pesticide" refers to any agent used to kill a pest. For example, insecticides kill insects, fungicides kill fungi, and herbicides kill plants. The National List uses the word "substance" to include not only inputs to crops but also any materials used for other purposes, such as rodent baits. All substances are listed by the generic terms only (e.g., sodium bicarbonate), not by the brand name (e.g., Arm and Hammer baking soda). This avoids suggesting that any one brand is better than any other.

In this context, the term "product" will refer to the brand name of an input material. For example, Biomin® Calcium 2-0-0 is the name of a calcium product manufactured by JHBiotech, Inc. Pesticides contain an active ingredient, which is the material that kills the pest. Both pesticides and fertilizers also have inert ingredients, which make up the remainder of the product. Active ingredients are listed on the label, but inert ingredients typically are not listed. Although the inert ingredients are not listed on the product labels, they must be allowed for organic production, in order to use a specific product.

There are two organizations that review products and publish lists of products allowed for organic production: the Organic Materials Review Institute (OMRI) and the Washington State Department of Agriculture (WSDA) Organic Food Program. These organizations obtain information about all the inert and active ingredients in a product formulation, review them, and assess whether the product is allowed.

As explained in the previous chapter, the USDA organic regulations require that farmers implement pest-management practices in a hierarchical fashion, beginning with a systems approach. If that approach is not sufficient, inputs may be needed, whether for plant nutrition, disease prevention, or pest management. This chapter explains broadly the types of materials allowed and specifically how to choose a product that will be approved by your certifier.

Allowed pesticides

There are two organizations that review products and publish lists of products allowed for organic production: the Organic Materials Review Institute (OMRI) and the Washington State Department of Agriculture (WSDA) Organic Food Program.

Generally speaking, pesticides derived from natural materials or living organisms are allowed in organic production as long as they do not contain synthetic additives or are not specifically prohibited on the National List under § 205.602. By contrast, most synthetic pesticides are not allowed; those few that are can be found on the National List under § 205.601.

Allowed inputs typically include but are not limited to the following:

- Biological pesticides
- Botanical pesticides
- Dormant and summer oils
- Fatty acid insecticidal soaps
- Minerals
- Pheromones

Biological pesticides

Biologicals may contain living microbes, such as the fungi *Beauveria bassiana* or *Trichoderma harzianum*. Other biologicals contain toxins derived from naturally occurring microbes, such as the Bt toxin, produced by the bacterium *Bacillus thuringiensis.* There are various formulations of Bt, all of which control insect larvae.

Spinosads are a relatively new class of biological insecticides derived from a rare form of soil-dwelling actinomycete. Spinosads control a variety of insect pests, including thrips, fruit flies, and caterpillars, without harming beneficial insects.

Botanical pesticides

Botanicals are derived from plants. They include pyrethrum, rotenone, sabadilla, neem, ryania, and garlic. Strychnine and nicotine are also botanicals, but are expressly prohibited in organic production. Since botanical pesticides are relatively nonselective, they can affect natural predators and other nontarget organisms. Rotenone, for example, is highly toxic to fish. For this reason, many organic growers use botanical pesticides only as a last resort.

Spray oils

Vegetable- or animal-derived oils are generally allowed as suffocating (stylet) oils, summer oils, dormant oils, and surfactants. Some petroleum-derived oils, referred to as "narrow-range oils," are allowed for the same purposes. Spray oils are commonly used to control scale and mite pests.

Insecticidal soaps

Fatty acid insecticidal soaps are synthetic pesticides specifically allowed in organic production. Safer® Brand Insect Killing Soap Concentrate II is a product that is commonly used by organic farmers. Insecticidal soaps can be hard on beneficial predatory mites, so they should be used with caution.

Minerals

Mineral-based pesticides include sulfur, copper products, diatomaceous earth, and kaolin clay. These must be used with caution, even though they are allowed. Sulfur can reduce the populations of some beneficial insects and may burn plants if used during hot weather. Diatomaceous earth can cause respiratory problems and itching in the farmworkers who apply it. Copper can accumulate in soils, so it is allowed with restrictions. The organic regulations state that "copper-based materials must be used in a manner that minimizes accumulation in the soil…" Certifiers may require soil testing to verify that copper is not accumulating in the soil. Certain highly toxic minerals, including arsenic and lead, are specifically prohibited.

Pheromones

Pheromones are chemicals released from insects that cause other insects of the same species to change their behavior. Pheromones are not considered pesticides because they do not kill the insects. The pheromones used for pest control are often called mating disrupters because they alter mating behavior. Being totally natural, the pheromones themselves are allowed in organic production. However, some of the inert ingredients in mating disrupter products are prohibited.

Allowed fertilizers

Allowed fertilizers and amendments typically include, but are not limited to, the following:

- Plant materials such as crop residues
- Rock dusts such as gypsum, rock phosphates, granite dust, greensand, natural potassium sulfate, sulfate of potash-magnesia, and glacial gravel dust
- Animal byproducts
- Manures
- Composts
- Marine products and byproducts, such as seaweed and fish emulsion
- Non-GMO microbial inoculants
- Sodium nitrate (Chilean nitrate), only if its use constitutes no more than 20 percent of the crop's total nitrogen requirement

How to determine if a product is allowed for organic agriculture

The allowed pesticides on the National List are called active ingredients when they are formulated into a commercial product. Even if the active ingredient in a pesticide is allowed, if an inert ingredient is not allowed, the pesticide may not be used in organic crop production. The U.S. Environmental Protection Agency provides four classifications of inert ingredients: List 1, List 2, List 3, and List 4. At this time, only a small fraction of the inert ingredients on these lists is allowed in organic production.

The active ingredient is listed on the product label, but the inert ingredients often are not listed, and companies may choose not to reveal that information. Determining whether a commercial pesticide is allowed for organic production is a daunting task.

The same situation holds true for fertilizers and soil amendments. For example, the commonly sold agricultural gypsum often is made from recycled wallboard, a construction material that contains synthetic chemicals. For that reason, gypsum used in organic production must be obtained only from a mined source.

The safest option for organic farmers is to avoid using any product unless you're sure that it is allowed. One way to verify the product's status is to review the lists published by OMRI and the WSDA Organic Food Program. When companies develop a fertilizer or pesticide that they believe is suitable for organic production, they typically list the product with OMRI or WSDA, or both. The organizations review the products, including the inert ingredients, and determine if they meet the requirements of the USDA organic regulations. Organic farmers can use these listed products with confidence that their use will not jeopardize their organic certification. The review does not include a review of product effectiveness, and the listing is not an endorsement of the product. On the other hand, organic producers should be aware that many companies choose not to list their products with OMRI or WSDA, yet their products are allowed in organic agriculture.

Even if the catalog or the manufacturer claims that a product is allowed, it's a good idea to verify that the product approval is current before it is applied to organic land.

Using the OMRI list

OMRI has two lists: the OMRI Products List and the OMRI Generic Materials List. Both include materials for crops, livestock, and processing. To use either OMRI list, start on the OMRI Web site home page, and click "OMRI list" on the left side of the page. The next screen allows you to search the OMRI lists for your product.

For example, if you search using the word "gypsum," the Products List will include brand names of several products (e.g., Ida-Grow Pelletized Gypsum). The generic materials list will simply list gypsum.

At the bottom of the page, there is a link to download the Products List as a PDF file. If you use the downloaded file, be sure to update it frequently, as new products are added and others are removed on an ongoing basis. The OMRI Web site also has links to the names and addresses of suppliers to make it easier to purchase approved materials.

Using the WSDA Brand Name Materials List

The Brand Name Material List (BNML) is maintained by the WSDA Organic Food Program and can be accessed on its Web site. There are three versions: Sorted by Product, Sorted by Company, and Sorted by Type. Each of these lists can be downloaded as a PDF file. The list of materials sorted by product is best used to look up a specific product, such as MicroPak PolyAmine, which is a fertilizer sold by Northwest Agricultural Products. The list of materials sorted by company is useful when searching for products from a particular company, such as Bio-Gro, NuFarm, or Northwest Agricultural Products. The list of materials sorted by type can be used to find an approved product. For example, searching under D&PC (Disease and Pest Control), there are numerous sub-types, including neem, pheromones, and fungicides.

Although this list was developed by one certification agency, it is accepted by most of the certifiers in the United States.

Caveats

Companies that sell agricultural products will often state in their catalog that a product is OMRI or WSDA approved. Some manufacturers will state on the package that the mate-

rial is listed with OMRI or WSDA. Even if the catalog or the manufacturer claims that a product is allowed, it's a good idea to verify that the product approval is current before it is applied to organic land.

When using either WSDA or OMRI lists to verify the product's status, be sure to check the most recent version. Each list is updated several times each year, and the most current version is posted online. Using the complete and correct name of the product will make it easier to find the product if it is listed.

Restrictions on use of approved products

Although products may be listed by OMRI or WSDA, there may be restrictions on their use. The WSDA indicates restrictions in the column on annotations. For example, the product Biomin Zinc is allowed as a fertilizer, but there is a restriction: soil deficiency must be documented by testing. Before applying zinc to crops, farmers are required to obtain a soil test to verify that the crop needed additional zinc. Some certifiers will accept fruit or leaf tests that indicate a deficiency in the plant, as opposed to the soil.

The Organic System Plan

Each year, when a farmer prepares the paperwork to renew organic certification, one of the questions will be: "Please list any materials you plan to use in this year's growing season." This list should be based on the types of inputs applied in the previous year or the past few years. This is a list of materials that might be applied, but they should only be applied if they are needed. Always, if it is necessary to use a product that is not on the Organic System Plan, the certifier must be notified before use.

Online Resources

OMRI Materials Lists, www.omri.org/omri-lists

WSDA Materials Lists, www.agr.wa.gov/FoodAnimal/Organic/MaterialsLists.aspx

Biorationals Database, www.attra.ncat.org/attra-pub/biorationals

Questions

- Do you have a list of all inputs used for insect control in the previous growing season? ☐ Yes ☐ No ☐ N/A
- Do you have a list of all inputs used for weed control in the previous growing season? ☐ Yes ☐ No ☐ N/A
- Do you have a list of all inputs for disease control in the previous season? ☐ Yes ☐ No ☐ N/A
- For a product listed by OMRI or WSDA, do you have evidence that it is allowed for organic agriculture? This can be a label or a copy of the online listing. ☐ Yes ☐ No ☐ N/A
- If you are using natural materials such as gypsum, do you have evidence that they are from a naturally mined source? ☐ Yes ☐ No ☐ N/A
- Do you understand any restrictions on the use of the products and have you complied with the restrictions? ☐ Yes ☐ No ☐ N/A
- Have you kept invoices of all materials purchased? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 10
GREENHOUSE PRODUCTION

This chapter does not reference a particular section of the USDA organic regulations because there is no one section addressing greenhouse production. Whether growing plants in the field or in the greenhouse, organic producers must comply with all practice standards related to fertility management, pest control, allowed materials, seed, and treated lumber. For example, treated lumber may be allowed for structural support of buildings, benches, or trellises, but it is not allowed for raised beds or plant supports.

The word "greenhouse" traditionally refers to a heated, permanent structure. The discussion in this chapter refers to plants grown in any enclosed structure, whether heated or unheated, temporary or permanent, including cold frames and hoop houses, since many of the same considerations apply to all enclosed systems.

There are several types of greenhouse growing systems. Plants can be grown in containers, in the ground, or in water. Container-grown plants may be short-term crops, such as annual transplants, nursery perennials, or research studies, or they may be grown for harvest. Peat, compost, vermiculite, perlite, and many typical ingredients in soilless potting mixes are allowed in organic production. Other ingredients are not allowed, such as the chemicals used to increase water-holding capacity of the soil and the fertilizers that are added to some potting mixes. Before using a potting mix, read the label carefully, list the brand name on your system plan, and save an empty bag to show your inspector. A greenhouse with container-grown plants will not need a 3-year transition period to become certified organic. If the pots are reused, they can be cleaned with soap and water or disinfected with a chlorine solution. The method used to sanitize containers will need to be approved by the certifier.

Hoop houses often are used to cover plants growing directly in the ground, rather than in pots. If plants are grown in the ground within the greenhouse, the soil will require a 36-month period free of prohibited materials, just like an outdoor field. Cover crops typically are not used in a greenhouse, but rotation may be required if crops are grown in the ground.

When there is both organic and conventional production at the same location, either in adjacent or shared greenhouse structures, there are additional challenges related to avoiding contamination and commingling. For example, you must take extra care to ensure that pesticide drift does not reach organic crops and that shared equipment is adequately cleaned. Split production within a single greenhouse structure is not prohibited but is discouraged due to the difficulties in controlling pesticide drift and monitoring fertilizer applications. Handling, labeling, and segregation procedures must be well established to guarantee that conventional and organic products are not commingled. The inspector will observe a split operation closely to ensure that organic products are grown and handled properly.

Despite the emphasis that organic agriculture places on the importance of soil, crops grown in a hydroponic system, rather than soil, can be certified organic. Hydroponics is the production of plants in a soilless medium, whereby all of the nutrients supplied to the crop are dissolved in water. Aquaponics is a type of hydroponic production in which nutrient-rich effluent from fish tanks fertilizes the crops grown in hydroponic production beds. The waste products of one biological system—the fish tank—produce nutrients for a second biological system—the crop plants.

Related ATTRA publications

www.attra.ncat.org

Organic Greenhouse Tomato Production

Organic Greenhouse Vegetable Production

Herbs: Organic Greenhouse Production

Potting Mixes for Certified Organic Production

Management of insects, diseases, and weeds

Regardless of the system they use, greenhouse growers will need to have a plan for insect and disease management. In an enclosed environment such as a greenhouse, insects and foliar diseases can reach damaging levels very quickly. Conventional greenhouse production

can rely on pesticides for control. In contrast, many organic producers focus on a systems approach for insect and disease management:

- Choose crops adapted to greenhouse production
- Plant a diversity of crops
- Use screens to exclude insects
- Introduce predators such as ladybugs to reduce insect populations
- Break the pest cycle using heat or cold

In order to break the pest cycle, choose a time when the greenhouse is not in use for crops and create conditions unfavorable for insect survival. A greenhouse used in the winter can be closed in summer and allowed to heat to high temperatures to kill insects. Conversely, a greenhouse used in the summer can be opened in the winter so that insects are killed by cold temperatures.

Foliar diseases can become a problem in the enclosed, humid greenhouse environment, but there are simple techniques to minimize disease outbreaks:

- Water plants early in the day
- Space plants far enough apart to allow air flow
- Use drip irrigation rather than overhead watering
- Open vents to encourage air movement

The goal of all these techniques is to reduce humidity and minimize periods of leaf wetness. When ventilating an organic greenhouse, be sure to avoid drift from attached conventional greenhouses or from pesticides sprayed outside the greenhouse.

Weed control can be a challenge in a greenhouse. Only approved herbicide materials may be used inside the greenhouse, even if you are spraying the ground and all the plants rest on benches. Use of black plastic or landscape fabrics for weed control must follow the guidelines for organic production, as explained in Chapter 8.

Questions

• Are all planting media ingredients allowed in organic production?	☐ Yes	☐ No	☐ N/A
• Are all fertilizers allowed in organic production?	☐ Yes	☐ No	☐ N/A
• Do you actively take steps to prevent disease and pest outbreaks?	☐ Yes	☐ No	☐ N/A
• If growing trays and pots are reused, are they cleaned using approved practices and materials?	☐ Yes	☐ No	☐ N/A
• Do you manage weeds in and around the greenhouse site with allowed technologies and inputs?	☐ Yes	☐ No	☐ N/A
• Are your greenhouse structures adequately distanced or protected from sources of pesticide drift?	☐ Yes	☐ No	☐ N/A
• Are greenhouse construction materials selected and managed to prevent contamination of producing soils and crops? Pay special attention to the use of treated lumber.	☐ Yes	☐ No	☐ N/A
• If you produce conventional crops, are separate structures used to segregate conventional and organic production? Is air exchange prevented?	☐ Yes	☐ No	☐ N/A
• Are adequate barriers present and/or procedures in place to prevent pesticide-laden air movement from conventional production areas into organically managed sections?	☐ Yes	☐ No	☐ N/A

Questions

- Are the organic production areas situated to prevent contamination by drainage from conventional areas? ☐ Yes ☐ No ☐ N/A
- Are sprayers and other application equipment for organic use labeled and segregated? ☐ Yes ☐ No ☐ N/A
- Does shared equipment have clearly defined cleanup protocols? Are cleanup logs maintained? ☐ Yes ☐ No ☐ N/A
- Where fertigation is used in split production, are the water systems fully segregated to prevent contamination? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 11
PREVENTING CONTAMINATION OF ORGANIC CROPS

This chapter discusses various precautions and additional recordkeeping that are needed to prevent contamination of organic crops. These precautions are important for split operations (farms that raise both organic and conventional crops) and are essential for parallel production (farms that raise the same crop in both an organic and conventional manner). Managing a split operation requires extra care to ensure the organic integrity of the crops because of the risk of spray drift, contaminated equipment, or accidental sprays of conventional chemicals on organic crops. Preventing contamination also is a concern if contractors are hired for seeding, spraying, or harvesting, or if spray drift from neighbors is a possibility.

Related ATTRA publications

www.attra.ncat.org

Sources of Spraying Prohibited Signs for Organic Farms

Transgenic Crops

It is the responsibility of the organic farmer to ensure that organic crops are not contaminated with conventional materials. Contractors hired for seeding, spraying, or harvest may not be familiar with practices needed to prevent contamination of organic crops. If a prohibited material is applied, even if it is done by a contractor by mistake, an organic farmer can lose organic certification for 3 years. Certainly this would have an economic impact. It pays to educate employees and contractors and verify that they follow organic practices carefully.

Seeding

Many conventional growers use seeds treated with fungicides that are prohibited in organic production. These fungicide-treated seeds are required by law to be dyed, usually bright pink or green, so the fungicide will be obvious to the user. Before seeding equipment is used to plant organic crops, all fungicide-treated seeds must be completely removed from the planting equipment. The seed drills may need special attention, typically cleaning with compressed air, to remove fungicide deposits or seeds that may be caught. After cleaning the equipment, it's a good idea to check that the fungicide-treated seeds have all been removed. If the seeding equipment is not cleaned and treated seeds are distributed throughout the field, this will be considered an application of a prohibited material and the field will lose organic status for 36 months.

Special considerations apply to split operations that grow genetically modified (GM) crops, or that have nearby neighbors that grow GM crops (also referred to as GMOs, or Genetically Modified Organisms). Pollen from GM crops has been contaminating organic crops with increasing frequency. There is little information on the distance that would be needed to prevent pollen from traveling from the GM crop to the organic crop. The distance will depend on the type of crop, the surrounding vegetation, and the terrain that separates the two crops. The isolation distances used for seed production are intended to minimize transfer of pollen from one crop to another. These will provide a starting place to determine the isolation distance needed to prevent organic crop contamination with GM pollen, but there are no guarantees.

Spraying and maintaining buffers

As an organic farmer, you are responsible for all materials applied to your fields, even when you do not apply those materials yourself. Organic crops can be contaminated through residues in spray equipment, drift from nearby fields, accidental sprays, or mistakes made by employees.

Residues from spray used for conventional crops must be thoroughly removed before equipment is used to spray organic crops. Although most farmers rinse equipment with water after spraying, some conventional pesticides, such as DDT, are hard to remove, so rinsing may not be adequate. Residues may be removed more effectively by using a cleaner such as Nutra-sol.

Pesticide drift is a concern if there are conventional crops growing near organic crops. Even if a farm is entirely organic, pesticide drift may occur if the neighbors manage conventional fields near the organic fields. In the past, farmers maintained a 25-foot buffer between organic and conventional crops, but this is no longer considered a standard. Buffers may need to be larger than 25 feet, or they may be smaller, but they must be large enough to prevent measurable drift. Windbreaks, made of hedgerows or tall crops such as corn, will reduce the likelihood of drift. If the conventional crop is fruit trees sprayed with an air-blast sprayer, a large buffer will be needed. Conversely, if the nearby conventional spray is for weed control, using a backpack sprayer near the ground, a smaller buffer will be sufficient. It is important to educate neighbors and employees to be careful to avoid drift onto organic crops.

Accidental spraying of conventional pesticides onto organic fields is something that should never happen, but it does. A neighbor might believe he or she is being helpful by spraying herbicides at the edges of your organic fields, or custom applicators might apply aerial sprays to the wrong fields. To minimize the chances of instances such as these happening, notify your neighbors in writing that some of your fields are organic. Supplying a map—perhaps the map sent as part of the Organic System Plan (OSP)—can be very helpful. Additionally, if organic crops are planted near roadsides, it may be necessary to inform county authorities that they should not spray herbicides near your organic crops. Some counties provide free signs that state "Owner Will Maintain." These are placed at the beginning of the organic property to indicate that the owner will control weeds along the roadside. Other sources of signs are provided in the ATTRA publication "Sources of Spraying Prohibited Signs for Organic Farms."

Mistakes by employees should never happen, but they do. During the transition period from conventional to organic, it's easy to reach for familiar conventional pesticides without realizing that they are prohibited. If employees will be spraying pesticides, it is essential to educate them about the use of materials approved for organic production, the proper cleaning of sprayers, the importance of accurate spray records, and any other organic procedures for which they are responsible. One common mistake is to use a material that is allowed in organic production in the United States but is not allowed according to the organic standards in Europe. If any product will be exported, be especially vigilant to be aware of additional restrictions.

Fertilizing (custom mixing)

Each material applied to an organic crop must be documented, reported to the certification agency, and allowed for use in organic production. The list of ingredients used in a custom mix, including the brand names and copies of invoices, must be available for review by the organic inspector.

Irrigation

The USDA organic regulations have very little to say about irrigation and irrigation water quality. However, since it is the general intent of these regulations that crops and soils not be contaminated with prohibited substances, producers should take precautions to ensure that irrigation water is not loaded with agricultural pesticides or other polluting chemicals.

If you have a split operation and shared irrigation equipment is used for fertigation or other chemical application, protocols for decontamination of the equipment and a cleanout log will be required. It is probably easier to use separate irrigation equipment for organic and conventional crops. If irrigation lines require a cleaning agent, an algaecide, or any antimicrobial chemical, consult your certifier to be certain the material you choose is allowed for use in organic production.

Harvest

If the same equipment is used to harvest both organic and conventional crops, there is a possibility of commingling, or combining, of organic products with conventional products. Several precautions are needed to prevent commingling. Cleanout procedures need to be established and documented to ensure that product mixing does not occur. Along with clearly written protocols, a log of cleanout dates also will be expected by the certifier.

Before beginning the organic harvest, organic farmers often rely on purging to scour combines and other harvesting equipment that is used for conventional crops. One way to purge equipment of conventional crops is to harvest the first organic crop row and sell it as conventional. This is a common technique for hay balers and combines. Purging may not be an adequate cleanout technique in circumstances where the remains of GM crops need to be removed. Very small quantities of GM crops can be detected with current testing procedures.

Transportation of organic products

Transporting organic crops from the field to the storage location might present a contamination hazard. If trucks have been used to transport conventional crops, they need to be thoroughly cleaned before being used to transport organic crops. Even small details can be very important. For example, cleanout protocols must include cleanup of the tarps used to cover grain trucks or hay bales.

Cleaning procedures for harvest and transportation equipment will depend on the specific crop. The protocols, or step-by-step procedures, should be written down so that employees can easily follow the directions. A cleaning log should be used to document the dates that cleaning occurred. This is especially important if contractors are used. Farm produce that is transported by your own farm equipment is covered under your OSP for the farm certification. If other transportation is used, truck or rail, the company must be mentioned in your OSP.

Storage

In a split operation, several precautions should be taken to avoid commingling of organic and conventional crops in storage. Organic crops must be stored separately from conventional crops. Separation can be achieved with a separate location in the storage area, identified by clearly readable signs, or an entirely separate room. Your certifier will determine whether the separation is adequate. All bins and storage areas should be clearly labeled. Inventory records, cleanout protocols, and cleanout logs must be current. The inspector may conduct a detailed in/out audit to compare the amount of product sold to the amount of product harvested. All records should be available at inspection.

Pest-management decisions for storage areas will need to follow organic guidelines as well. These are explained in chapter 14 “Structural Pest Management.”

Online Resources

Isolation Distances and Pinning Maps in Organic Seed Production, www.extension.org/pages/18435/isolation-distances-and-pinning-maps-in-organic-seed-production

NOP 5031 Draft Guidance: Handling Bulk, Unpackaged Organic Products, www.ams.usda.gov/nopprogramhandbook

Questions

- If planters or seeders are also used to apply prohibited materials, are cleanout protocols clearly established and cleanout logs maintained? ☐ Yes ☐ No ☐ N/A
- If conventional crops are grown, is separate spraying equipment available and clearly marked? ☐ Yes ☐ No ☐ N/A
- If sprayers are also used to apply prohibited materials, are cleanout protocols clearly established and cleanout logs maintained? ☐ Yes ☐ No ☐ N/A
- If both organic and conventional crops are irrigated using the same equipment, are you taking steps to ensure that prohibited materials do not contaminate organic crops? ☐ Yes ☐ No ☐ N/A
- Is all runoff from conventionally managed land properly diverted to prevent contamination of land and water resources used in organic production? ☐ Yes ☐ No ☐ N/A
- If equipment is used to harvest both conventional and organic products, are cleanout protocols established and cleanout logs maintained? ☐ Yes ☐ No ☐ N/A
- When harvesting equipment is purged, have adequate records been kept on the quantity of organic product used in purging and how it was subsequently used or disposed of? ☐ Yes ☐ No ☐ N/A
- Are crops harvested from buffer zones segregated, documented, and sold as nonorganic product? ☐ Yes ☐ No ☐ N/A
- Are cleanout protocols maintained for farm-owned trucks? ☐ Yes ☐ No ☐ N/A
- Do all hired trucks have either clean truck affidavits or cleanout logs? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 12

POST-HARVEST AND LABELING

The importance of maintaining organic integrity not only while the crop is being grown but also after the crop is harvested cannot be overstated. To ensure organic integrity from the field to the consumer, it is important to develop standard procedures, or protocols, for harvesting, washing, storing, transporting, and labeling organic produce. These protocols should be written in the Organic System Plan (OSP), approved by the certifier, and followed by all farmworkers.

Protocols differ from farm to farm, depending on the size of the farm and the storage facilities. On every farm, there are two common goals: preventing contamination of organic crops and preventing commingling of organic crops with conventional crops. This chapter discusses some important considerations for harvesting, washing, storing, packing, labeling, and transporting organic crops. Chapter 13 "Recordkeeping" will discuss the importance of an audit trail, which allows products to be traced from the consumer back to the farm and perhaps to the field where the crop was grown.

Containers

Any container used for harvest, storage, or shipping can present a threat of contamination to organic produce. This includes bins, cardboard boxes, and trucks used to transport produce from the farm to a local market.

As organic producers harvest crops into containers, they should consider the potential for contamination and take appropriate steps to prevent it. Harvest and storage bins should be clean and free of residue left from conventional produce. Almost any type of soap or detergent can be used to clean containers, as long as the containers are thoroughly rinsed. A few sanitizers, such as quaternary ammonium compounds, are prohibited because they leave residues that are difficult to remove. If the harvest containers must be sanitized, several brands of chlorine and peroxyacetic acid sanitizers are allowed for organic use. The chlorine residues can be easily washed off with water. Peroxyacetic acids may not even need rinsing because they will decompose into water and oxygen and because washing with water after using peroxyacetic acid risks further contamination.

Packaging and shipping materials that are impregnated with prohibited pesticides can contaminate organic products. For example, reusing cardboard boxes that have been used for conventional produce is an excellent idea from the standpoint of sustainability. However, many of those boxes have been treated with fungicides, so they should not be used for organic produce.

Washing produce

Microbial contamination of water used to wash fresh produce is a high-profile issue in the organic community. Some types of produce, such as lettuce, are simply rinsed with plain water to remove field heat. In those cases, the farmer needs to be aware of basic food safety and ensure that the water used is potable. For other types of produce, such as apples, synthetic materials are added to the wash water to reduce microbial loads. Adding hydrogen peroxide, ozone, or chlorine to control microbial growth is allowed in organic processing, but there are restrictions on the use of these chemicals.

Section 205.605 of the National List of Allowed and Prohibited Substances states that chlorine (Cl) materials are allowed for "disinfecting and sanitizing food contact surfaces" in organic processing. The regulation also states that "residual chlorine levels in the water shall not exceed the maximum residual disinfectant limit under the Safe Drinking Water

Act," which is currently 4 parts per million chlorine. The interpretation of this regulation caused some confusion, leading the NOP to issue additional guidance. The guidance document can be found in the NOP Program Handbook as NOP5026, "The Use of Chlorine Materials in Organic Production and Handling," and is summarized below.

When washing produce, the rinse water that makes final contact with the organic product must not contain more than 4 ppm chlorine. In other words, a food product, such as apples, may be bathed in water containing a higher concentration of chlorine, if it is permitted by the U.S. Food and Drug Administration (FDA), but that product must receive a final rinse of water containing no more than 4 ppm chlorine. The procedures used to wash produce and to monitor chlorine levels in the wash water must be included in the OSP.

Some farmers may choose to use chlorine materials for irrigating crops or cleaning irrigation systems. For those purposes, the water must contain no more than 4 ppm chlorine.

Storing produce

Storing produce appropriately is just as important as growing it. Your OSP should state the names of any storage facilities that you use. The farm inspector will want to visit any storage facilities that are used for organic crops, even if they are offsite. Storage in an open container, such as an apple bin, presents more possibility of contamination or commingling than produce stored in a closed container, such as a 40-pound cardboard box of apples. For bulk storage of certain crops such as apples and potatoes, it may be necessary to have a dedicated organic cooler to avoid contact with post-harvest chemicals applied to conventional crops. Potato storages, in particular, must be carefully cleaned after storage of conventional crops and before storage of organic crops.

The NOP Program Handbook includes a guidance document titled "The Use of Chlorine Materials in Organic Production and Handling."

Labeling nonretail containers

Nonretail containers include cardboard boxes, plastic bins, totes, or other containers used to transport fruits and vegetables to the warehouse, farmers market, or retailer. Such containers must be labeled with information that allows the product to be traced back to the farm and field where it was grown. Nonretail containers on the farm include only raw agricultural products, but these rules apply as well to processed (e.g., frozen) products kept in bulk storage by processors.

For many small farmers who market raw products, it will be sufficient to label the container with the word "organic" and the farm name. The USDA organic seal or the seal of the certification agency may be used, but they are not required. Farmers who have multiple fields of the same crop will need to assign lot numbers to the crops harvested from different fields and ensure that the lot number is attached to the container. For example, a farmer with three fields of sweet corn, all being sent to a processor to be frozen, may choose lot numbers of swc_JY30, swc_AU15, and swc_AU30. This code indicates the crop (swc), the harvest month (JY, AU) and the harvest day (15, 30).

Labeling retail containers

§ 205.301 Product composition

(a) Products sold, labeled, or represented as "100 percent organic."

(b) Products sold, labeled, or represented as "organic."

(c) Products sold, labeled, or represented as "made with organic" (specified ingredients or food group(s)).

(d) Products with less than 70 percent organically produced ingredients.

The rules for labeling organic retail products, both raw and processed, are addressed under the "Product Composition" section of the USDA organic regulations. The regulations cover the wording allowed on both the front panel and the information panel of a packaged product. The four categories of labeling based on product composition are summarized below:

- "100 percent organic" can be used to label any product that contains 100 percent organic ingredients (excluding salt and water, which are considered natural). Most raw, unprocessed farm products can be designated "100 percent organic." Likewise, many value-added farm products that have no added ingredients—such as grain flours, rolled oats, etc.—can also be labeled "100 percent organic."
- "Organic" can be used to label any product that contains a minimum of 95 percent organic ingredients (excluding salt and water). Up to 5 percent of the ingredients may be nonorganic agricultural products that are not commercially available as organic and/or nonagricultural products that are on the National List.[1]
- "Made with Organic _____" can be used to label a product that contains at least 70 percent organically produced ingredients (excluding salt and water). There are a number of detailed constraints regarding the ingredients that comprise the nonorganic portion.
- The specific organic ingredients may be listed in the ingredient statement of products containing less than 70 percent organic contents—for example, "Ingredients: water, barley, beans, organic tomatoes, salt."

Many farmers make jams, teas, salsas, or other processed products from their excess produce. These value-added products can be an excellent source of income, but there are additional requirements if they are to be labeled organic. Depending on the certifier, simple processing—such as drying of herbs, freezing of fruits, or grinding of grains—may be covered under the farm's Organic Producer certificate. If the product undergoes complex processing and is labeled organic on the front panel, an Organic Handler certificate will be required. If the organic ingredients are only listed in the information panel and those ingredients are grown on the farm, then the Organic Handler certificate is not necessary. For example, farmers can list organic strawberries as an ingredient in the jam if they make jam from organic strawberries that they grow. The certifier will want to review copies of the labels to ensure that they comply with organic regulations.

Online Resources

NOP 5026 Guidance: The Use of Chlorine Materials in Organic Production and Handling, www.ams.usda.gov/nopprogramhandbook

NOP 5031 Draft Guidance: Handling Bulk, Unpackaged Organic Products, www.ams.usda.gov/nopprogramhandbook

[1] For an explanation of the National List, see Chapter 9 "The National List of Allowed and Prohibited Substances."

Questions

- If both organic and conventional crops are grown, are harvest procedures sufficient to ensure segregation? Do adequate labeling protocols exist to ensure segregation? ☐ Yes ☐ No ☐ N/A
- Have labels been sent to the certifier for approval? ☐ Yes ☐ No ☐ N/A
- If you are reusing bags or containers, are you taking measures to ensure that there is no risk of commingling with nonorganic products or of contamination with prohibited substances? ☐ Yes ☐ No ☐ N/A
- Are all packaging materials free of impregnated pesticides or other prohibited substances? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 13
RECORDKEEPING

§ 205.103 Recordkeeping by certified operations

Certified operators must maintain records concerning the production, harvesting, and handling of organic products. The records must:

- Be well adapted to the business being conducted
- Disclose all activities and transactions in adequate detail
- Be maintained for not less than 5 years beyond their creation
- Be sufficient to demonstrate compliance with Federal regulations

Records must also be available for inspection and copying during normal business hours by authorized representatives of the certifying agent.

Related ATTRA publications
www.attra.ncat.org

Organic Market Farm Documentation Forms

Organic Field Crops Documentation Forms

Organic Orchard, Vineyard, and Berry Crop Documentation Forms

Forms, Documents, and Sample Letters for Organic Producers

The previous chapter discussed the importance of implementing protocols to prevent contamination and commingling after harvest. In order to verify that the protocols are followed, they must be documented as part of the recordkeeping requirements for organic operations. Each organic farm receives a visit from an inspector only once a year. The records verify that the protocols have been followed throughout the remainder of the year. The inspector reviews records as evidence that the farm practices are being carried out according to the Organic System Plan. Thus, the records are essential for ensuring organic integrity because they demonstrate compliance with organic standards.

The actual amount of documentation the individual producer will need in order to comply with organic regulations will depend on the complexity of the operation. A list of the types of documents kept by organic farmers is provided at the end of this chapter. Although the list may appear to be rather lengthy, many of these records are the same ones kept by any farmer, such as records of planting, fertilizing, spraying, harvest, and sales.

The audit trail

The records of particular importance to the organic industry are the documents necessary to determine the source, movement, and transfer of ownership of any organic product. These records, also called the audit trail, provide a paper trail that can trace the product from farm to table. A complete audit trail allows a product—an apple in a grocery store, for example—to be traced back to the orchard where the apple was grown. Processed products will have a lot code to allow each ingredient in the product to be traced back through the processor and to the farmer. The audit trail for fresh produce will be simpler than that for a processed product, but it may still involve records kept by several operations including the grower, the warehouse, the packer, the distributor, and the final retail store, plus all shippers. The records will include harvest records, purchase invoices, sales invoices, bills of lading, and others as needed. Sometimes the concept of audit trail is also extended to include production records and inputs, which also serve to demonstrate that the producer is farming organically.

Lot numbers

Lot numbers are an important aspect of a good audit trail. Lot numbers are codes assigned by producers to link products to the fields of origin and the year or date on which they were produced. Lot numbers may not be necessary for farmers who sell all produce directly to consumers soon after harvest, such as farmers who grow for a subscription Community Supported Agriculture (CSA) program. A lot number or other tracking system is useful for farmers who sell into wholesale markets or to processors. A good lot numbering system is logical and can readily be decoded. For example, Lot No. OC0603 might indicate Organic Corn, from bin #06, which was harvested in 2003. Lot No. B041433 might indicate Broccoli, from

field 04, harvested on the Julian day 143 (May 23), in the year 2003. In the Julian Date Calendar, each day is assigned a number in sequence from 001 through 365 (366 in leap years). The Julian system is commonly used for product coding.

Types of records

Correspondence

- Organic System Plan sent to certifier
- Application materials sent to certifier (map, affidavit, record of sales, etc.)
- Notices to neighbors, county road maintenance authorities, utilities, and others that demonstrate efforts protect organic fields from spray drift
- Correspondence from your certifier
- Correspondence to your certifier, addressing corrective actions to address any compliance issues
- Complaint log

Land

- Maps, with field names
- Field history sheets

Seeds and Planting Stock

- Verification of the organic status of seeds, seedlings, transplants
- Invoices to verify purchase of organic seeds and stock
- Documentation of efforts to procure organic seeds and planting stock when nonorganic materials have been used
- Verification of non-GMO status of nonorganic inputs

Production

- Planting records
- Material application records
- Soil tests
- Activity records with dates of field operations
- Labels from fertilizers
- Labels from pest control materials
- Invoices for purchased materials

Harvest and Storage

- Harvest equipment cleanout logs
- Storage unit cleanout logs
- Storage records
- Harvest and yield records
- Packout records

Transportation and Sale

- Clean truck affidavits
- Sales invoices
- Sales records
- Outgoing bills of lading
- Weigh tags

Questions

- Can your records be easily understood and audited? ☐ Yes ☐ No ☐ N/A
- Are you maintaining a complete set of operation records covering the production, harvesting, and handling of all of your organic crops? ☐ Yes ☐ No ☐ N/A
- Are sales records maintained to ensure a complete audit trail? ☐ Yes ☐ No ☐ N/A
- Does your lot-numbering system permit accurate tracking of products from harvest through storage and marketing? ☐ Yes ☐ No ☐ N/A
- Do you retain all records applicable to your operation for at least 5 years? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 14

STRUCTURAL PEST MANAGEMENT

The previous chapters of this guide have focused on the contamination of organic crops that can occur when materials are applied to crops in the field. The possibility of contamination also exists if crops or soil come in contact with treated lumber used as part of a trellis system, a raised bed, or structural support in a greenhouse. Crops may also be contaminated or commingled if they are kept in storage after harvest. This chapter explains regulations on treated lumber, storage facilities, and pest control inside buildings.

§ 205.206 (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.

Lumber has many uses on a farm: trellises, fences, tomato stakes, the sides of raised beds, and structural support in greenhouses. The usefulness of lumber can be limited because pines and other common tree species will quickly decay when exposed to soil and humidity. Conventional farmers often use lumber treated with arsenate or other fungicides, which prevents or slows the natural decay of wood. These fungicides are highly toxic and they can leach into soil where they remain for a long time. For this reason, the NOP prohibits organic farmers from installing treated lumber in places where it can contaminate soil or contact livestock. The prohibition applies to new and replacement installations—treated wood on existing structures will not need to be replaced unless the certifier identifies a clear hazard. Treated lumber is also harmful to humans. It is recommended that farmers wear a dust mask as they cut treated lumber to avoid breathing the sawdust laden with arsenic.

Related ATTRA publications
www.attra.ncat.org

Pressure-Treated Wood: Organic and Natural Alternatives

Treated lumber may be used in circumstances and in ways that ensure that contamination cannot and will not occur. For example, trellises can be installed outside the perimeter of the organic site, far enough away from the organic crop to avoid contamination. The distance will need to be approved by the certifier. Treated wood can be used in the base of a greenhouse, where plants are grown above ground on benches.

There are several alternatives to treated lumber. Alternative structural materials, such as metal posts, can be used for trellises. Tree species that resist decay, such as cedar or black locust, can be used for fence posts. There are also some natural treatments that can help prevent wood decay, although they are not as effective as arsenic treatments.

Structural pest management

§ 205.271 Facility pest management practice standard
The facilities where organic products are stored must use management practices to prevent pests.

This section on pest control applies to any buildings where organic product is stored or handled, such as grain bins, cold rooms, freezers, warehouses, packing sheds, and farm stands.

When food is stored, there is the possibility that it may become contaminated by insects, rodents, or other pests. As explained in Chapter 8 "Managing Pests, Weeds, and Diseases," a multi-level hierarchical approach is required when dealing with pests. The first three levels, A, B, and C, are analogous to those discussed previously to manage pests on crops in

the field. The fourth level, D, is available for use inside and around the outside perimeter of buildings if the organic products can be protected from contamination.

Level A

The first line of defense is prevention. Exclusion of pests from the facility saves time and money by reducing the need for further pest control. To prevent pests from entering a storage building, use screens on windows, keep doors closed, and ensure that doors are well-sealed when they are closed. If crops such as alfalfa are stored in an open barn, be sure they are covered to avoid contamination from bird droppings. Removing food sources will prevent pest populations from increasing. This may include sweeping up spilled grains and ensuring that food left in a lunch room is in sealed containers. Managing the environment so that it is unfavorable for pests will also prevent outbreaks. The area outside the facility should be kept clear so there are no places for rodents to hide. Inside the storage rooms, bins and boxes should be kept at least 12 inches from the walls. This will allow traps to be set for rodents, which like to run next to walls.

Level B

The second line of defense is the use of mechanical and physical controls. Level B practices include insect lights that attract and kill insects and mechanical rodent traps baited with food, such as cheese. Baits that kill rodents or insects are Level C practices.

Level C

The third line of defense, Level C, is to be used only after A and B control options are applied. Level C practices include the use of materials on the National List, section § 205.601. Examples include vitamin D3 bait to kill rodents, and diatomaceous earth placed in grain bins to kill insects. If any pest-control materials are used, application records must be maintained.

Level D

The fourth line of defense, Level D, may only be considered if pest control actions A, B, and C do not adequately prevent or control facility pests. Level D practices include the use of synthetic insecticides or rodenticides not on the National List. These substances, which are prohibited for most uses in organic agriculture, may be used only as a last resort. Use of prohibited pest control materials must be approved by the certifier. Before approving a Level D application, the certifier will verify that Level A, B, and C pest control actions have already been employed. The certifier will review the substance to be applied, the method of application, and the measures to be taken to prevent contact with organic products.

If use of a prohibited pesticide is required by Federal, State, or local laws or regulations, notify your certifier and agree on a plan to ensure that measures are taken to prevent contamination of organic products. If your certifier has agreed to the practice, it will not compromise your organic status.

Storage buildings

Just as every field where organic crops are grown must be inspected annually, every building where organic crops are stored must be inspected annually. All buildings where organic crops are handled or stored must be listed on your organic system plan. Examples include seed cleaning, potato washing, or controlled-atmosphere apple warehouses. These areas must be under your control, or else they must have their own organic certification, if there is any chance that organic integrity could be compromised while the product is in the storage or handling facility. Retail stores and other operations that have products packaged in

sealed retail containers do not need to be inspected or certified because there is no danger of contamination, and some retail stores are exempt or excluded from the requirement of certification according to § 205.101.

Records of crop storage will vary depending on the type of crops and length of storage. Vegetables kept in a cold room for a few days typically do not require complex storage records. On the other hand, grain bins where a large volume of grain is stored for a long period of time will require more detailed records.

Records for grain storage may include:

- Bin capacity
- Status of crop (organic, conventional)
- Name of crop (wheat, corn)
- Date of harvest
- Source of crop (field identification)
- Amounts of grain added or removed
- Dates on which grain was added or removed
- Cleanout dates
- Dates when pest control treatments were applied

If storage rooms include both organic and conventional products, the organic products should be stored in a manner that reduces the possibility of contamination or commingling with conventional products. Areas where organic product is stored must be clearly labeled. Organic products should always be stored on the upper shelves and conventional products stored on the lower shelves. Storing organic products on upper shelves reduces the chances of commingling. For example, an organic apple falling into a conventional lot means the loss of organic status and price premium for a single apple. A conventional apple falling into an organic lot is a violation of organic integrity and results in the loss of organic status and premium for the entire lot. Storing organic products on higher shelves also reduces the chances of contamination from pesticide residues and other prohibited materials.

Questions

- Are all pest-control products allowed for organic use? ☐ Yes ☐ No ☐ N/A
- If you were obliged to use a synthetic pest-control material, did you obtain approval from your certifier? ☐ Yes ☐ No ☐ N/A
- If you have used pest-control materials in buildings, are pesticide-use records maintained? ☐ Yes ☐ No ☐ N/A
- Are grain storage bins sealed to prevent infestation by rodents, birds, and pest animals? ☐ Yes ☐ No ☐ N/A
- Is each storage container or shelf clearly labeled "organic" or "conventional"? ☐ Yes ☐ No ☐ N/A
- Are cleanout protocols established after storage of conventional crops? ☐ Yes ☐ No ☐ N/A
- Where both conventional and organic produce is stored, are the storage areas clearly marked and segregated from each other? ☐ Yes ☐ No ☐ N/A
- Are prohibited materials (for example, fuels, pesticides, etc.) stored well away from organic crop storage areas? ☐ Yes ☐ No ☐ N/A
- If pest-control products are used, is their use recorded in a pest-control log? ☐ Yes ☐ No ☐ N/A

Questions

- If a pest-control company is contracted to manage pest control, has it been notified that it must comply with organic standards? ☐ Yes ☐ No ☐ N/A
- Are storage facilities large enough to segregate organic and conventional crops as needed? ☐ Yes ☐ No ☐ N/A
- If crops are stored off-farm, are the off-farm storage units either certified organic or included in your farm's inspection and certification? ☐ Yes ☐ No ☐ N/A
- Are fence posts constructed of approved materials or located where they cannot contaminate organic crops? ☐ Yes ☐ No ☐ N/A
- Are trellis posts constructed of approved materials? ☐ Yes ☐ No ☐ N/A

Notes

CHAPTER 15
RESOURCES

The information presented in this chapter is intended as a helpful reference. It is for information purposes only and inclusion in this list does not constitute endorsement by USDA. It is the user's responsibility to verify the accuracy of any information.

The following resources provide information on organic regulations, the organic products industry, and food-safety regulations. This list is not intended to be exhaustive. There are many additional resources available, notably in the areas of business management or government programs for small business.

Acres USA
www.acresusa.com
Acres USA publishes a national magazine that offers a comprehensive guide to sustainable agriculture. It also sponsors a conference and distributes books and videos on alternative agriculture.

Alternative Farming Systems Information Center (AFSIC)
http://afsic.nal.usda.gov
AFSIC is part of the USDA National Agricultural Library (NAL). AFSIC focuses on topics related to sustainable and alternative agricultural systems, crops and livestock, and implementing the NAL mission of "advancing access to global information for agriculture." Such systems include sustainable, low-input, regenerative, biodynamic, and organic farming and gardening.

ATTRA
www.attra.ncat.org
ATTRA–National Sustainable Agriculture Information Service is managed by the National Center for Appropriate Technology (NCAT). ATTRA has produced more than 300 publications on a variety of sustainable agriculture topics, as well as a number of webinars and other resources.

eOrganic
www.eorganic.info
The goal of eOrganic is to foster a national organic research and outreach community and to disseminate information about organic farming practices and regulations. eOrganic provides information to the agriculture community in the form of articles, videos, and webinars. Its resources are part of the Cooperative Extension System, called eXtension (www.extension.org/organic_production).

National Sustainable Agriculture Coalition (NSAC)
www.sustainableagriculture.net
NSAC is an alliance of grassroots organizations that advocates for Federal policy reform to advance the sustainability of agriculture, food systems, and natural resources. Its Web site has current information about the Farm Bill and other legislation that will impact organic farmers. NSAC publishes several documents that explain Federal programs, food safety, and public policy that affects agriculture. One recent publication is the "Farmer's Guide to the Conservation Stewardship Program," which can be found at www.sustainableagriculture.net/wp-content/uploads/2011/09/NSAC-Farmers-Guide-to-CSP-2011.pdf. The complete publications list can be found at www.sustainableagriculture.net/publications.

Natural Resource, Agriculture, and Engineering Service (NRAES)
www.nraes.org
The NRAES publishes practical books on agriculture and related subjects. One example is the book "Crop Rotation on Organic Farms: A Planning Manual."

Organic Farming Research Foundation (OFRF)
www.ofrf.org
The OFRF sponsors grants for research in organic farming, offers free publications on its Web site, and educates the public about the importance of organic agriculture.

Organic Materials Review Institute (OMRI)
www.omri.org
OMRI provides an independent review of products intended for use in organic agriculture and processing. The OMRI list of allowed products can be found on its Web site.

Organic Seed Alliance (OSA)
www.seedalliance.org
The OSA conducts research on organic seed production and hosts the Organic Seed Growers Conference each year. Its Web site includes a list of seed companies that sell organic seed.

Organic Trade Association (OTA)
www.ota.com
The OTA is a business association geared to wholesaling organic products in North America. OTA maintains "The Organic Pages," a directory of suppliers of organic products, at www.theorganicpages.com. It also maintains a Web site, www.HowToGoOrganic.com, that offers information on the transition from conventional to organic farming and processing.

Rodale Institute
www.rodaleinstitute.org
Rodale Institute conducts research on its organic farm in southeast Pennsylvania. The institute publishes "New Farm" magazine, offers a free online course in organic farming, and has an information-packed Web site. Two areas of special interest to organic farmers are the guide to organic certifiers at www.rodaleinstitute.org/certifier_directory and the organic system plan tool at www.tritrainingcenter.org/code/osp_index.php.

Sustainable Agriculture Research and Education (SARE)
www.sare.org
SARE promotes research and education to improve profitability and sustainability of farms. SARE's learning center contains books, videos, online courses, and fact sheets. The publications are typically national in scope and provide a thorough review of the subject. SARE also provides grants to farmers, researchers, and extension personnel to conduct on-farm research.

The Soil and Health Library
www.soilandhealth.org
This is a free, electronically accessible public library offering a collection of books on holistic agriculture. Many titles are out of print. It is an excellent place to find classic organic farming texts by pioneers from the early and mid 1900s.

USDA Cooperative Extension System
www.csrees.usda.gov/Extension
The Cooperative Extension System is a nationwide, noncredit educational network. Each U.S. State and territory has a State office at its land-grant university and a network of county offices to provide information related to local issues.

USDA National Organic Program (NOP)
www.ams.usda.gov/nop
The mission of the NOP is to ensure the integrity of USDA organic products in the United States and throughout the world. The NOP implements the Organic Foods Production Act. Its Web site has a link to the electronic Code of Federal Regulations applicable to organic production and handling, a list of accredited certification agencies, a list of all certified organic operations, and a wealth of other information. The Program Handbook, which can be downloaded from the Web site, provides guidance to assist in complying with NOP regulations.

USDA Natural Resources Conservation Service (NRCS)
www.nrcs.usda.gov
The NRCS provides technical assistance, through its employees or through Technical Service Providers (TSPs), to enhance soil- and water-conservation efforts on the farm. TSPs have technical expertise in conservation planning and design for a variety of conservation activities. TSPs are hired by farmers to provide these services on behalf of the NRCS.

Washington State Department of Agriculture (WSDA)
www.agr.wa.gov/FoodAnimal/Organic/MaterialsLists.aspx
The WSDA Organic Food Program reviews materials allowed in organic production and publishes the WSDA Materials List on the Web.

Publications

Farmers' Guide to the Conservation Stewardship Program, www.sustainableagriculture.net/wp-content/uploads/2011/09/NSAC-Farmers-Guide-to-CSP-2011.pdf

Building Soils for Better Crops, www.sare.org/publications/soils.htm

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers. If you believe you experienced discrimination when obtaining services from USDA, participating in a USDA program, or participating in a program that receives financial assistance from USDA, you may file a complaint with USDA. Information about how to file a discrimination complaint is available from the Office of the Assistant Secretary for Civil Rights.

To file a complaint of discrimination, complete, sign and mail a program discrimination complaint form, available at any USDA office location or online at www.ascr.usda.gov, or write to: USDA, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410.

Or call toll free at (866) 632-9992 (voice) to obtain additional information, the appropriate office or to request documents. Individuals who are deaf, hard of hearing or have speech disabilities may contact USDA through the Federal Relay service at (800) 877-8339 or (800) 845-6136 (in Spanish). USDA is an equal opportunity provider, employer and lender.

Persons with disabilities who require alternative means for communication of program information (e.g., Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

This publication is available online at:
www.attra.ncat.org
or by calling NCAT's ATTRA project: 800-346-9140
IP222
Slot 92

For more information, please contact the USDA National Organic Program:

National Organic Program
Agricultural Marketing Service
U.S. Department of Agriculture
1400 Independence Avenue, SW
Stop 0268, Room 2648-S
Washington, DC 20250-0268
Tel. 202-720-3252
Fax 202-205-7808
www.ams.usda.gov/NOP