Pastures: Going Organic

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This publication is an introduction to regulations related to organic pasture and rangeland in the United States. Organically certified land is described under The National Organic Program, including activities and materials that are allowed or prohibited. Fertility, weed, and insect pest management issues are briefly addressed. Organic integrity is discussed, including records required to demonstrate compliance with the National Organic Standards. References and resources follow the narrative.

Introduction

This publication covers the major concepts and issues associated with the organic management of pasture and range. The focus is on compliance with U.S. National Organic Standards that govern use of the word "organic" in relation to pasture or range. A brief explanation of the biological basis of organic pasture/range management is followed by specific information about materials that can and cannot be used. The organic integrity section outlines how to ensure that a pasture is not contaminated with prohibited materials and how to document measures that ensure this.

This publication does not contain everything one needs to know in order to manage a ranch or pasture organically. There is much more information that will be important to specific circumstances. More information on how to manage livestock, pasture and range is available from many other sources, including several ATTRA publications listed within.

Dense, diverse pastures produce healthy animals. Photo by Linda Coffey, NCAT.

The National Center for Appropriate Technology (NCAT) offers an *Organic Livestock Workbook*, available through the ATTRA Project. It offers a more detailed treatment of what is required and recommended for an organic pasture or range operation. Readers are encouraged to obtain a copy. The Workbook is a guide to all aspects of livestock production that must be addressed in order to comply with federal regulations.

Definition: Pasture

The National Organic Standard defines pasture as land used for livestock grazing that is managed to provide feed value and maintain or improve soil, water, and vegetative resources [section 205.2]. Land is not pasture when any of the following are dominant characteristics:

• It is a drylot • It is denuded of vegetation • It is overgrazed

Ruminants must have access to pasture, according to the Organic Rule [section 205.239(a)(2)], and managers have the responsibility to maintain the ecological integrity of the pasture resource with proper grazing management. Certified organic hay is appropriate if the animals must be off pasture for management reasons. See the National Organic Standard for more information. *www.ams.usda.gov/nop/indexNet.htm*

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A large portion of the workbook is dedicated to pasture management. Emphasis is placed on biologically and economically sustainable systems.

What Does "Organic" Mean?

As of October 2002, the definition of "Organic" has been established as part of federal standards for organic agriculture. The National Organic Program (NOP) defines organic production as: "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 biodiversity." (NOP 205.2 definition of Organic Production).

The word organic is now legally defined by the National Standard as published in the Code of Federal Regulations. It is now illegal to market any agricultural product as organic or to advertise a farm as organic unless the producer is in full compliance with these regulations.

Contrary to popular myth, organic agriculture originated in the early part of the 20th century, not in the 1960s. The people who founded and promoted it were concerned with a wide range of agricultural problems, including a decline in soil fertility, increased erosion and pollution, and an increase in degenerative diseases in society as a whole. They believed that the growing use of soluble fertilizers and chemical pesticides would not only fail to address these problems, but would only make them worse.

These founders established a core philosophy that is fundamental to organic production today—that people cannot be healthy unless they eat healthy food, and healthy food can only come from healthy, vital soil. For a soil to be vital and healthy it has to be alive with biologically active, organic elements.

Proponents of organic agriculture recognize two interrelated and interwoven objectives of this type of farming. The first is that the farming or ranching system works on natural principles. The second objective is to ensure prevention of contamination of that system by prohibited substances, either in the field (production) or in the marketing and handling process. Preservation of the identity—and integrity—of organic products means that organic products must not be mixed with any conventional products from the farm. Both of these objectives are important.

Organic as a Biological System

The Soil Food Web

The Soil Food Web is a recently coined term that describes the marvelous, intricate underground ecosystem that includes earthworms, fungi, bacteria, insects, and many others—both plants and animals—that make up a living soil. These are the regenerative agents that build soil. Their basic food is organic matter and the mineral nutrition bound up in organic matter.

These soil organisms provide countless services that benefit the plants growing above the ground.

- They recycle the nutrients in plant residues and animal wastes by converting them gradually over time

Earthworms, insects, fungi, nematodes, bacteria, interact with each other as well as with plant roots and soil components to create the Soil Food Web.

Related ATTRA Publications

Organic Farm Certification and the National Organic Program

Preparing for an Organic Inspection: Steps and Checklists

Forms, Documents, and Sample Letters for Organic Producers

NCAT's Organic Crops Workbook

NCAT's Organic Livestock Workbook

National Organic Program Compliance Checklist for Producers

Organic Livestock Documentation Forms

Organic Marketing Resources

Pastures: Sustainable Management

Nutrient Cycling in Pastures

Assessing the Pasture Soil Resource

Rotational Grazing

Dung Beetle Benefits in the Pasture Ecosystem

Multispecies Grazing

A Brief Overview of Nutrient Cycling in Pastures

Pasture, Rangeland, and Grazing Management

back into soluble forms available to plants.

- They fix nitrogen from the air.
- They create a host of natural antibiotics, vitamins, and other compounds that add to plant nutrition and help control soil pests and diseases.
- They also create organic acids that release even more nutrients from the parent rock material of the soil and subsoil.

Natural, Conventional, and Organic Approaches to Plant Nutrition

The organic approach builds healthy soil and provides nourishment to crops. This approach is based on an understanding of how plants are fed under natural conditions. Under natural conditions, plants get their necessary minerals from the action of the whole complex of organisms that make up the Soil Food Web.

Conventional fertilization attempts to bypass the Soil Food Web by providing nutrients already in a soluble form. When this approach is taken, the activity of the Soil Food Web often declines, because it needs to be fed through additions of organic matter. (Ingham, 2004) Pesticides and many conventional fertilizers are also directly toxic to soil organisms, which reduces their populations even further.

The soil's humus content also declines as does its ability to provide nutrition to the crop. As the soil loses its natural digestive capacity, the system becomes increasingly dependent on soluble fertilizer to function. Additional consequences of a depleted Soil Food Web and reduced humus level include poor soil structure, poor drought tolerance, increased erosion, and increased pest and disease problems.

In contrast, organic farmers and ranchers work to enhance and build the Soil Food Web. The health of the Soil Food Web is improved primarily by feeding it with organic matter, by providing deficient nutrients, and through adjustments to soil pH. In addition, organic farmers and ranchers avoid the use of pesticides, anhydrous ammonia, and other materials harmful to the organisms that make up the Soil Food Web.

Healthy, living soil produces forages that in turn support healthy livestock. Photo by Alice Beetz, NCAT.

Additional benefits of the organic approach include balanced plant nutrition (not just nitrogen, phosphorus, and potassium and the other few elements that synthetic fertilizers may provide), reduced nutrient leaching, and a natural pest control.

Organic farming is often described—by those not familiar with the National Organic Standards—in terms of what is prohibited. It is identified as farming without synthetic fertilizers and pesticides. This presents a false picture. From its beginnings, organic farming has been a deliberate approach to agriculture that focuses on soil management. You can sum up the strategy in a phrase that organic farmers have used for decades: "Feed the soil." When they talk about feeding the soil, they're talking about feeding the Soil Food Web.

Many descriptions of organic culture are based on vegetable or grain crop production. Some of them translate well to

Crop Production Standards Apply to Pasture

Pasture is a crop whether it is harvested by animals through grazing or made into hay, silage, baleage, etc. All the standards relevant to crop production apply to pasture. These include:

- Crop production standards (NOP Sections 205. 200 - 205.206)
- Organic Systems Plan
- Land requirements: transition and buffers
- Soil fertility and crop nutrient management
- Crop rotation
- Pest, weed, and disease management
- Seeds and planting stock
- National List of allowed and prohibited materials (Sections 205.600 - 205.603)
- Recordkeeping (Section 205.103)

pasture-based production; some do not. When it comes to managing organic matter, pasture based systems have a great advantage over tillage agriculture.

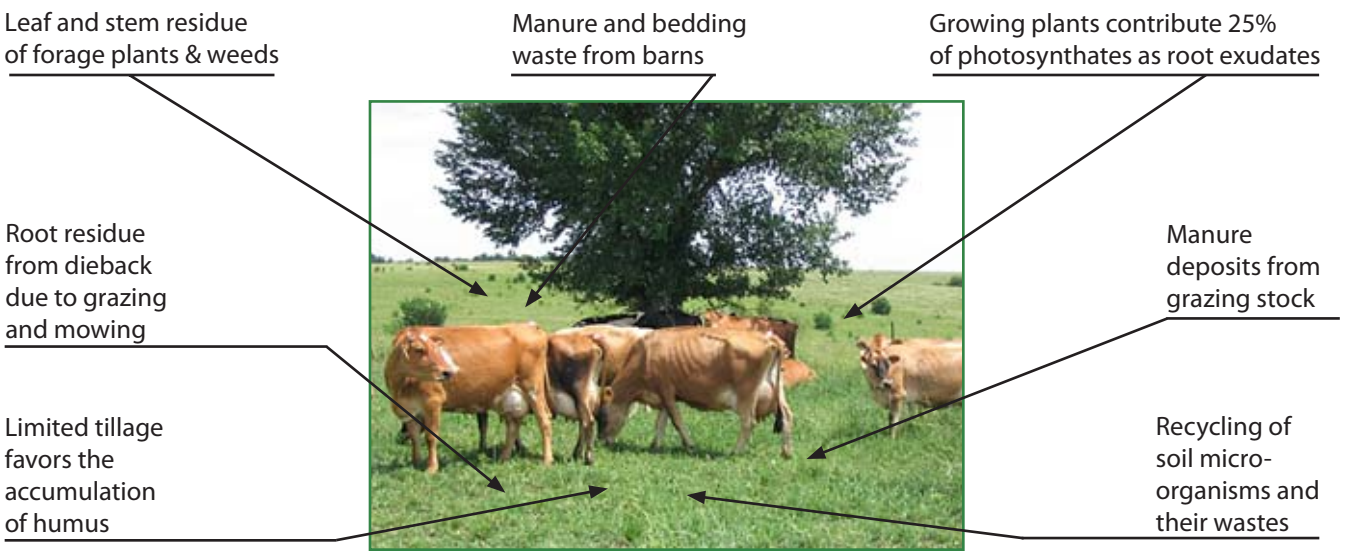
Tillage over-stimulates the Soil Food Web, causing humus to oxidize and "burn up" more rapidly. Unless a considerable volume of organic matter is supplied to tillage systems to compensate for these losses, humus levels will decline along with the volume and diversity of the food web. Because pasture systems receive little or no tillage, they do not face this problem.

A well-managed organic pasture enjoys not only the benefits of a Soil Food Web undisrupted by tillage, it also receives regular and substantial inputs of organic matter from various sources.

Plant residues from root dieback and from surface accumulation are important. Good rotational grazing practices create cycles of growth and dieback for the extensive grass root systems, contributing greatly to soil building. After each grazing period or hay harvest, some of the forage roots die, becoming food for the organisms in the soil.

Good grazing management—which also serves to create a dense stand of forage—contributes to soil humus building in another way. Pasture plants are known to contribute as much as 25 percent of the carbohydrates they produce through photosynthesis as root exudates. These exudates, in turn, feed the soil organisms so that they can provide more of the benefits listed above. (Ingham, 2000) Therefore, more plants growing on the pasture means a better-fed underground ecosystem.

Contributions of Organic Matter to the Food Web in a Pasture



Dairy cows on pasture. Photo by Linda Coffey, NCAT.

High stock density followed by adequate rest contributes to root growth and dieback cycles that build soil. Photo by Alice Beetz, NCAT.

Grazing livestock also contribute manure as organic fertilizer. Since this manure is generated on-site from the pasture itself, it is really a form of nutrient cycling or recycling. Some organic operations also import manures, compost, or other organic-rich materials from other farms in the region. When reasonably priced, locally available manure can be a terrific resource. Once established, however, a well-managed pasture-based system should grow on-site all the organic matter to meet the needs of a healthy Soil Food Web.

Nitrogen in Organic Systems

As in conventional farming, nitrogen is usually the limiting nutrient in production. Nitrogen is supplied in agricultural production from a wide variety of natural and human-controlled sources. However, in conventional management, a great tendency is to rely on synthetic ammonium, nitrate, and urea fertilizers for all the nitrogen required.

Imported nitrogen is falsely believed to be the only way to get needed quantities. Some producers try to buy up all the manure they can find and apply it at levels designed to meet their nitrogen requirements. This can lead to overloading the soil with phosphorus, potash, or other nutrient elements. In the mid-South, for example, this practice has created water quality problems because of phosphorus buildup from continuous use of poultry litter on pastures. The most economical source of nitrogen in organic systems is homegrown legume nitrogen. If your goals and circumstances allow,

Inoculation with Nitrogen-Fixing *Rhizobium* Bacteria

Rhizobium species of inoculants are commonly used to increase the effective nodulation of legume crops and cover crops, including clovers, alfalfa, peas, vetch, birdsfoot trefoil, and others.

These bacteria are often present in the soil naturally. However, inoculation is probably worthwhile for a specific legume planted on a new piece of ground not recently planted with that crop. It's a small cost and can help increase legume plant productivity.

Legumes and rhizobium bacteria develop a mutually beneficial relationship through formation of root nodules. Through a biological process inside these nodules, nitrogen gas from the atmosphere (N_2, a form of nitrogen that cannot be taken up by plants) is converted into ammonia (NH_4+, a form that plants can use). The bacteria in turn get sugars that the plant produces through photosynthesis. The plant gets available nitrogen from this arrangement, something it can't make for itself.

There are many species of rhizobium bacteria, and each is adapted to form this kind of relationship and make good, productive nodules with only one—or a small group—of legumes. For example pea/vetch inoculant is a different species from alfalfa inoculant. Rhizobium bacteria can be purchased as an inoculant, usually in a small bag with peat moss as a carrier. It is very important to keep the inoculant cool. The refrigerator is a good place. Bacteria are living, and they will die if they get too hot. The inoculant is usually applied by mixing it with the seed—either wet or dry—right before planting. That way, the bacteria will be near the plant roots with which they will form a symbiotic relationship.

You can tell if the nodules are effective little natural fertilizer factories by digging up a plant, finding nodules, and checking the color inside. If you see pink tissue when you cut open a nodule, that's a good sign. The red color indicates the presence of leghemoglobin, whose function is similar to the hemoglobin in animal blood. It helps maintain oxygen flow to the bacteria so they can fix nitrogen.

Genetically modified inoculants have reached the market. Before you buy inoculant, get written documentation of its non-GMO status to protect your organic certification eligibility. Be sure that the one you buy is a naturally occurring bacteria.

Maintain legumes as about 30 percent by weight of the pasture by adjusting pH and soil minerals. Graze so that grass doesn't shade out the legume. Photos by Linda Coffey, NCAT.

To establish a new legume, coat the seed with the correct inoculum, but be sure it's approved for organic production.

manage pastures to promote legume production. It is a giant step toward sustainable, organic management.

Legume Nitrogen

If you don't have existing populations of desirable legumes, over-seed or even reseed pastures with these plants. Legume root nodules can capture nitrogen from the air for their own use. Seed inoculation may be necessary to establish a healthy population of rhizobium bacteria appropriate to the species of legume you wish to grow. These bacteria grow in root nodules and are able to capture nitrogen from the air and convert it into a form the legume can use. Producers benefit enormously by inoculating seed, particularly under the following circumstances:

- The pastures have not grown legumes in several years
- The existing rhizobium species are not of the same inoculation class as the one needed by the legume being over-seeded
- Current legumes show poor nodulation

To develop a legume-based pasture system, you must manage for legumes. Soil fertility and grazing must be managed to favor legume growth. Soil tests indicate calcium levels and will also show whether to adjust the pH with lime to be more favorable to legumes. Lime is very important since most high-value legumes like alfalfa and the clovers need calcium. Tests also indicate the presence of other essential nutrients that legumes need to thrive. The lack of phosphorus and sulfur can limit good legume growth in certain soils.

For best pasture quality for grazing animals and optimal renewal of soil fertility and health, a good goal is that legumes be 30 percent (by dry weight) of the forage population. At this level, legumes provide plenty of nitrogen to their neighboring forage plants. Keep the grass grazed short enough that it doesn't shade out the legumes. If the legume is an annual, it must be allowed to reseed each year—or at least every other year.

Managing Manure in the Pasture

Finally, optimize the recycling of nitrogen. Manage the manure resource well, so that the nitrogen you grow stays in the field and is available to the growing plants, even if it cycles through the livestock first. Animals tend to gather and rest in favorite areas, such as near a water source, by the minerals, or

Moving minerals and water sources around in a paddock prevents manure buildup in these popular areas. Photo by Alice Beetz, NCAT.

in the shade. Try to keep from transferring and concentrating nutrients from the field to these favorite spots by moving the minerals to different areas in a paddock. Moving the water source and the shade provides the same advantages. Refer to ATTRA's publications on nutrient cycling (see the ATTRA publications list on page 2) for a more thorough treatment of the subject.

Supplemental Nitrogen Fertility

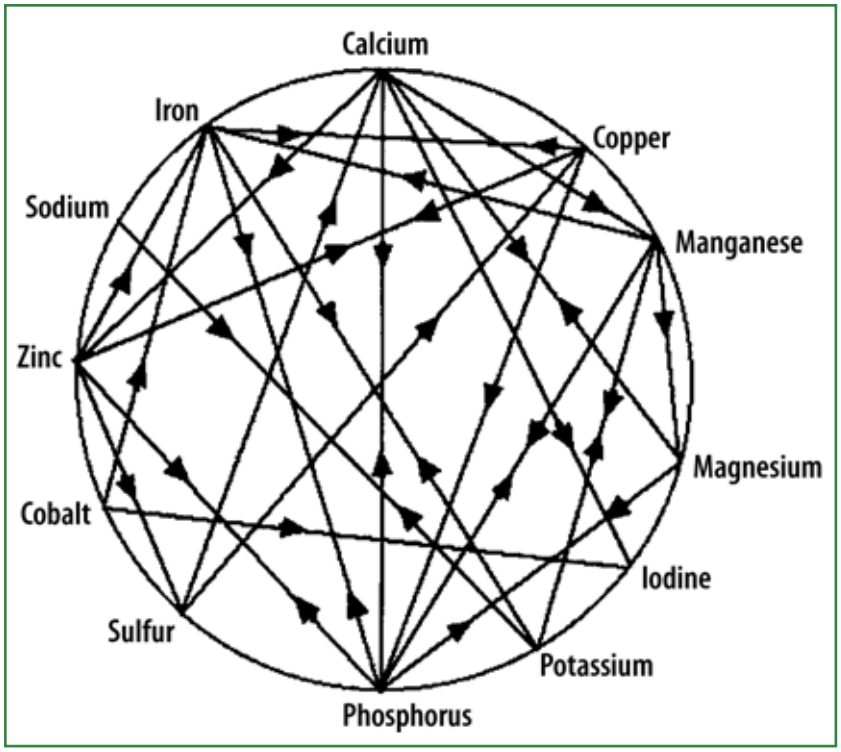
To supplement nitrogen fertility, find a natural source of nitrogen for organic production. Be aware that almost all synthetic nitrogen sources are prohibited in organic production. This includes synthetic urea, ammonium sulfate, and liquid synthetic formulations such as 9-18-9. Sales people may tell you these are easy on soil organisms and they're possibly right, but the products are also "synthetic" and are therefore prohibited. However, some liquid fertilizers like fish emulsion and compost tea are made from natural ingredients. While these are allowed in organic production, they are probably not very practical or as cost-effective for pasture production as other sources of nutrients.

Manure and composted manures are the most common sources of imported nitrogen. You may use manure and composts from conventional confinement operations. Manure does not have to come from organic animals. However, if a certifier suspects a high level of contamination with prohibited substances, you may have to have the manure or other material tested, and further use may be denied. That is a judgment call on the part of the certifier.

Managing Phosphorus, Potash and other Essential Nutrients

As pointed out earlier, organic management is designed to accelerate natural chemical and biological processes in the soil, making nutrients from the native soil more available. These processes include recycling nutrients, and making the pasture as self-sufficient in fertility as possible. Some organic farms are quite successful in reaching or at least approaching a closed-loop fertility system—especially for nitrogen. Most farms, however, need to supplement soil nutrients, usually because of soil type, the intensity of production and export of nutrients, or the effects of prior management. Soil and forage testing can be valuable tools in this effort.

Use soil and/or forage tests to monitor and balance soil nutrients. Photo courtesy of USDA-NRCS.



Too much or too little of any mineral affects other nutrients as well as forage and livestock health.
Figure from: Holliday, R.J. "Let your animals teach you nutrition." **Organic Broadcaster.** ***May–June 2002.***

It is wasteful to purchase nutrients your soil may already have in abundance.

When supplemental fertility is necessary, nutrient needs can often be met with manure or compost—assuming it is sufficiently rich in the minerals your pastures need. Natural rock powders are the next most valuable input. As with anything you use on your pasture, you should identify and document the sources in order to show it is natural and not synthetic. For example, natural forms of lime are allowed as a soil amendment. Hydrated lime is a synthetically processed product and is therefore prohibited. Natural mined gypsum is allowed, but recycled gypsum wallboard is not. Potassium sulfate is allowed if it is from a natural mined source; the synthetic form is prohibited.

Document the source of any mineral you use. Wood ash is allowed if it is from natural untreated wood, but not if plastics and other synthetic materials were also in the fire. Micronutrients are often overlooked. You probably don't need to test for them very often, but do so often enough to know whether a micronutrient is deficient or at an excessive level. High levels can present a risk of toxicity; low levels can cause forage or animal health problems.

Another reason soil testing can be important is nutrient balance. The mineral wheel (see above left) presents a visual concept of how each nutrient affects others. The soil is a living thing; imbalances have consequences. For this reason, many organic livestock producers use soil laboratories that provide a full cation nutrient profile. They use a system known as the Albrecht approach. It is not in universal use in organic production, but it is a popular way to monitor and manage soil nutrients.

Soil Amendments and the Organic Rule

As previously mentioned, most conventional fertilizers are considered synthetic and are prohibited in organic production. This includes ammoniated fertilizers, super phosphate, nitrates, and common blends such as 13-13-13, 9-18-9, and so forth. Ash from manure burning is specifically prohibited as is the use of sewage sludge. Organic material that has been contaminated by heavy metals or other materials is prohibited.

This issue can arise with the use of manure from factory-scale and factory-style productions. Contaminants may be an issue with poultry litter anywhere throughout the country. Most conventional poultry producers use arsenic as a feed additive to control parasites and stimulate growth. Much of the arsenic passes through the birds and into the manure.

Other materials applied to poultry litter to prevent volatilization of nitrogen can also cause problems for organic producers. Hormones used to supplement dairy animals can also be an issue. These manures may be seen as contaminated with a prohibited material for organic production. Though not routinely done, a certifier may require testing of manure if there is reason to suspect unacceptable levels of contamination. These are especially important

considerations if the producer seeks international certification to export products to Europe.

Finally, genetic engineering is also prohibited in organic production. Genetically engineered seed, inoculants, or soil amendments are regularly marketed. Obtain documentation that no genetically modified organism (GMO) or GMO-derived matter is contained in your sources. Note that the prohibition on GMOs has practical limits. Unless otherwise contaminated, there is no regulation against using manure from animals that have been fed genetically engineered crops.

A few synthetic materials are allowed in organic agriculture with specific restrictions. Each of these is listed in the National Organic Standards section 205.601 with specific annotations about how they may be used in organic production. Micronutrients are one example of allowed use of synthetic materials in organic production. Only certain forms of micronutrients may be used. These are listed in NOP section 205.601(j)(6) and a need for them must be documented by testing (soil or tissue tests).

Fish emulsion, seaweed extract, and humic acids are commonly believed to be natural products. While the basic ingredients in these products are natural, the process by which they are manufactured may involve synthetic materials. The regulations articulate the specific applications for which certain synthetic materials are allowed. For example, "Liquid fish products—can be pH adjusted with sulfuric, citric, or phosphoric acid. The amount of acid shall not exceed the minimum needed to lower the pH to 3.5" (NOP 205.601 (j) (7). This acid solution helps break down fish byproducts and makes nutrients more available in fish emulsion. The National Standard permits the use of these materials in the production process, but not to "enhance" the products with synthetic fertilizers or other prohibited substances.

You are not likely to be using it on pastures, but sodium nitrate is a natural mineral that is restricted to no more than 20 percent of a crop's nitrogen requirement. There are some forms of muriate of potash that can be used. They are hard to find. You can assume that most widely available commercial grades of potassium chloride are prohibited forms.

Be careful about what you buy. There are loopholes in our fertilizer laws that allow materials with any nutrient content to be sold as micronutrient fertilizers. Some are being sold as fertilizers, even though they might actually qualify as toxic waste under EPA classifications.

Organic Strategies and Considerations for Weed Management

For most organic cropping systems, weeds are considered the greatest challenge to production. Unlike vegetable and row crops, pasture systems have a higher tolerance for weeds. In part, this is due to the fact that

Keeping Pastures Healthy - Self-regulation and sustainability in pasture systems are best accomplished through the following weed management strategies:

- Improve the soil organic matter
- Understand the causes, life cycle, and feed value of the weed
- Increase species diversity in the pasture
- Graze during the time of a weed's maximum palatability
- Practice high-intensity grazing and high frequency of grazing
- Graze several complementary livestock species
- Introduce biological weed control agents
- Mow, hand weed, and dig to remove weeds mechanically
- Use flame weeding or other forms of heat destruction
- Rotate into annual crops

Managed grazing prevents many weed problems as livestock learn to eat weeds in their young, palatable stage. Photo by Linda Coffey, NCAT.

many weeds have nutritional value and are palatable at some stage in their life cycles. It's worthwhile to rethink which plants you consider to be "weeds."

Organic Standards (NOP 205.206) describe pest management (including weeds), in terms of three main approaches. First, cultural practices prevent pest problems at the systems level. For instance, rotational grazing provides a system effect of improved weed pest management. Second, mechanical and biological responses can be used to manage pests. Examples include the use of physical or mechanical practices, such as flaming to control alfalfa weevil, and biological controls such as multispecies grazing. Several specific suggestions are listed in the standards for weed management.

How Do Weeds Get Started?

When grasses are grazed, a portion of the root mass dies and decays. This process has some ecological benefits in that it allows underground nutrient cycling and opens passages for water and air to move freely to supply other plants with nutrients and oxygen. However, if a plant is grazed repeatedly and has no time to re-grow, it loses more root mass than it can tolerate, and plant health and vigor decline. This situation gives other, often unwanted, plants a chance to germinate and take root.

Cultural Practices for Weed Management

Good organic soil management and a healthy Soil Food Web result in weed control benefits. Some weeds are favored by tight anaerobic soil conditions, extremes of acidity or alkalinity, or low organic matter. These species will be discouraged on well-managed organic soils. Weed seed viability is also reduced on biologically active, organically managed soil, according to recent research. (Anon. 2000)

Learn about the weeds. First, consider whether the "weed" is really a problem in your grazing system. Some weeds have very deep taproots and bring up nutrients that livestock need. If these plants are palatable, consider them a valuable part of your forage system. If the weed truly is undesirable, learn as much as you can about it. Where did the seed come from? Can you prevent further infestation? What conditions does this weed prefer? Can these conditions be changed? Try to identify the point in its life cycle when it is most vulnerable, and target your efforts to that time. Many weeds are palatable during early stages of growth, and grazing keeps them from going to seed.

A mixed-forage pasture provides more protection against weeds than a single-species pasture. A diverse pasture utilizes all the available space, nutrients, and water at various levels both above ground and below ground. Mixed stands stay weed-free longer than pure stands because of the increased ecological diversity. Nature always tries to restore species complexity, a concept known in ecology as succession. For instance, a field planted to alfalfa, orchardgrass, and timothy is better than a pure stand when it comes to weed suppression. Clover, birdsfoot trefoil, alfalfa, or other legumes as a 30 percent mix with two or more grasses provides a higher nutrient content than pure stands. It also offers a longer grazing season.

Good grazing practices—especially rotational grazing—go a long way to discourage weed competition. The rhythm of grazing and rest creates lush, dense pastures with little space or light for weeds to become established. See ATTRA's publications *Rotational Grazing* and *Pastures: Sustainable Management* for a more complete treatment of this subject.

High stock density encourages animals to graze the pasture more uniformly than lightly stocked pasture. "Weedy" species are grazed at the same intensity as "good" species. Because the growing points on grass plants are located below the normal grazing level, high density stocking favors grass growth. The growing points on broadleaf weeds are higher and are grazed off. This sets up a competitive advantage for grasses. Broadleaf weed populations tend to decrease under intensively grazed systems. Since legumes and some other desirable forages are broadleaves, special effort must be taken to preserve them in the pasture mix as you work to eliminate weed species.

Be careful not to introduce new weed seeds into paddocks that don't have them. If you feed hay on pasture, be sure it doesn't contain viable weed seeds. Similarly, livestock moved from a weed-infested paddock can carry weed seed and deposit it with manure. Even equipment can carry seeds from paddock to paddock.

A few years of pasture in a crop rotation interrupts the life cycle of weeds that have adapted to either the perennial or the annual system. Intensive grazing favors grasses and discourages broadleaf weeds in the pasture. Photo by George Kuepper, NCAT.

A healthy, weed-resistant plant community consists of a diverse group of species occupying all the niches (sites) and using all the resources in the system, keeping them from weeds (Sheley et al., 1999). Photo by Alice Beetz, NCAT.

Mechanical Means of Weed Management

Although more expensive than cultural practices, mowing, brush-hogging, pulling, and hoeing are traditional mechanical means of weed control. Flaming, a newer method of burning out the undesirable plants from an area, can be accomplished either with backpack or over-the-top equipment. These are all allowed practices in organic settings. Each may be appropriate for specific applications, depending on the weed species and the extent of its spread. For further information see the ATTRA publication on flame weeding.

Finally, rotating to an annual forage or crop that requires tillage presents the opportunity to completely renovate a pasture that has been invaded by toxic or noxious weeds. You will be able to choose among new, improved varieties of the forage species you want in your grazing system. Traditional farming systems include long rotations that plan for several years in pasture between annual cropping cycles. Tillage, however, comes with risks to the soil ecosystem as well as opportunities for further

Mixing types of animals that prefer different forages helps control weeds, breaks parasite cycles, and increases potential profitability.
Photo by George Kuepper, NCAT.

weed invasion, so focus first on improved grazing management if the pasture is not already in such a long crop rotation.

Biological Control of Weeds

Multi-species grazing offers several benefits, including weed management. Goats, for example, are good at cleaning up brushy weeds. Sheep prefer broadleaf forages to grass, graze closer to the ground, and can be grazed on the same pastures with cattle. Because of their different forage preferences, small ruminants can often be added to a pasture system without decreasing the cattle stocking rate.

Even noxious, introduced weeds can be controlled and eventually eliminated by repeated, intensive grazing through species such as sheep or goats. These animals have mouth parts that can graze close to the ground, and they exhibit broad forage preferences. The ATTRA publication *Multispecies Grazing* offers a further exploration of this option.

Some weed species have parasites or predators that have been developed as weed control options. Among these are some thistles, leafy spurge, and the knapweeds. Buying and releasing these biological control agents can be costly. In addition, they usually require several years to establish in an extensive pasture or range situation. Even when effective, they are usually considered one of several tools in a weed management system. Further information about insects for biological weed control is available from ATTRA or your Extension service.

Forage Diseases and Insect Pests

Compared to row crop and horticultural systems, pastures typically have a limited number of insect and disease problems. Under good organic management, a high degree of biological control is seen and many potential problems simply do not emerge.

When they do, they can often be tolerated. Sometimes, however, pest problems can't be ignored. The three-level approach: 1) cultural control practices, 2) mechanical methods, and 3) biological agents should be tried before considering the application of a material for control purposes.

Only when the cultural, physical, and biological defenses fail is it time to consider allowed pesticide materials. Materials are a complement to—not a substitute for—good management, and they usually add to the cost of production. Materials may be used only when other methods are not effective and when the conditions for their use are

Related ATTRA Publication

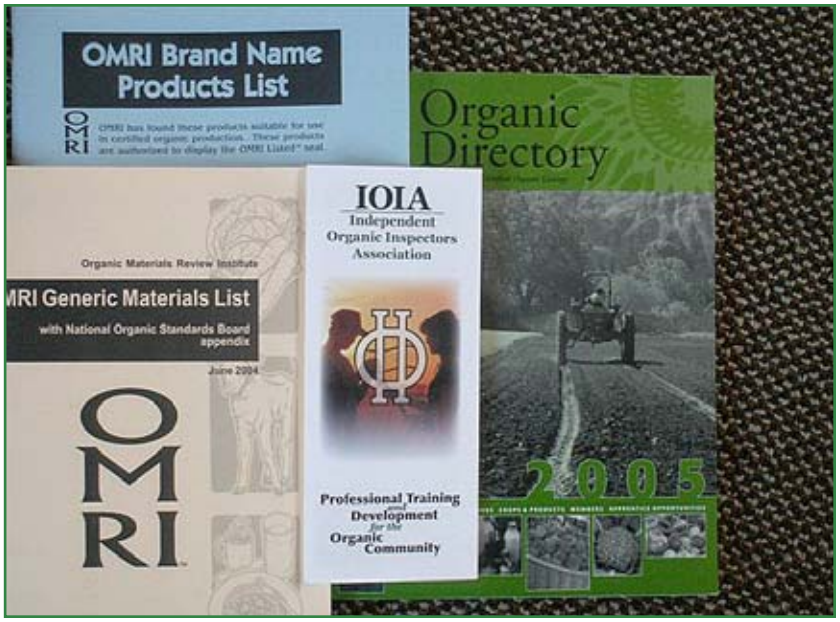
Farmscaping to Enhance Biological Control

This publication contains information about increasing and managing biodiversity on a farm to favor beneficial organisms, with emphasis on beneficial insects. The types of information farmscapers need to consider is outlined and emphasized. Appendices have information about various types and examples of successful "farmscaping" (manipulations of the agricultural ecosystem), plants that attract beneficials, pests and their predators, seed blends to attract beneficial insects, hedgerow establishment and maintenance budgets, and a sample flowering-period table.

described in the producer's Organic System Plan (OSP) as approved by the certifier.

Sorting out what commercial pesticide products you can and can't use is even more difficult than it is for soil amendments and fertilizers. The more you can avoid pesticides, the better off you'll be. But if you should need to include such inputs, here are things you need to know.

The National Organic Standard describes what may and may not be used as a control agent. Allowed natural materials typically fall into three classes—minerals, biologicals, and botanicals. Among the few allowed synthetics are mineral formulations of copper and sulfur, and insecticidal soaps. It is unlikely that these would be used in a pasture situation. There are a few natural materials you are NOT allowed to use. These are listed in NOP 205.602.



Learn which products are approved and discuss your Organic System Plan with your certifier. Photo by Ann Baier, NCAT.

How to Tell What Is Allowed and What Is Prohibited

Remember that the heart of organic production is not so much about materials as it is about management. Nonetheless, when materials are used, understand what is allowed and prohibited under the standards for organic production. Sometimes it is difficult to know whether a product is natural or synthetic, allowed or prohibited, especially if it contains inert ingredients that are not disclosed on the label. There are three approaches to determine whether a commercial product you plan to use is an allowed material.

- **First, read the pertinent parts of the Regulation.** This is your best option if you know all the materials and whether they are synthetic or not. The Web site of the National Organic Program *(www.ams.usda.gov/nop/IndexIE.htm)* includes the complete standards.
- **Second, look at a current Organic Materials Review Institute (OMRI) Brand Names list.** The OMRI Web site *(www.omri.org)* offers its Brand Names list indexed three ways—as materials, by company name, and by product name. Clearly, use of the Web site is free. OMRI also publishes a Generic Materials List which is very useful and available for a fee.

  The OMRI list is not static. New products are added all the time and some products drop off—either because the manufacturer has changed the formulation or because they chose not to reapply to have a product listed. (The OMRI seal on a product indicates that it was "OMRI Listed" at the time it was produced.) OMRI reviews products for use in organic production, and its seal is an excellent indicator of acceptability. However, OMRI listing is a fee-based service and only companies that pay for it are listed. Many acceptable products have never been reviewed by OMRI and are not OMRI listed.
- Finally, **consult your certifier** anytime you are uncertain whether a substance can be used in production. According to the standards, materials you plan to use must be

Treated wood is prohibited for new fencing in organic pastures, but existing treated wood fencing is often allowed. Photo by Ann Baier, NCAT.

in the Organic System Plan (OSP) that you submit to your certifier. This plan must be approved by your certifier. Keep your plan up to date. If you plan to use a new product or material, submit an updated OSP to your certifier and be sure use of the material is approved before you use it. A few certifiers provide lists of allowed and prohibited products. But such lists are rarely comprehensive since so many new materials continue to come on the market.

Ask questions before you develop and submit an OSP to your certifier. Also, verify with your inspector that the materials you list in your plan are allowable when you review it at each annual inspection. Never use a material without first adding it to your OSP and having it approved by your certifier.

Organic Integrity

This publication began with a focus on organic production as a biologically based system. Now we begin to concentrate on matters that deal more with organic integrity. A discussion of land requirements for certified production serves as kind of transition; both faces of organic production are addressed here.

Land Requirements

To begin with—and this is probably obvious—any field or farm you seek to certify must have distinct boundaries. You must submit a map to your certifier as part of your organic system plan. Certification is tied to the land as well as to your management and record-keeping as a producer. You may sell or rent organically certified land to another party and that property will immediately be recognized as transitioned to organic. If you acquire new property, clear documentation of its land use history and all materials used in the previous three years must be obtained. If you don't have such documentation, that distinct piece of property will need to go through a transition period of its own before it is considered organic.

Fencing

Fences have already been mentioned; however, fence construction has not. The National Organic Standard prohibits the use of treated wood in organic production where it can contact organic soil, crops, or livestock. This affects new installations. If you are transitioning to organic production and you have old treated wood fencing, most certifiers will readily allow that and prohibit the use of treated wood for new or replacement uses. (See ATTRA's publication entitled *Organic Alternatives to Treated Lumber.)*

Transition Period

The period of organic transition is 36 months from the last time a prohibited material was applied, until harvest of the first crop as organic. In other words, the pasture forage is not considered organic until 36 months have passed.

Soil Protection

We briefly discussed organic approaches to soil fertility above. No matter what actions or techniques you use, the soil resource must not be depleted. The Standard requires that you do some form of monitoring to ensure that organic matter and nutrient levels are maintained or improved under your management. Likewise, erosion must be controlled, and the land must be managed in a way that prevents pollution. The levels of manure you add must be agronomic rates and cannot contribute to runoff or leaching problems.

Maintaining Organic Integrity

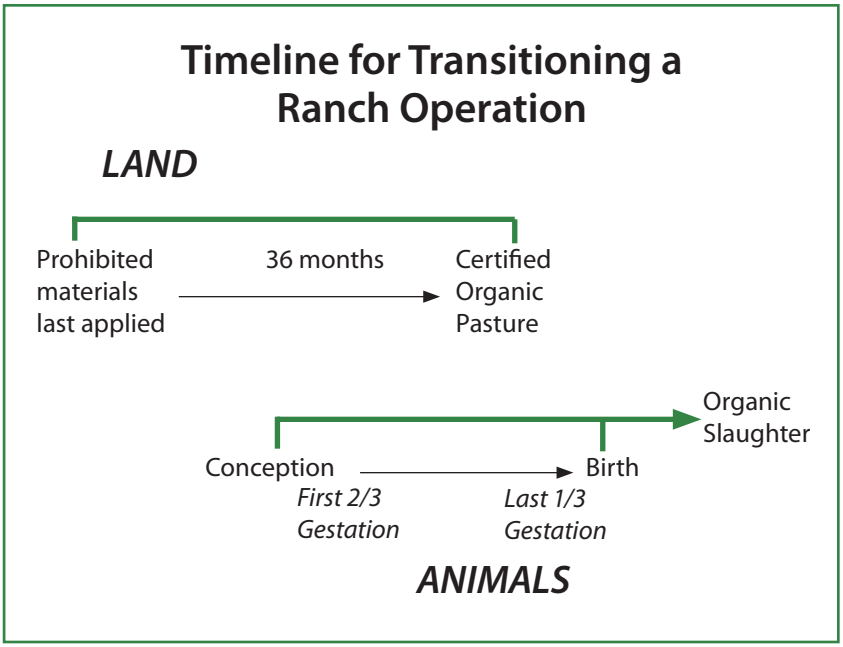
The Rule states simply, "Any [organic] field or farm…must: (c) Have distinct, defined

boundaries and buffer zones such as run-off diversions to prevent the unintended application of a prohibited substance to the crop or contact with a prohibited substance applied to adjoining land that is not under organic management."

Organic integrity is about ensuring that the product you are raising organically stays that way until it is in the hands of the consumer. With organic pasture, the greatest threats to organic integrity typically come in the form of pesticide drift from neighboring farms, from road and utility maintenance, or—if you have a split operation—from your own conventional enterprises. If you are entirely organic and are adequately isolated from conventional chemical farming activities, you really don't have an issue.

Isolation is the best insurance for organic integrity. Most, however, will not be isolated and may need to buffer production areas. That is easier said than done. If a neighbor does a lot of spraying or other chemical applications, you may need to set your border fence back from the field edge. The Regulations do not specify how wide such a buffer must be, only that contamination must be prevented. Twenty-five feet used to be customary, but that probably isn't adequate if a neighbor aerial sprays. This is one of those things that will require clear communications with your neighbors and with your certifier.

Keep livestock out of ponds for good quality drinking water that supports better livestock health. Photo by Linda Coffey, NCAT.



This timeline illustrates how to coordinate organic pasture certification with organic livestock feed requirements. The 36-month requirement must be met by the time that the mothers reach the last third of gestation. The Rule states that they must be eating only organic feed from that time on.

Other measures may be needed if a neighboring farm's runoff crosses your property. Water that drains from conventionally managed land onto yours must be kept from organically certified pastures and livestock. You may need to put in some sort of diversion, or perhaps create a flow-through grassed waterway that is fenced off so that it can't be grazed. Water that leaves your land should run clear and show no signs of eroding soil. Usually the best way to handle these issues is to establish effective lines of communication with your neighbors whenever possible.

One can also put up "do not spray signs" along roadsides. Working with your neighbors or with utilities through some combination of notification and communication is one of the best things you can do. If you don't have a chip on your shoulder, people can be remarkably cooperative. In the case of utilities and roadside maintenance, you may need to assume responsibility for mowing some weeds, but that seems a reasonable trade-off.

Work with road maintenance crews to prevent overspray on certified organic land.
Photo by Ann Baier, NCAT.

Producers must decide whether they would rather lose land from production or harvest and sell buffer crops as conventional. The answer may depend on whether the buffer area in question is ten feet around a one-time spot treatment of herbicide on a thistle on your neighbor's side of the fence, or a 25-foot swath the length of a quarter section. As long as the organic crop is protected, producers can usually decide whether it is worth their trouble to clean or purge equipment (such as balers), and separate the crop from harvest through transport and sale, documenting the sale of that crop as non-organic.

Another question that is sometimes raised is whether grazing conventional livestock affects the status of an organic pasture. As previously discussed, manure from conventional sources may be applied (unless there is concern about contaminants as discussed above). Manure may be deposited directly on the land by grazing conventional animals, as long as the land is managed organically. Obviously, you would not be allowed to place conventional pesticide dust bags or backrubbers on an organic pasture site, or do anything similar that could lead to contamination of the land with prohibited substances. Animals should be removed from the pasture for any treatments with conventional medications.

Seed and Planting Stock

Under the National Organic Standards, producers must use organic seed and planting stock if it is commercially available. Otherwise, you must use untreated, non-GMO seed, and demonstrate (document) a good faith attempt to find organic seed and planting stock. Finding organic seed and and planting stock is not always easy. The box on this page suggests some resources to try.

If the variety you need or its equivalent is not commercially available, you may use conventional seed—if it is not treated with a prohibited substance. A variety can be considered not commercially available if you cannot locate an organic supplier. If there

Resources to Help Producers Find Organic Seed

1. ATTRA's *Suppliers of Seed for Certified Organic Production*
<*www.attra.ncat.org/attra-pub/altseed.html*> This is an online list of seed sources. Producers need to get further verification of organic certification of seeds on this list.

ATTRA takes the suppliers' word and doesn't require proof of organic certification. In light of this, please ask for documentation—such as a current organic certificate—when you place your order.

It is clearest and easiest to verify organic status if the supplier lists the seed as organic and includes the name of the certifier on the invoice or packing list. If the seed is not organic, see 2 and 3.

2. OMRI Certified Organic Seed and Planting Stock List
<*www.omri.org/OMRI_SEED_list.html*> These items are unquestionably certified organic. However, this list represents only a small fraction of the seed suppliers who offer organic seed.

3. Save Our Seed's Certified Organic Seed Sourcing Service
<*www.saving ourseed.org/pages/sourcing.htm*> This free online service lets producers know if a particular organic seed is available. Producers fill out a simple form with type of plant (e.g., clover), variety (e.g., berseem), and quantity (e.g., 50 lb.) needed. A response is mailed within five days with documentation that would be acceptable to any certifier.

is an organic source, it might still be commercially unavailable if the supplier can't provide the quantity or quality needed. Quality can be considered substandard if there is seed-borne disease, very low germination percentages, high noxious weed seed content, and the like. The higher cost of organic seed and stock is NOT considered an argument for not purchasing available organic seed.

If you need to use non-organic seed, you must demonstrate that you tried to source organic. Although the regulations do not specify a number, most certifiers will expect reasonable documentation that you contacted three seed suppliers likely to carry organic seed. You should also be prepared to document that non-organic stock is not genetically engineered. As mentioned, be certain you are using untreated seed. Most conventional seed treatments are prohibited.

A few additional comments should be made regarding seed and planting stock requirements. The requirement for organic seed applies to any kind of seed—whether it is crop, cover crop, or pasture seed. Legume inoculants must be non-GMO. Buyer beware. Get written documentation if there is any question about whether seed has been treated or if seeds or inoculant might be genetically modified.

Finally, if you are sprigging a pasture—as is commonly done with bermuda grass—or are interplanting comfrey or some other perennial, the standards are not especially clear. Be certain to ask your certifier how such planting stock is classified. Annual transplants must be organic. Perennial planting stock must be organic if commercially available. If not commercially available, it must be managed organically for 12 months before harvest.

Your certifier will determine whether there is a need to delay grazing, and if so, for what period of time. A certifier can also offer guidance on sufficient documentation for any of the above issues. The National Organic Standard on this subject (Sect. 205.204[4]) is open to several interpretations, and your certifier will decide how you must deal with these situations.

Finding sources of organic seed can be a challenge, but ATTRA's Web site has tools that can help. Photo from the OSU Forage Information System Web site.

Documents to Keep

The kinds of documents you need to retain for organic pasture record-keeping are the same as for other crops. Activities affecting the land, materials used on it, and monitoring must be documented. You will need a running field history, especially if you have rotation pasture with permanent paddocks. You will probably already be keeping records on when animals enter and leave each paddock. Keep track of other field activities like mowing and the dates of those activities. Such records are useful for your own information on your farm management as well as for organic compliance.

You will want the same sort of record of any materials applied for fertilization or pest control purposes. Because seed is also an input, keep any documents related to seed and planting stock you use, including labels or packets, invoices, documentation of your searches for organic seed, if you used conventional seed, as well as documents that show it is untreated and not genetically engineered. If you used

inoculants for legume seeds, the purchase records should also be kept.

Save your labels and purchase receipts for any fertilizers or pest control products you buy. Keep all soil and water test reports. And of course, keep harvest and sales records. Harvest records are important as evidence of the source of organic feed. These should include the field location, harvest quantity, and date.

Good grazing management averts many pest problems for both forages and animals. Photo by Alice Beetz, NCAT.

These dense pastures provide excellent nutrition for healthy animals and good milk production. Photo by Linda Coffey, NCAT.

Conclusion

In order to manage a pasture organically you must pay very close attention to soil and forage plants. This publication does not go into the details of what this skilled management entails. Rather, it outlines the boundaries within which you must operate to comply with the National Organic Standard. If you produce livestock for eventual export, the requirements might be different. International regulations vary only slightly on most issues except in the area of what is allowed regarding manure from "factory farms." Your certifier can help you learn more if you are considering producing for the international market.

Many other ATTRA publications address the nuts and bolts of managing cropland and pastures sustainably. Grazing systems, soil and weed management, and marketing resources are the subjects of publications available cost-free to farmers, ranchers, and those who work with them. Many can be downloaded from the ATTRA Web site *(www.attra.ncat.org)* and all can be obtained by requesting them with a call to 800-346-9140. *The Organic Livestock Workbook* is especially recommended.

The ATTRA publication *Organic Certification Process* orients the user to the procedures for certification. *Preparing for an Organic Inspection: Steps and Checklists*, reminds producers about all of the documents needed to meet a commitment to maintaining pasture as organic. Sample forms and letters have also been developed. These are available on the ATTRA Web site or can be obtained by calling 800-346-9140 and requesting a copy.

Clearly understand that the certifier makes the determination when there is a question about any material or activity related to your certified organic pasture. Choose your certifying agency carefully and work with staff as cooperatively as possible. The certification office staff and your inspector can help you understand the standards as they apply to your operation.

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Further Resources

National Organic Program
A site that includes considerable information on certifying agencies; consumer information; NOP Regulations (standards) and guidelines; producers, handlers, processors, and retailers; and state programs and cost-share opportunities. *www.ams.usda.gov/nop/indexNet.htm*

Certifying Agencies in the United States
A list of USDA-accredited certifying agents. *www.ams.usda.gov/nop/Certifying Agents/Accredited.html*

Organic Materials Review Institute (OMRI)
A nonprofit organization that reviews substances for use in organic production, processing, and handling to ensure compliance with USDA National Organic Program standards. *www.omri.org*

Save Our Seed's Certified Organic Seed Sourcing Service. A service to help producers find documented organic seed or alternatives, if organic seed sources are not found. *www.organicseedsourcing.com*

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Notes

Pastures: Going Organic
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This publication is available on the Web at:
www.attra.ncat.org/attra-pub/pastures_organic.html
or
www.attra.ncat.org/attra-pub/PDF/pastures_organic.pdf

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