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SARE
Sustainable Agriculture Research & Education

Transitioning to Organic Production

Left: Klaas Martens and his family operate Lakeview Organic Grain, a mill and seed company, on 1,700 acres in Penn Yan, N.Y. *Photo by Jermaine Hinds, SARE.* **Right: Jennifer Taylor and Ron Gilmore own Lola's Organic Farm, a 3.5-acre farm in Glenwood, Ga., that includes vegetables, orchard crops and animals.** *Photo by Leah Overstreet*

Why Go Organic?

When farmers explain why they decided to make the transition to organic, they typically mention the importance of price premiums, environmental stewardship, health concerns related to antibiotic and pesticide use, and personal values.

Charlie Johnson, who has been farming organically for decades near Madison, S.D., says he inherited his father's principles when he took over the farm from him in 1980. "His belief is that the soil is a community, and for that community to be viable, it needs to be healthy," Johnson says. As a result, they began using practices that emphasize soil health and biodiversity, and stopped using synthetic pesticides and fertilizers on their farm, which is 2,400 acres and produces corn, soybeans, oats and alfalfa.

Today, Johnson's view on organic agriculture goes beyond his father's environmental values to embrace a focus on people and community. Because his approach to farming is management intensive—for example, through his use of a six-year crop rotation, mechanical weed control and composted manure—he works with his two brothers and his adult son as partners. "Our farm, even though it's fairly large for organic, would probably only enable one or two people to be farming today, from a non-organic standpoint, whereas with organic farming, we've got four full-time farmers involved," Johnson says.

To him, this means more jobs in agriculture and more people who are able to remain in rural communities, allowing local schools, businesses and institutions to thrive.

Yield and Economics

The current high demand for organic products is a big motivator for many, and this sizable market is a sign of the USDA National Organic Program's (NOP) success. Thirty years after Congress passed the Organic Foods Production Act, which established uniform national standards for producing, handling and certifying organic foods, U.S. organic sales have grown steadily each year and soared to new highs in 2020 with the COVID pandemic. According to the Organic Trade Association (OTA), sales jumped by a record 12.4% between 2019 and

Brothers Kevin, Charlie and Allan Johnson (pictured from left to right) operate a 2,400-acre organic grain farm in South Dakota, along with Charlie's adult son. The management-intensive nature of organic production allows this farm to support four partners.
Photo by Jermaine Hinds, SARE

2020, from $55.1 billion to $61.9 billion. It marked the first time that total sales of organic food and non-food products surpassed $60 billion.

Research shows that yields in organic systems are often lower than conventional ones, except during extreme weather situations such as drought, when they can be higher due to the healthier soils that organic practices create. However, because of strong sales and the higher prices organic products command, organic operations are usually more profitable than non-organic operations. A 2015 analysis of findings from 40 years of studies covering 55 crops across five continents found that organic agriculture was 22–35% more profitable than conventional agriculture (Crowder 2015). The analysis also found that organic operations required a breakeven price premium of only 5–7% compared to conventional, even when organic yields were 10–18% lower.

Resilience and Environmental Stewardship

Along with the economic benefits, many farmers who transition to organic are motivated by a conservation ethic. Years of research have shown that organic systems provide essential environmental benefits to humans, also known as "ecosystem services." Examples of important ecosystem services associated with organic agriculture include:

- Soil and nutrient cycling
- Water quality protection and conservation
- Habitat to support pollinators and wildlife
- Waste decomposition and detoxification

In addition, organic farming practices may make farms and ranches more resilient to weather extremes caused by climate change, such as intense storms and drought, or extreme pest damage. This resilience and the aforementioned environmental benefits stem mainly from those organic practices that increase both biodiversity and soil organic matter. Because organic systems generally have higher soil organic matter, they tend to have better water retention, higher infiltration rates and better soil structure. The soil's higher capacity to store and percolate water can make organic systems more resilient to ever-increasing weather fluctuations, such as floods and droughts; multiple studies have shown that in many instances organic farms do indeed outperform their conventional counterparts under severe drought conditions (Lockeretz 1981, Lotter 2003). Well-managed organic systems also have reduced soil erosion and nitrogen runoff.

Increased biodiversity at the field and landscape levels can be achieved through common organic practices such as crop rotation, conservation tillage and the inclusion of flowering plants around the farm. These practices work by providing resource-rich and disturbance-free habitat for important pollinators, beneficial insects and wildlife, which in turn provide further ecosystem services like crop pollination and pest management.

The Organic Mindset

The amount of change that will be required when transitioning to organic can vary considerably from one farmer to the next. The farming practices at the core of the NOP are rooted in agroecological practices that many individual farmers, communities and cultures around the world have passed down through many generations, including Black and Native American farmers in the United States. For farmers who already practice "organic" agriculture, the challenge of getting certified is oftentimes less about making major changes to production practices and is more a matter of adapting to regulation requirements, such as recordkeeping. Farmers from historically marginalized communities often face additional challenges, including a lack of access to financial resources, organic markets and to the NOP itself. (See the box "Seeking Equity in the Organic Industry.")

For farmers who are currently running a more "conventional" operation—for example one that relies heavily on synthetic inputs or makes little to no use of crop rotations and biodiversity—moving toward a successful organic operation oftentimes requires a different way of

thinking. This is because you have to treat your farm as an integrated system that works more in sync with nature. Plus, your ability to use non-organic farming practices and inputs becomes restricted. (See the section "The National Organic Program.")

"In organic farming, a mind shift is essential," says Brad Brummond, a North Dakota State University Extension agent from Walsh County, who specializes in organic production. "You must go from treating problems to treating the causes of the problems and recognizing that every decision you make will affect other aspects of your system."

When deciding if organic farming might be right for you, Brummond offers this list of characteristics shared by successful organic farmers:

- A more focused commitment to a safer food supply and protection of the environment
- Patience and good observation skills
- Good recordkeeping habits and sound business management skills
- A deeper understanding of ecological systems
- Good marketing skills and motivation to spend time seeking out markets
- A willingness to learn from others and share stories of successes and failures
- Flexibility and eagerness to experiment with new techniques and practices

Getting Started

The most important starting point in the transition to organic certification is to become familiar with the certification process and regulations of the NOP and, as needed, find an organic consultant to assist you. All organic products must be certified by a USDA-accredited organic certification agency. Certification provides consumers the built-in assurance that the organic products they're buying have been grown following specific standards and methods of farming. The certifier can review NOP rules and regulations with you, but it does not provide individual guidance on how to transition successfully. An organic consultant, on the other hand, can help you develop the necessary Organic System Plan (OSP) that will essentially act as your agreed upon annual contract with your certifier. Your OSP

The most important starting point is to become familiar with the certification process and regulations of the NOP.

SEEKING EQUITY IN THE ORGANIC INDUSTRY

With the widespread emergence of social justice movements in 2020, many organizations have adopted or continued efforts to acknowledge discrimination within the organic industry, and they are seeking opportunities to improve equitable access to organic certification for farmers of color. A few examples:

- The Organic Farmers Association and the Rodale Institute offer mini-grants to BIPOC farmers (Black, Indigenous and People of Color) who are certified organic, transitioning to organic or aspiring to begin the transition. https://organicfarmersassociation.org/bipoc/
- The Organic Trade Association has established a Diversity and Entrepreneurship Fund that provides two years of association membership to BIPOC farmers who are certified organic or are transitioning to organic. (This fund is available to women-owned businesses as well, regardless of race.) https://ota.com/webform/diversity-and-entrepreneurship-program-application
- The USDA Agricultural Marketing Service, which operates the NOP, has started a Human Capital Capacity Building Initiative that provides funding support to organizations working to expand the organic industry's capacity, including its capacity to serve marginalized communities.
- There is currently a proposed change to the NOP regulations (as of 2022) that would, among other things, establish a clear process for organic farmers to establish grower groups, an approach used by many small-scale, limited-resource farmers who are certified organic in other countries. A grower group consists of multiple farmers in the same geographic area who are producing the same crop and who become certified as a single operation. Grower groups are able to share costs and centralize important business functions, such as recordkeeping and marketing. Check with an accredited certification agency to see if this becomes an option for you and your community.

This strip of buckwheat in bloom provides resources for beneficial insects that can improve pest control in the adjacent corn field, which is managed organically in central Pennsylvania. *Photo by Jermaine Hinds, SARE*

must include exhaustive details about the production and marketing practices you'll use in your organic operation.

This publication is organized into four sections meant to introduce you to the key aspects of making a successful transition to organic:

- **The National Organic Program**: The principles, practices and regulations that make up the NOP
- **Making the Transition to Organic Cropping Systems**: The key practice areas that apply to all organic systems, such as soil and pest management
- **Transitioning Livestock, Field Crop and Horticulture Systems to Organic**: Important considerations based on your specific production system
- **Business Planning**: Strategies to prepare for the financial and personal transition

Part One:
The National Organic Program

Organic producers work closely with the environment to maintain the balance of their ecosystem.

In brief, the history of organic agriculture in the United States can be traced to traditional agricultural systems in India and their emphasis on maintaining soil health through the use of compost, green manures and deep-rooted crops. These systems were studied by the British scientist Sir Albert Howard, and the principles and practices were first popularized in the United States by the publisher J.I. Rodale, who began advocating for "non-chemical" farming methods in the 1940s and who used the term "organic" to describe such systems.

By the 1970s, increased environmental awareness and consumer demand fueled the growth of the organic industry, but the earliest certification programs were decentralized and resulted in confusion about what the organic claim actually meant from one region to another. In response, the U.S. Congress passed the Organic Foods Production Act (OFPA) in 1990 to develop a national standard for organic food and fiber production. This eventually resulted in the establishment of the National Organic Program (NOP) and the set of standards that farmers, ranchers and others in the food industry must meet today in order to receive organic certification. (See the box "Requirements for Organic Certification.")

The broad definition of organic, according to the USDA, is "a production system that is managed to respond to site-specific conditions by integrating cultural, biological and mechanical practices that foster cycling of resources, promote ecological balance and conserve biodiversity." Organic practices are intended to improve water quality, conserve soil and water, reduce the use of off-farm inputs, maintain ecological balance, and promote the health and welfare of livestock.

Primary practices used on organic farms include:

- **Crop rotation**, **biological control** and other integrated techniques to manage fertility, weeds, insects and diseases
- Planting **cover crops** between cash crops and using **intercropping** practices to protect soil, build organic matter and recover nutrients that could otherwise leach into the subsoil and

groundwater. Cover crops also sequester carbon, promote biological activity and build long-term soil health.

- Using **conservation tillage** to minimize soil disturbance
- Adding **composts**, **animal manures** and other organic soil amendments
- Enhancing **biodiversity**, both on the farm and in the surrounding environment
- **Rotational grazing** and mixed forage pastures for livestock, and protecting animal health and wellbeing with **preventive care** practices and **alternative treatments**

In other words, organic producers work closely with the environment to maintain the balance of their ecosystem. Using nature as a model for an organic system—recycling nutrients, encouraging natural predators to manage pests, increasing plant densities to block weeds—organic farmers don't merely substitute non-toxic materials for pesticides and fertilizers. Instead, they consider the farm or ranch as an integrated entity, with all parts interconnected. At the heart of this interconnection is a well-planned crop rotation or perennial cropping system, which helps build soil health, provides control of weeds and pests, and recycles nutrients. When livestock and poultry are incorporated into organic systems, the potential for diversification and integration is even greater. Some organic enterprises rely solely on grasses and mixed forages, both of which help improve soil structure while also providing manure to fertilize soil.

The NOP regulations also address what organic producers cannot do, such as:

- Use synthetic chemicals (except ones that have been approved for use by the NOP)
- Use genetically modified organisms
- Produce certified organic crops or livestock on land where prohibited substances have been applied within the past three years (36 months)
- Manage animals without adhering to organic practices

Complete information on the regulations and certification process is available on the NOP website (www.ams.usda.gov/organic). You can also learn which regulations apply to your operation by speaking with a certifier, consultant or local Extension agent with knowledge of organic agriculture.

Ricardo Zaragoza is a member of 9 Organic Farmers Co-Op, a group of growers in the Pajaro and Salinas valleys of California that cooperatively markets its produce to wholesale buyers. *Photo courtesy Erendira Saenz, Pink Glitter Unicorn*

REQUIREMENTS FOR ORGANIC CERTIFICATION

In order to sell, market or label any product as organic and to use the USDA organic seal, all farms and businesses earning more than $5,000 annually must follow specific standards outlined by the USDA NOP, the agency in charge of determining prohibited and allowed materials and practices. All products sold, marketed and labeled as organic must also be certified by a USDA NOP accredited certification agency. All certified organic farmers must have an Organic System Plan (OSP)—which you first develop while transitioning—that details how you'll meet program regulations, describes your management practices and recordkeeping system, provides a list of substances you'll apply, and explains how you plan to avoid commingling organic and conventional products.

For more information on the steps to becoming certified, go to www.ams.usda.gov/services/organic-certification/transitioning-to-organic or call the USDA NOP at (202) 720–3252. The ATTRA program maintains a library of publications to help you transition to and successfully manage many kinds of organic systems: https://attra.ncat.org/topics/organic-farming.

Management often becomes more intensive when you transition to organic. At this organic almond orchard in Denair, Calif., soil health is maintained by integrating cover crops and rotational sheep grazing. *Photo by Jermaine Hinds, SARE*

Part Two:
Making the Transition to Organic Cropping Systems

Many farmers who want to transition to organic production will need to change their practices or adopt new farming strategies in common areas of management, regardless of what they produce. These include building and maintaining soil health, responsibly incorporating tillage, managing pests and omitting prohibited substances. Generally, organic production becomes more management intensive because it integrates multiple aspects of a production system—for example, practices such as crop rotation and cover cropping simultaneously improve soil health and help manage weeds, insect pests and diseases.

Consulting an organic certifier early in the planning process will give you a clear idea of how you'll need to adapt your production practices to align with NOP regulations.

Anu Rangarajan, a Cornell University horticulture specialist and director of the Cornell Small Farms Program, advises that you begin by identifying and resolving major problems in your current system, such as perennial weeds, poor drainage or low soil organic matter. "If you haven't tackled these problems, you should fix them before you … transition to an organic system, which is going to require tighter management," she says.

Success with transition also hinges on gaining experience with the practices that are specific to organic farming, including:

- crop rotation
- cover cropping
- addition of organic fertility sources
- disease prevention
- integrated pest and weed management
- conservation tillage
- soil management
- incorporation of biodiversity

Many of these practices, such as managing healthy soil, can be integrated into your system before transition in order to reduce problems and risk during the transition.

Healthy Soils

The foundation of all organic farming systems is healthy soil. Successful organic farmers build and manage healthy soils over the long run with cover crops and crop rotations, compost and manures, reduced tillage and no-till practices, and other methods. These practices and amendments feed not only your crops but also the soil organisms. In fact, the underlying mantra of organic systems is "feed the soil so the soil feeds the plants," because in organic systems, the primary source of nutrients is the soil itself. As soil organic matter builds up, so too do populations of important soil organisms, from large ones like earthworms to microorganisms like bacteria and fungi. Taken together, soil organic matter in combination with organisms can support:

- Improved soil structure, aeration, water infiltration and drainage
- Improved nutrient availability from decomposing organic materials
- Reduced nutrient loss through leaching, soil erosion and runoff

"A lot of people don't think of the soil as an ecosystem, but, in fact, it's probably the most complex ecosystem on earth," says Ray Weil, a University of Maryland soil science professor. "A healthy soil should be breathing out carbon dioxide, breathing in oxygen. It should hold and absorb water so the plants can survive between rains. It should resist erosion."

While most organic farms rely on tillage for weed control and bed preparation, the regular addition of organic matter through cover crops and manure applications, along with other soil-building practices, can offset the damage caused by tillage and help you maintain healthy soils.

Crop Rotations

Although practices vary from farm to farm and region to region, at the core of any successful annual organic farming system is the crop rotation. As the main management tool for all aspects of the farming system, including weeds, insect pests, soils and crop production, a well-planned rotation is more than the sum of its parts, and it addresses the connections between all of those factors. According to *Switching to a Sustainable System* by Fred Kirschenmann, a successful rotation:

- Includes the use of cover crops to provide fertility, control weeds and provide habitat for beneficial insects
- Has a diversity of plant species to encourage natural predators, discourage pest and disease buildup, and minimize economic and environmental risk
- Provides a balance between soil conservation and crop production by adding organic matter to the soil to both supply nutrients and improve soil quality properties such as water infiltration and waterholding capacity
- Provides weed control by alternating between warm- and cool-weather plants, and by including weed-inhibiting plants (such as rye and sorghum)

The book *Crop Rotation on Organic Farms* (www.sare.org/crop-rotation-on-organic-farms) provides in-depth guidance on the principles of crop rotation, including sample rotations taken from 16 organic vegetable farms in the Northeast (for more, see Chapter 4 of the book). Collectively, these experienced farmers are guided by the following "conventional wisdom" when planning their crop rotations:

- Avoid planting the same crop family in the same field too often
- Alternate cover crops with cash crops
- Alternate deep-rooted crops with shallow, fine-rooted crops
- Precede heavy feeders with nitrogen-fixing cover crops
- Avoid following a root crop with another root crop

Healthy soil is critical to the success of all organic farming systems. *Photo courtesy Montana NRCS*

Soybeans (left) and oats (right) are grown as part of a six-year rotation at this organic farm in Madison, S.D. *Photo by Jermaine Hinds, SARE*

According to ATTRA's *Organic Crop Production Overview*, a standard organic rotation in the Corn Belt might consist of alfalfa, corn, soybeans and a small grain. This is true for Charlie Johnson, the organic grain farmer from South Dakota, who sticks firmly with a six-year crop rotation of oats–alfalfa (two years)–soybeans–corn–soybeans. "We don't base our cropping or planning decisions on, well, organic corn will bring in more this year, or wheat or some other commodity," he says. "We let agronomy drive our decisions and not necessarily the market."

A rotation like this accomplishes multiple functions:

- The legumes fix nitrogen, providing for the subsequent non-legumes in the rotation.
- Several pest cycles are interrupted, especially that of the northern and western rootworm species, which can be devastating to corn.
- Several plant diseases are suppressed, including soybean cyst nematode.
- Weed control is enhanced when perennial weeds are destroyed through cultivation of annual grains; most annual weeds are smothered or eliminated by mowing when alfalfa is in production.

Another benefit of including a multi-year phase of perennials in a rotation (e.g., alfalfa or mixed species hay) is that it gives the soil time to rest and rebuild.

Cover Crops, Compost and Manure

Cover crops, which build soil fertility, provide much of the soil health improvement in organic annual systems. Organic matter added through cover crops and soil amendments improves soil structure, which in turn improves water infiltration, water holding capacity and resistance to erosion. In the Sustainable Agriculture Farming Systems (SAFS) project at the University of California, Davis, a long-term research station experiment comparing organic and conventional farming systems, researchers found that water infiltration was 50 percent higher and water runoff was 35 percent lower in the organic plots. (For more on the benefits of cover crops and tips for getting started with them, see the box "Cover Crops as an Introductory Practice to Organic Farming.")

In addition to compost and manure, cover crops can be an invaluable fertility source. A study in Idaho found that legumes such as alfalfa, peas and pea-oat hay could provide 80–100% of the nitrogen needed for a potato crop, and if harvested for feed or seed, 40–60% of the required nitrogen for the subsequent crop. A California research project also showed a nitrogen replacement value of 150 pounds per acre from cover crops.

Organic farmers also use manures and composts regularly, especially when they're accessible and affordable. Many organic farmers make their own compost, with livestock manure either from their own operations or from another farm, combined with a source of carbon such as straw, wood shavings or municipal yard waste. Manures and composts provide many of the same soil-building benefits as cover crops, but also supply a more readily available source of nutrients for crops. (Be sure to read the NOP regulations carefully to review prohibited substances. Also, current federal regulations dictate that raw manure may not be applied 90 days prior to harvest if the edible portion of the crop does not contact the soil, or 120 days prior to harvest if the edible portion of the crop does contact the soil.)

One of the biggest questions transitioning farmers have is how to supply enough nitrogen to their crops. Shifting from readily available N in inorganic fertilizers to organic N is definitely challenging and takes some time to master. Over time, it's possible to supply enough N using cover crops, manures, compost and other types of organic soil amendments, but not all organic materials contain the same amount of N. Nitrogen availability differs among materials as well, so it's also important to be familiar with their carbon to nitrogen ratio (C:N), which impacts the

rate of N that's released as the material is decomposed by microbes.

When considering which amendments to add to the soil, remember the C:N ratio of 24:1. Organic materials with a C:N ratio close to this figure have nutrients more closely aligned with what soil organisms require, and this promotes balanced decomposition (Table 1). As a general rule, high C:N materials (e.g., straw or wood chips) don't supply high amounts of N because soil microbes will immobilize or "tie up" N from plants, whereas materials with a lower C:N ratio (e.g., manure) have enough N for microbes, and so any excess N is readily available for plants to use. However, be aware that additional fertility may be needed to meet a specific crop's overall needs.

Although high C:N materials don't provide as much fertility as other sources, carbon does enhance soil structure over time and pools of N can accumulate in soils that are rich in organic matter. Improved soil structure also improves root growth, which can improve a crop's uptake of nutrients and water. Nitrogen also needs to be regularly replenished, since much of it is removed

A rye cover crop planted between lettuce rows at an organic farm in Peconic, N.Y. *Photo by Preston Keres, USDA*

TABLE 1. CARBON TO NITROGEN RATIOS OF COMMON CROP RESIDUES AND SOIL AMENDMENTS

Relative decomposition rate	Material	C:N RATIO
SLOWER ↑	Rye straw	82:1
	Wheat straw	80:1
	Oat straw	70:1
	Corn stover	57:1
	Rye cover crop (flowering)	37:1
	Pea straw	29:1
	Rye cover crop (vegetative)	26:1
	Mature alfalfa hay	25:1
Relative decomposition rate	**Ideal microbial diet**	**24:1**
FASTER ↓	Rotted barnyard manure	20:1
	Legume hay	17:1
	Beef manure	17:1
	Young alfalfa hay	13:1
	Hairy vetch cover crop	11:1

Source: *Carbon to Nitrogen Ratios in Cropping Systems (USDA-NRCS)*

Compost piles at an organic farm in Sylvania, Ga. *Photo by Stephanie Schupska, University of Georgia Extension*

annually when the crop is harvested. Using a combination of organic matter sources and taking regular soil tests is the best approach to managing organic N.

One reason to start building up your soils before beginning the transition is that when a soil is low in N, microbes will immobilize whatever N is in organic materials in the short term, making it unavailable to your crops until the materials are highly decayed.

Microbial products and inoculants exist on the market that have the potential to improve soil microbial activity, but they can be expensive, and any positive impacts are largely anecdotal. If you decide to use microbial products, it's recommended that you closely observe your crops and soils and do a cost analysis to ensure their use is worth the cost. Giving the soil time to recalibrate and build a healthy microbial population can pay off when you do switch over to organic management, as the system will more readily cycle available N.

For more information on soil management, see SARE's in-depth book, *Building Soils for Better Crops* (www.sare.org/bsbc).

Transition Strategies: Building Healthy Soils

» Get to know your soils with a soil test for chemical and physical properties. This will give you baseline information. Note that although more comprehensive soil health tests exist, biological activities are more difficult to determine from soil tests. The NRCS recommends soil testing every 3–5 years.

» Determine strategies for building soil health, since your Organic System Plan will require this. Include some combination of cover crops, animal manures, composting and/or tillage strategies.

» Start building soil organic matter with cover crops, perennial crop phases and/or compost/manure before your transition.

» Research carefully which types and varieties of cover crops will work in your area. Regional differences will significantly impact what cover crops will grow and when they can be planted to generate the greatest benefits. SARE's *Managing Cover Crops Profitably* (www.sare.org/mccp) includes detailed information on cover crops, including suggestions for common species based on hardiness zone and management goals.

» Consult the Organic Farming Research Foundation's guide *Reducing Risk through Best Soil Health Management Practices in Organic Crop Production*, which includes a worksheet to help you evaluate how and where you can improve your soils by changing your practices.

Carlos Gonzalez Torrez is an organic farmer in Monterey, Calif. *Photo by Lance Cheung, USDA*

COVER CROPS AS AN INTRODUCTORY PRACTICE TO ORGANIC FARMING

There's no doubt that cover crops are important, not just in organic systems but in American farming systems overall. Between 2012 and 2017, cover crop acreage jumped approximately 50 percent, from roughly 10 million acres on 133,500 farms to more than 15 million acres on 153,400 farms, according to USDA census reports. Annual surveys from a collaborative project between SARE, the Conservation Technology Information Center (CTIC) and American Seed Trade Association (ASTA) find that growers who use cover crops are committed to the practice, and that they have data to show that cover crops provide a wide range of benefits.

According to the survey (www.sare.org/covercropsurvey), in drought years, growers reported consistently higher yields in the fields where they planted cover crops. But even in 2019, which was one of the wettest years on record, some growers still reported slight boosts in soybean, corn and wheat yields: 5%, 2% and 2.6%, respectively. This suggests that cover crops build organic matter, which not only improves the water-holding capacity of soils (useful for times of drought) but can also absorb excess moisture (useful during excessively wet seasons).

Growers in the CTIC/SARE survey also report other benefits from cover crops, including weed control, soil health, erosion control and livestock grazing. An economic analysis of survey results found that cover crops improve the bottom line in 1–3 years for commodity farmers when used in these situations (www.sare.org/resources/cover-crop-economics):

- Herbicide-resistant weeds are a problem (In fact, this may be a very good reason to transition to organic because individual weeds that have developed herbicide resistance no longer have an advantage in an organic system.)
- Cover crops are grazed
- Soil compaction is an issue
- Cover crops are used to speed up and ease the transition to no-till
- Soil moisture is at a deficit or irrigation is needed
- Fertilizer costs are high or manure nutrients need to be sequestered
- Incentive payments are received for using cover crops

For organic growers and researchers, these results don't come as a surprise. Organic growers use cover crops to manage many facets of their systems. The well-established benefits of cover crops include:

- Protecting the soil from erosion when there are no cash crops planted
- Building soil organic matter, which builds a store of nutrients that are released in time with crop uptake
- Improving waterholding capacity and drainage via increased soil aggregation
- Improving soil structure, which can decrease compaction
- Decreasing weed populations
- Increasing soil microorganisms by providing a greater variety of food sources and by lengthening the portion of the year when living roots are present for soil organisms to feed on
- Providing livestock forage in either late fall or early spring

If you're ready to plan a transition to organic, consider these strategies for using cover crops to help convert conventional ground:

- Research mixtures, practices, timing and rotations, and experiment in your field to see what works best. Consider talking to nearby farmers to learn what works for them.
- If you're planning to keep the land in organically planted cover crops for two years, consider using a perennial like red clover and terminating it at the end of the second season. Because the regulation for transitioning to organic requires a three-year gap (36 months) between the final use of prohibited materials and the first harvest of an organic crop, a cash crop can be planted into this system after the second year of your cover crop, as long as the harvest occurs after that three-year period. It's important to check with your certifying agent first to confirm when a crop will be eligible for certification.
- If you have a use for forages, consider starting with a sod crop like alfalfa or a mixed grass–legume hay. This is the best way to build soil structure and organic matter. It will also prevent annual weeds from establishing and should promote a natural decrease in density of weed seeds in the soil by predation, decay or termination prior to seed set. If weed seed production occurs during the establishment year of the sod crop, be sure to eliminate the weeds prior to seed set.
- Consider sowing perennial forages with a small-grain "nurse" crop. The nurse crop will shade out weeds while the forage crop establishes. Certain winter grains, such as winter wheat and spelt, can outcompete weeds more effectively than spring grains by being better established in the spring at the time when dominant weeds in the field will germinate. You can also sow spring grains and forages at the same time. Winter grain underseeded with clover is a popular combination on Northeastern farms.
- Consider weeds that emerge in early spring as a cover crop. Allow the weeds to grow and then terminate them ahead of any spring planting, especially row crops. Early spring weeds are less prone to quick set seed and should therefore allow significant growth ahead of seedbed preparation without the danger of enhancing weed seed production. This timely practice can greatly reduce existing weed seed banks.

Walk-behind and tractor-mounted roller crimpers can allow you to terminate a cover crop without tillage. *Left photo courtesy Rue Genger, University of Wisconsin-Madison; right photo by Brandon O'Connor, Indiana NRCS*

In integrated crop and livestock operations, reducing tillage by rotating with perennial crops and grazing is an excellent way to build soil health.

Conservation Tillage and No-Till

For many years, low intensity tillage practices were considered incompatible with organic farming. Without access to herbicides, organic farmers had to rely on careful tillage to manage weeds, incorporate cover crops and prepare beds for planting. This is still very true—but yes, there are ways to reduce the intensity and frequency of tillage.

Due to weed pressure and crop emergence, reducing the intensity of tillage in organic farming remains a challenge. It can be difficult to find the precise timing as far as letting the cover crop grow long enough to supply nutrients and smother weeds without delaying when you plant the next crop. However, by experimenting with varieties, cover crops, timing and machinery on your own farm, it's possible to reduce tillage in an organic system. A useful publication that discusses these issues is ATTRA's *Reducing Tillage Intensity in Organic Production Systems*.

In some smaller scale operations, organic farmers have found that using tarps to reduce tillage has been effective. In integrated crop and livestock operations, reducing tillage by rotating with perennial crops and grazing is an excellent way to build soil health. In other cases, organic farmers have used cover crops to serve as surface mulch for no-till-planted cash crops such as soybeans and squash.

While continuous no-till is unlikely in an organic system, "rotational no-till" is more achievable. This essentially means tilling occasionally as part of the rotation plan, for example using no-till methods to terminate a cover crop and plant a spring crop, and then using tillage in the fall after harvest to prepare for cover crop planting.

In the Pacific Northwest, extremely wet winters and springs can result in wet soils that delay planting. Using a SARE grant (FW12-035), Washington farmer Gary Miller found he could prepare no-till beds as many as six weeks earlier than tilled beds without harming soil structure. This earlier planting date led to higher yields of salad greens in the no-till beds due to the increased length of the growing season.

The type of cover crop you use and the timing of incorporation can also make a big difference. Finding the best approach for your system will likely require some fine tuning. For example, one SARE-funded study (FNC16-1055) conducted by two Iowa farmers found that although hairy vetch could supply approximately 100 pounds of nitrogen per acre, it was dependent upon growth stage, moisture availability and termination date. The growers found they would need to terminate the vetch at full flowering to get that amount of nitrogen. But in order to plant corn at a reasonable date, they needed an earlier cultivar of hairy vetch, such as Purple Bounty. They also found that after surviving a mild winter and at 50% flowering, the vetch did not roll down well with a roller crimper, suggesting the need for repeated passes of the roller crimper or that a different cover crop might be more effective.

When planting into a rolled cover crop, use a no-till planter that limits your tillage and soil disturbance just to the seed zone. You'll need to adjust your no-till planter properly to cut through any residue because of the amount of biomass cover crops generate.

Keep in mind that in some areas of the United States, no-till fields will have lower temperatures than tilled fields. Mulched fields will also take longer to warm up. Since soil microorganisms are more active at warmer soil temperatures, if you're using no-till, be sure to time your planting to coincide with microbial nutrient release, and/or consider switching to shorter season varieties.

Consider a combination of reduced-tillage practices suited to your climate and system. In the Pacific Northwest, with its cold springs and shorter growing seasons, SARE-funded researchers (SW14-013) looked at strip tillage, which uses tillage only in narrow strips where seeds will be planted. One trial in western Washington compared different rotational tillage strategies to continuous no-till in vegetable production. The rotational tillage treatments included fall tillage to prepare a seed bed for cover crops and the use of no-till, strip till or full tillage in the spring to prepare fields for the next crop. Researchers found that planting lower biomass cover crops between rows, combined with strip tillage, might increase soil temperature and favor warm-season crops.

Transition Strategies: Lowering Tillage Intensity

- Try to reduce initial weed pressure as much as possible during transition. Use cover crops and heavy residue to smother weeds. Consider using a high residue cultivator, inter-row mower or inter-row roller crimper to keep as much mulch on the ground as possible.
- Focus on timing, as getting this right will go a long way toward a successful season. Mow or roll cover crops just before the end of their life cycle to prevent them from going to seed and becoming weed-like. The ideal time to terminate a cover crop is when it starts to enter its reproductive stage. Ryes and small grains tend to mature uniformly. Vetch and legumes tend to flower at different times, so try to mow or roll when somewhere between 50–100% of the crop is flowering.
- Search for the right machinery to fit your system. Ideally, in a lower-intensity tillage situation, your cultivator should be able to kill the cover crop, leave a mulch on the ground and also prepare the soil. The Rodale Institute has developed a "one-pass no-till system" that combines a roller crimper with a no-till planter that can roll down a cover crop and plant into the mulch in a single pass, but most organic farmers have multiple pieces of tillage equipment.
- Consider eliminating fall tillage in row crops such as corn and soybeans. Leaving crop residue on the soil surface with stubble from these crops can provide longer weed seed predation opportunities, catch greater amounts of snow, protect the soil and allow for earlier weed germination in the spring ahead of seed bed preparation. Light tillage of soybean stubble is all that's needed for spring small grain seeding. Corn stalks chop much more efficiently in the spring, and these fields can then be lightly tilled for soybean planting. This isn't exactly no-till, but it does eliminate the need for disruptive deep tillage.

Pest Management

Organic farming requires more intensive management of pests than non-organic systems; with no access to synthetic broad-spectrum insecticides and herbicides, you'll need to learn about the life cycle of the pests that attack your crops in order to develop effective, targeted management strategies. Organic farmers also place an emphasis on practices that help prevent pest problems from arising.

Charlie Johnson relies heavily on rotary hoes, tine weeders and other cultivation equipment to manage weeds on his organic grain farm in Madison, S.D. *Photo by Jermaine Hinds, SARE*

At this organic farm in DeMotte, Ind., tarps are laid out on beds to terminate weeds and cover crops before a new crop is planted. *Photo by Brandon O'Connor, NRCS*

Weeds

One of the biggest challenges facing growers transitioning to organic is weed management. It's often ranked number one among research priorities and it's not hard to see why: successful weed management is difficult in organic systems, especially in transitioning ones. The decisions organic farmers make about crop rotations and tillage practices are heavily influenced by their weed management needs. Managing weeds organically requires a change in attitude and approach, including a willingness to develop a tolerance for higher weed populations than what you may be used to.

To organic growers, a field doesn't have to be weed free to be productive. In fact, results from the side-by-side trial at the Rodale Institute showed that most crops can tolerate a few weeds without a measurable impact on yield or quality, and that organic crops can tolerate weeds better than non-organic crops. In the trial, even with higher weed pressure, the organic plots yielded as well as the non-organic plots. This was due to a combination of factors, including a less competitive weed community and increased yield capacity in the organic plots.

Managing weeds in organic systems, often referred to as ecological weed management, requires a whole host of tools that, when used together, can be very effective. Often called the "many little hammers" approach, instead of using a one-shot herbicide, it entails a variety of cultural and physical practices such as mowing, mulching, sanitation, livestock grazing, mechanical cultivation, adjustments to planting (e.g., dates, row spacing, seeding rates), hand weeding, thermal or flame weeding, and crop rotations.

Cover crops, for example, when grown in a rotation, are excellent at smothering weeds; a dense mat can prevent weed germination or crowd out weeds struggling to gain a toehold. Forages are similar; in a five-year alfalfa, corn and oat rotation, a three-year alfalfa stand goes a long way to getting the weed seed bank out of the field. Another living mulch strategy might be to interseed one crop into another, which can be done with aircraft, tractors or by hand. The second crop, which should germinate after the first, will compete for nutrients and moisture, so only use this technique when crops are well established or have ample soil fertility and moisture. Dutch white clover, for example, is effective in corn or late-season brassicas. Its high density keeps out weeds, it fixes its own nitrogen, and it's low growing so it doesn't compete with the crop for sunlight.

Thirty years of research into weed management in organic and transitioning systems has now yielded information that is helping growers achieve high levels of weed control. For example, careful weed control was one reason that an Iowa study found no yield reduction in soybeans, and a yield loss in corn only for the first year of a transition trial. "We attribute our results to high managerial

DIG DEEPER INTO ECOLOGICAL WEED MANAGEMENT

The SARE book *Manage Weeds on Your Farm: A Guide to Ecological Strategies* (www.sare.org/manage-weeds-on-your-farm) is a comprehensive guide to weed management that uses integrated cultural and physical strategies. The strategies outlined in this book are compatible with organic agriculture. It includes a detailed section on the identification, growth habits and management strategies for dozens of the most common weeds in the United States.

experience in producing diverse crops and accurately operating various implements in organic systems," says project leader Kathleen Delate, an Iowa State University horticulture professor.

Transition Strategies: Weeds

- Select land with low weed populations when identifying where to plant crops.
- Identify weed problems before they start and address them through crop rotations.
- Distinguish between annual and perennial weeds, and manage weeds according to their life cycle and reproductive strategies. For example, tilling weeds like quackgrass and Canada thistle is ineffective, since tillage may propagate their rhizomes. Repeated cultivation, however, forces them to draw upon their storage and can eventually weaken the population. Biennials, on the other hand, must not be allowed to go to seed; persistent mowing can eventually exhaust root reserves.
- Learn to identify weeds, such as common lambsquarter, that can serve as reservoirs for viral and bacterial crop diseases that get transmitted to crops by insects.
- Plant higher crop densities to block weed germination.
- To disrupt the life cycle of various weeds and reduce their competitiveness, shift between warm- and cool-season crops, and broadleaves and grasses in your rotation.
- Include crops that have natural weed inhibitors, such as rye and sorghum.
- Plant crops that can be sown late in the season and that are easily cultivated.
- Switch to transplants in horticultural crops to provide a jump on the season. Transplanting also allows more soil to be thrown up around the plant without causing damage.
- Control the weed seed population and keep it as low as possible, not only to manage weeds and prevent yield losses, but also to prevent those weeds from going to seed and building up a soil seed bank.
- Allow more time for weed seed predation by birds and insects in both fall and spring by eliminating fall tillage after harvest of corn, soybeans, sunflowers and other fall harvested row crops.
- Consult the book *Manage Weeds on Your Farm: A Guide to Ecological Strategies* (www.sare.org/manage-weeds-on-your-farm) for comprehensive guidance on how to identify problem weeds and use integrated cultural and physical control strategies that target weeds' vulnerabilities.

Insects

Although certain insecticides such as Bacillus thuringiensis (Bt) are permitted under certain conditions, organic farmers don't rely on them exclusively, and these products can often be cost prohibitive, especially for large-scale field crops. Rather, farmers use multiple practices to keep insect pest populations under control, and they only use sprays as back up when other cultural and physical management strategies aren't effective.

The most effective pest management practices are based on ecological principles and are integral to organic agriculture, for example, using crop rotations and enhancing biodiversity. These practices can disrupt pest cycles and promote natural predators. In addition, to manage insect pests effectively, you'll want to determine threshold levels of pest populations and scout fields regularly, introduce natural predators, promote natural habitats for predators, use physical barriers and follow good sanitation practices as needed.

The approaches you take to insect management will depend largely on your system and geography. In a SARE-funded project (OS18-121) on an organic vegetable farm in southern Texas, researchers at the University of Texas, Rio Grande Valley found that a sunn hemp cover crop resulted

Parasitic wasps are released in fields of dry beans at Lakeview Organic Farm in Penn Yan, N.Y., to provide control of the Mexican bean beetle. *Photo by Jermaine Hinds, SARE*

Restoring native habitat, such as this wildflower planting beside a vineyard in Washington State, can support pest predators and result in improved insect pest control. *Photo by Lorraine Seymour*

in significantly lower insect pest damage and a higher population of beneficial insects compared to a cowpea cover crop. Sunn hemp, which grows well in the area's hot, semiarid conditions, also provided effective weed control compared to a summer fallow.

In New York, where the wet, humid summers pose enormous pest challenges for organic fruit production, Cornell University researchers found that organic grape vineyards could be as pest and disease free as conventional ones. During a three-year, SARE-funded experiment (LNE90-020) comparing organic and conventional grape production with three varieties, the use of pheromone disruption and insect scouting allowed researchers to eliminate regular insecticide applications. The researchers also learned that pheromones successfully controlled grape berry moths and that scouting allowed them to control insects that emerged when the regular spraying was eliminated. They avoided an anticipated spike in grape leafhoppers by releasing predatory wasps.

In Minnesota, organic berry farmer Andrew Petran used a SARE grant (FNC19-1188) to compare two approaches to managing insects in strawberries: a traditional organic spray regimen in an open field and the use of exclusion netting with a reduced spray regimen. Petran sprayed open fields twice per week and netted fields twice per month, and he released mason bees in the nets for pollination. After two years, Petran found that using nets resulted in higher yields and superior fruit quality, enough so that the netting system would pay for itself within two years.

In South Carolina, Clemson University Assistant Professor Juan Carlos Melgar used a SARE grant (OS16-094) to compare the practice of bagging fruit to regular pest control methods in both conventional and organic peach orchards. Using brown bags to protect fruit from diseases and insects such as plum curculio had no positive effect in the conventional system, but it increased marketable fruit yield by 11% in the organic system because of the protection the bags offered. The practice comes with a high labor requirement and cost, but Melgar found it can be profitable if labor is available and if the organic fruit is sold directly to consumers.

Transition Strategies: Insects

- Be aware that eliminating pesticides can lead to temporary outbreaks of pests.
- Use a combination of cultural, mechanical and biological control strategies before resorting to chemical solutions.
- Minimize pesticide applications before you start the transition, and use pesticides that have the least impact on natural enemies. This will make the transition less jarring.

- Adopt integrated pest management (IPM) practices, such as scouting and setting thresholds for pest populations, either before or as soon as you begin your transition.
- Gain experience identifying pests and natural predators in the field.
- Become familiar with acceptable management materials and start trying them.
- Plan your rotation and soil-building strategies to manage insects and diseases.

Pathogens

Organic growers use numerous strategies to control soil-borne diseases, including composts, variety selection and the main method, crop rotations. Since most pathogens are plant specific, rotations break the cycle of pathogen populations by removing their host. Compost has long been known to effectively suppress plant pathogens. Planting resistant varieties and adding organic matter also have been shown to reduce soil-borne diseases. For example:

- In the SAFS project in California, a four-year organic rotation had lower incidence of corky root and red root rot than the two-year conventional rotation.
- An on-farm tomato study in the Central Valley of California showed that organically managed soils may be suppressive to the organism that causes corky root.
- In North Carolina, another SARE-funded study (LS01-128) showed disease significantly reduced by organic soil fertility amendments on organic versus conventional farms.

Other disease control methods include soil solarization, biofumigation, biosolarization and anaerobic soil disinfestation. These methods kill pathogens through a variety of means, including heat, oxygen deficit and/or release of natural toxins. Although the actual effects of these treatments are short term, they can contribute to a shift in the soil microbiome, which can lead to longer-lasting disease suppression. Growers also use biofungicides, which are a formulation of beneficial soil organisms, to prevent or control plant diseases. While some of these products target specific pathogens or a group of pathogens, others are more broad spectrum and can suppress a wider range of pathogens or enhance crop disease resistance. Use them as one part of your overall integrated disease management strategy.

Plant pathogens are controlled using many of the same techniques to control soil-borne diseases: maintaining crop and soil health, and using cultural controls such as resistant cultivars and sanitation. Applications of approved pesticides can be important for certain foliar pathogens. To control late blight, downy mildew and powdery mildew, growers will use copper-, sulfur- and bicarbonate-based compounds, sometimes combining these with other practices such as plant spacing and resistant varieties.

Transition Strategies: Pathogens

- Learn the prevalent pathogens of each of your crops, including their life cycles, seasonal patterns and conditions that favor disease development.
- Diversify your crops and design your crop rotation to deter pathogens.
- Look for disease-resistant cultivars that are adapted to your region and have been developed for organic production systems.
- Use multiple strategies, such as green manure, mustard meal or other amendments, and anaerobic soil disinfestation, to modify your soil microbiome to suppress pathogens.
- Build healthy soils that have good tilth, drainage and high levels of organic matter. Better drainage makes the environment less hospitable for pathogens and better for plant roots.
- Remove visibly diseased weeds and crops before the pathogen spreads.
- Attempt to identify specific pathogens based on symptoms so you know how to prevent and treat them.
- Consider setting up small side-by-side trials of different varieties or biological control treatments to explore what works best in your system.
- Provide proper aeration around plants by adjusting plant spacing. When growing too close together, plants may increase local humidity and improve conditions for pathogens to spread.
- Keep loose soil covered with mulches to reduce the likelihood of soil-borne pathogens splashing onto crop plants.
- Know what products you're planning to use. Look for research that supports their claims. Make certain they will do what they are intended to do and are approved for organic use.

Since most pathogens are plant specific, rotations break the cycle of pathogen populations by removing their host.

Part Three:

Transitioning Livestock, Field Crop and Horticulture Systems to Organic

Developing a farming system that ties together principles of sustainability and productivity is complex. Organic farmers must consider how the various components of their system—rotations, pest and weed management, and soil health—will maintain productivity and profitability. If you're already using some of the practices discussed in previous sections, you've already started thinking about your farm as a system, and organic may be closer than you think. While the fundamental concepts and practices of organic agriculture are universal, the way you achieve certification will vary based on the kind of system you're working with.

This section lays out basic transition strategies for livestock, field crop and horticultural systems. It also includes broad approaches to transitioning your land as well as additional resources you might find useful.

Livestock Systems

Traditionally, livestock have played an important role in integrated farming operations and fit well in organic farming systems. For example, livestock:

- Feed on forages and grasses, which are essential components of the annual crop rotations and perennial cropping systems used by organic farmers because they prevent soil erosion and build organic matter
- Provide manure, an important organic fertilizer
- Can graze land that is considered marginal or not suitable for commodity crops
- Can be effective weed control agents (in particular, sheep, goats and chickens)
- Are raised year round and can generate income throughout the year instead of just at harvest time

The initial investment of time and finances to transition an animal system is high because you'll likely have new input, infrastructure and labor costs while still receiving conventional prices, so careful financial planning, risk analysis and, oftentimes, a gradual transition that spreads out costs over time, are essential to a successful transition. The higher prices you often get after certification should make up for the large investment, but during your transition planning period you should confirm contract pricing and/or market opportunities for your organic products to ensure this will be the case. For example, a 2016 analysis by the USDA of small-scale dairies (organic and conventional, up to 199 head) found that organic dairies had higher costs than conventional ones but much higher returns. Also, the only segment that broke even that year was organic dairies with herd sizes of 100–199 head.

Organic rules require that livestock health and natural behavior be accommodated year round. One application of this rule is that livestock must have daily access to fresh air, sunlight and the outdoors, and that ruminants must have access to pasture. So if you're already providing outdoor access and grazing your ruminant livestock, the transition to organic will be less complicated than if you operate a confinement system. In the 1990s, many beef producers in Nebraska entered the organic market with ease because they were able to adapt existing pasture-based systems they'd perfected over the years, according to the Center for Rural Affairs. In addition, dairy farmers who use pasture as a major feed source and who are balancing milk production output with herd health practices that don't require routine use of antibiotics and hormones also find it easier to transition.

Beef cattle graze on pasture and a silage of grass and alfalfa at an organic farm in Adamstown, Md. *Photo by Lance Cheung, USDA*

Keep in mind that even if you're using pasture and providing outdoor access, you must follow other rules as you convert to organic. For example, buffer areas on pastures may be required if there are contamination risks, such as spray drift, from adjacent land use. Additionally, organic regulations require that pastures be managed in a way that protects natural resources, including water quality, which may mean fencing livestock out of streams and other natural water sources.

Although the land to produce organic grain, hay and pastures must be managed according to organic standards for three years, dairy cows only need to be managed organically for one year before they can be certified for organic milk production. As a cash-flow strategy, some operators transitioning to organic sell off the milkers and keep the young stock for this transition period. Heifers eat very little grain, so it isn't too expensive to feed them organically during the transition year. In some instances, a farmer will choose to sell their conventional herd and buy an organic herd once their land is ready for certification. Organic slaughter stock (swine, beef animals, lambs, goats, etc.) must be managed organically from their last third of gestation. Organic poultry must be managed organically from their second day of life.

Poultry farmers who have adopted outdoor, minimal confinement systems also may have an easier transition to an organic system. The small but growing practice of raising broilers, layers and turkeys in pasture-based systems lends itself to organic certification because it meets two of the requirements of the national rule for organic meat: outdoor access for livestock and elimination of antibiotics in feed. Most alternative poultry producers already avoid antibiotics, as birds not crowded together in confinement systems experience fewer infections. Producers still need to watch for diseases and weather-related stress. To prevent disease and stress, many organic farmers move the birds frequently, allowing pathogens to die off when their food source is removed, and they clean pens and brooders regularly between flocks.

Because outdoor systems don't require elaborate or expensive housing, organic livestock systems may cost less than confinement systems and are thus a viable option for beginning farmers or those who have trouble raising capital. Poultry, for example, can be raised on pasture using inexpensive, easy-to-build structures.

Animal Health

One of the biggest challenges when transitioning livestock is finding alternative approaches to animal health, since hormones and antibiotics are prohibited. In organic systems, the focus on animal health is almost entirely preventive. In fact, many organic farmers find that the incidence of diseases typical in a confinement system is generally reduced by pasturing the animals, providing better nutrition and following preventive care practices. For example, because animals aren't standing on cement, they tend to have fewer foot and leg problems, while the fresh air reduces respiratory problems. Organic dairy farmers also see reduced incidence of mastitis due to improved immune systems and overall health, different bedding practices (including time on pasture) and lower milk productivity demand.

Focusing on animal nutrition through high quality feed and good soils also goes a long way toward reducing stress, illness and the need to treat animals for medical problems. Hubert Karreman, a dairy veterinarian, organic veterinary medicine consultant and dairy farmer in Saxapahaw, N.C., agrees that the incidence of many diseases is lower in organic and grazed herds. "But," he adds, "just because you're using organic management does not mean you won't have health problems." He sees more pasture bloat, hoof punctures and abscesses in grazed animals, but he also believes that preventive strategies such as probiotics (immune system builders), homeopathy and botanical medicines can be used very successfully to manage and treat organic herds.

Pastured chickens on an organic farm in Hamilton, Mont. *Photo courtesy Montana NRCS*

Research shows that organic field crops can be more profitable than a non-organic corn–soybean rotation on a per acre basis.

Transition Strategies: Livestock Systems

- Research different organic livestock systems, including the animal species that fit best with your climate, farm system and management skills.
- Take stock of what you already have, including buildings, fences, pasture and cropland, labor, expertise and breed genetics. What changes will you need to make?
- Create a business plan that includes market research to confirm you'll have a market for organic livestock products. Focus on lower-cost changes, waiting until you have more experience to add larger investments and changes.
- Be sure you have a reliable source of organic feed, and make sure you have backup sources in case of an emergency. Be planning at least three months out to allow adequate time for emergencies and other feed source failures, as organic feeds are not as readily available as conventional sources.
- Develop a recordkeeping system that allows you to track each animal or flock from birth to slaughter (or sale), all feed produced or purchased, and all health treatments.
- Discontinue prohibited practices. This may involve culling animals susceptible to health problems such as lice or parasites. Since you'll be giving up conventional veterinary medicine you'll also have to figure out how to improve conditions to foster good health among the herd or flock. Alert your veterinarian about your transition plans before you move ahead.
- Prolonged periods of stress will have a negative effect on livestock health and will make organic management more challenging, so look for ways to reduce stress in housing and handling practices. For example, poor ventilation, a lack of dry places to rest, overcrowding and handling that upsets animals are typical sources of stress.
- In dairy systems, expect cull rates to go up at first, because the older cows may have a hard time fitting into the new system.
- Anticipate decreased milk production in dairy production systems if your ratio of forage to grain increases in the livestock rations. Stay focused on the bottom line rather than on production numbers.
- Consider using operating loans to bridge the gap while you're buying organic inputs but selling into conventional markets. In your business plan, include projections for when you think you can repay these loans given your anticipated costs, production levels and prices received during the transition and after certification.
- When possible, partner with other transitioning and organic growers to share equipment, storage and other resources.

—Partially adapted from the Rodale Institute's *Transition to Organic Course*

Field Crops

Research shows that organic field crops can be more profitable than a non-organic corn–soybean rotation on a per acre basis. The 40-year Farming Systems Trial at the Rodale Institute, the longest running side-by-side comparison of organic and conventional grain in the United States, has produced some stunning results. In drought years, organic fields can produce up to 40% higher yields than non-organic systems. Organic systems also earn 3–6 times higher profit, use 45% less energy and release 40% fewer carbon emissions. An economic analysis of another long-term comparison study, the Variable Input Crop Management Systems Trial in Lamberton, Minn., found that an organic system using a four-year rotation of corn–soybeans–oats/alfalfa–alfalfa produced a net return that was 88% higher than a conventional system using a two year corn–soybean rotation (Delate 2015).

Prices for organic grains, like conventional grains, are variable, which often increases risk and may cause some farmers considering the transition to organic to hesitate. But, "it's not clear that transition costs are or have to be high," says Jeff Schahczenski, an agricultural and natural resource economist with ATTRA. "It's more about learning how to get better yields and managing costs well." Three other barriers listed by the Organic Trade Association's *U.S. Organic Grains Report* include:

- Uncertainty that the organic prices at the end of the transition period will be as high as when starting the transition
- Lack of easy access to markets for lower-value crops used in rotations to control weeds and build soil health
- Lack of technical assistance and resources

A SARE-funded survey (LNC17-397) of field crop growers in Indiana found additional constraints. For one,

many growers rent land, and this, along with tight margins, makes them reluctant to switch to long-term investments like organic. Some growers were also worried about negative social pressure.

Yet, many farmers have successfully transitioned to organic field crops by using a variety of strategies and carefully assessing their land and markets. Common transition strategies used by farmers range from a complete "cold turkey" approach to gradual ones that transition some plots of land before others. Others may take a split approach, where the farm is permanently split between organic and conventional land. (See the section "Select the Pace That Works for You.") A gradual or split approach might work better if you think the labor-intensive nature of organic farming will be hard to manage initially, or as a way to manage the risk associated with the learning curve of trying something that is considerably different than what you're used to. Networking with local organic growers more experienced than yourself is critical to the success of any transition approach because you can gain both encouragement and important insights about the best production and marketing practices.

For Rory Beyer and his family, who farm dairy, beef steers, corn, small grains and alfalfa, the "a-ha" moment came after a year of volatile milk prices and high feed costs. "I had been watching our [certified organic] neighbors. … They were feeding their own grain, producing less milk and making more money," Beyer says. "So I started looking at what it cost us on a per cow basis to produce feed, buy feed and deliver it to our animals." After running the numbers, the family decided to transition to organic. One successful strategy they used was to negotiate a decrease in rent on 130 acres they rented during the transition period, in exchange for higher rent after certification. The Beyers developed a four-year rotation of hay–corn with a winter cover crop of rye or tillage radish–corn–alfalfa seeded with a small grain. Like many other mixed operations, they also transitioned their land ahead of the animals, allowing them to have certified grain and forages ready to feed their own herd when the animals transitioned. This allowed them to avoid paying higher organic prices for feed while they were still getting conventional milk prices.

Transition Strategies: Field Crops

» The biggest factors contributing to yield decline during the transition are available nitrogen and weed competition. Focus on controlling problem weeds and building soil health with cover crops and other practices very early in, or even before beginning, the transition. Improving soil fertility takes time, so try to avoid beginning the transition with a heavy nitrogen-feeding crop such as corn. Ideally, begin instead with a perennial forage of nitrogen-fixing legumes such as alfalfa. Beginning with soybeans may present challenges with initial weed management and crop quality.

» Seek out current and historical pricing via USDA-NASS, which has been compiling bi-weekly organic cash (spot market) price data for corn, soybeans, wheat and hay-alfalfa since 2006. Look up 10-year price histories for organic commodities to help you determine how to price your grain. A good resource for a discussion of organic pricing is the ATTRA publication *Understanding Organic Pricing and Costs of Production*.

» Consider subscribing to Mercaris, a private company that publishes a market survey of organic and non-GMO grain prices that you can use to track current prices and view historical prices. (This is a recommendation by the authors and does not constitute an endorsement by SARE or the USDA. Exclusion of other businesses does not imply a negative endorsement.)

» Look for companies that may offer a little more for alternate labels or for transition production practices while you're in the transition. For example, some companies (mostly grain and dairy) may offer non-GMO and "transition premiums," usually at $1–$2 above conventional prices. Check Mercaris for listings of non-GMO pricing.

Mark Haines, an organic farmer in Keokuk County, Iowa, stands in a field of no-till soybeans. He terminated a cereal rye cover crop with a roller crimper one day after planting. *Photo by Jason Johnson, Iowa NRCS*

Kaly Hess prioritizes the use of living mulches, conservation tillage and biodiversity on her 15-acre organic farm in Albee, Mont. *Photo courtesy Montana NRCS*

- Use the Organic Grain Resource and Information Network (OGRAIN) to improve your organic row crop and small grain operation. OGRAIN, located in the Midwest, provides extensive information on everything from farming practices such as weed control and termination of cover crops; marketing, including buyers and brokers; grain storage; and organic transition and certification. OGRAIN also includes OGRAIN Compass, a planning tool with a spreadsheet and tutorial booklet to help you understand the financial implications, at both the crop and whole-farm level, of pursuing organic grain production.
- Talk to other organic farmers and attend Extension and farmer-focused events to learn from experienced growers. Explore and consider joining existing organic marketing co-ops, such as OFARM, that can provide expert market advice as well as assistance at a minimal cost to you.

Horticultural Systems

Organic fruits, vegetables and herbs comprise approximately 12% of total U.S. produce sales. Growers with well-developed markets can expect high returns; depending on the product, organic prices currently range from 20–200% over conventional prices.

When planning your transition, use your Organic System Plan from the get-go "as an opportunity to design offensive and defensive strategies," says Danielle Treadwell, associate professor and state Extension specialist of organic and sustainable vegetable production at the University of Florida. Defensive strategies are those that you plan against known risks, while offensive strategies are to prepare you for threats that might arise. For example, defensive strategies can include variety selection, grafting and crop rotation, all of which offer protection against pests you expect will arrive. Offensive strategies might include soil building practices and diversifying your crops. It takes time, adds Treadwell, but "well-planned offensive strategies always pay off in the end."

Offensive strategies may also include planning ahead financially and considering what tools you'll need, perhaps even investing in tools such as a cultivator ahead of time to help defray loss of income during the transition years. Another example of a good defensive strategy would be to adapt your marketing strategies in response to how the COVID-19 pandemic has changed your sales.

Because timing is so critical in horticultural systems, you'll want to spend time mastering the practices organic farmers use to tackle weeds, one of the biggest problems in organic horticultural systems. Specifically, this means getting a handle on your use of cover crops, pest scouting and, most importantly, cultivation, throughout the rotation calendar.

Transitioning to organic horticulture systems also requires you to become a good observer of the whole farm, and that you learn to think about your system at a landscape level. For example, how can you adapt your hedgerows to provide habitat for beneficial insects? What's the best way to balance cultivation for weed control with the need to build soil organic matter through reduced tillage? Without the usual chemical arsenal of rescue solutions, you'll have to be far more reliant on the landscape-level ecology of your system to prevent problems.

Smaller systems within the farm that can be micromanaged and that offer protected cultivation, such as high tunnels, greenhouses or plasticulture, can be smart places to start a transition, as the protection will allow you to lower your risk.

"Protected cultivation is more powerful in organic. It can provide a larger return faster in transition," says Anu Rangarajan, the director of the Cornell Small Farms Program. For example, in greenhouses, and in high tunnels to a lesser extent, you can screen the space against insects and manage moisture. Of course, if you're producing organic seedlings or crops in high tunnels or in other greenhouses, you must follow organic regulations in your management of those structures.

Additionally, plasticulture can be used as a targeted micro-management area to help you reduce two of the biggest challenges in transition: weeds and nutrients. Plastic mulch will give you a jump on weeds by providing crops with a more steady supply of nutrients. While plasticulture is acceptable according to NOP regulations and can be helpful during the transition, many experts and farmers discourage its ongoing use because the huge amount of landfill waste it generates goes against the principles of organic agriculture. There are no biodegradable mulches currently on the market that meet NOP standards, although this may change in the future.

Moving to drip irrigation can make a big difference in disease and weed control. For example, a SARE-funded research project (SW01-057) involving large-scale vegetable growers in California transitioning to organic found that adopting dripline for irrigation and delivery of soluble organic fertilizers not only conserved water and cut costs, but also reduced the incidence of weeds and diseases by keeping the surrounding soil dry.

Along with cultivation and nutrient supply, finding crop varieties less susceptible to disease and insect pests will go a long way toward a successful transition. It's "your first line of defense," says Rangarajan. And, she adds, don't just settle for the varieties you've been using, but think about how to move beyond them to find ones that will adapt well to your farm and systems, and that have a high level of disease resistance. When selecting varieties of crops, consider traits related to disease resistance or an ability to compete with weeds, as well as other desirable traits like yield or flavor.

Successful organic horticulture farms also make use of grafted rootstock to manage pests, as grafted crops are more resistant to soil-borne diseases and tend to yield higher than non-grafted ones. Because grafted plants cost more, you may want to reserve their use for high-value crops. They're commonly used in high tunnels or greenhouses.

Transplants are also useful in organic systems. Transplants can minimize damage from certain insect pests, help with weed control and also alleviate timing constraints brought on by use of cover crops and uncertain weather. For example, transplants allow you to push back your planting date to allow cover crops to grow longer, or allow you to plant your crops into existing mulch and/or and give plants a head start over weeds. (If using seedlings that you didn't start, during your transition be sure these transplants were grown following organic standards; after your transition is complete, seedlings that are sourced from off the farm must be certified organic.)

Last but not least, prepare for labor needs to increase both on and off the field. You'll be spending more time in the field as you plant and terminate cover crops, use mechanical or hand cultivation, and scout for pests. Also, be prepared to spend more time locating, purchasing and having approved inputs shipped, particularly if the products you need aren't produced in your state.

Transition Strategies: Fruit and Vegetable Crops

- Practice the management skills you'll need during transition, such as cultivation and scouting, before you start transitioning your farm, so as to be skilled at them when you're ready to transition.
- Prepare for the increased amount of time it takes for planning, doing paperwork and working in the field.
- Evaluate a wide range of new crops and be willing to let go of certain high-value crops in order to diversify, which will help lower risk.
- Experiment with the wide range of tools available to you to control weeds, such as solarization, flame weeding and drip irrigation.
- Transition on fields that have the best soils and that are relatively free of weeds.
- Study crops and varieties in your area to determine those that are least susceptible to disease during transition. For example, in the Northeast, squash and potatoes have a high susceptibility to disease and aren't considered good transition crops,

Juan Raygoza uses a belly mounted basket weeder and shanks to provide weed control for a radish crop on his 15-acre organic farm in Edinburg, Texas. *Photo by Jermaine Hinds, SARE*

whereas tomatoes, which are hardier and have disease-resistant varieties, generally perform better and are recommended as good transition crops.

» Modify your landscape to control pests and to invite beneficial insects and pollinators by planting flowering cover crops and wildflowers at field edges. This creates habitat for natural enemies and positively impacts crop production. In the field, use row covers and crop rotations to disrupt insect and disease cycles.

» Don't forget sanitation for disease control. Clean all tools, boxes, implements, stakes and any other materials that can vector diseases, weed seeds or insect larvae.

General Transition Strategies

Regardless of your farming system, there are some ways you can ease, and possibly speed up, your transition to organic certification. These include finding the approach that works best for you, taking advantage of existing educational and financial resources, and looking for land on your farm that might be eligible for a quicker transition because of how you're currently managing it.

Select the Pace That Works for You

There's no one strategy for deciding how much acreage to transition. Many successful organic farmers have ventured into organic a little at a time, which makes the switch more manageable and gives them time, at low financial risk, to evaluate what's working in different areas like fertility or pest management. Others find that they can successfully transition large amounts all at once. Consider which of these approaches works best for you.

» **Transition one parcel at a time**. Start with limited acres, with the intention of eventually transitioning all land (and livestock, if applicable). Your pace can be dictated by availability of finances and labor, and to minimize risk. Experiment with a portion of the farm rather than with the entire acreage. Transitioning one parcel at a time also helps minimize the economic losses you may face during transition.

» **Gradual transition**. Withdraw one class of prohibited products at a time, or start by reducing your use of fertilizers and herbicides, and monitoring pests for threshold levels. Preliminary results from a North Carolina study investigating the impact of withdrawing classes of inputs show that there were no yield differences between conventional, transitional and organic soybeans for the first year of the transition. This approach will delay how quickly land can be certified—three years of complete withdrawal from prohibited synthetic chemicals is required—and may impact your profitability. However, if you market directly to consumers you may be able to take advantage of your transitional status to fetch a moderate premium.

USING ALTERNATIVE LABELS DURING THE TRANSITION

You can't begin capturing organic price premiums during transition because you aren't allowed to label anything organic, even though you've already started the organic farming process. However, by using third-party labels, you can inform consumers that your product is not conventionally grown and thus possibly get a small price increase. If you direct market at the farmers' market or to restaurants, you can take the time, while in transition, to explain your practices. Some growers even use these third-party labels first and then eventually transition to organic.

Most of these labels have far less recordkeeping and lower costs than organic certification. They address a range of farming practices such as grass-fed and humane treatment for livestock, non-GMO for crops and fair trade for social justice, making them appropriate for a wide range of farming systems in transition. (A primer for consumers is at www.farmaid.org/food-labels-explained.)

Because there are many labels out there, all with their own rules you'll need to follow and varying degrees of influence in the marketplace, it's critical to do your research and consult with local marketing specialists before you proceed with one. It's also important to remember that organic is the only certification managed by federal law, meaning it has more oversight and regulation behind it than third-party labels. These regulations may give some consumers more assurance about the quality and consistency of products bearing the organic seal.

» **Split transition**. Manage some land conventionally and some land organically as a long-term strategy. This is often combined with the "gradual" transition strategy, but the intent is to simultaneously maintain both organic and conventional land. Keep in mind that all equipment, crops and machinery must be separated between the operations, and everything you use for the organic side must be maintained according to regulations.

» **Cold turkey**. Originally this wasn't considered a wise strategy because it was thought that it took 3–5 years of organic production before soil and field quality began providing desirable yields, but there's more information now on how you may be able to minimize yield declines associated with the transition. For example, research shows that if you use crops that don't have high nitrogen requirements, or if you select varieties that can fix their own nitrogen, you may see favorable yields sooner. Moreover, legume crops such as soybeans are easy to cultivate and can perform well even with all chemical inputs withdrawn.

» **Immediate transition**. Certify livestock and land with minimal or no transition period. Immediate certification is often an option for land under conservation agreements that hasn't been actively farmed for three or more years, but you'd still need to provide records showing that no prohibited substances have been used over the most recent three years. (See the following sections, "Coordinate with NRCS Programs" and "Hidden Acres.")

Coordinate with NRCS Programs

EQIP initiatives for organic transition. Many conservation practices encouraged by NRCS—soil health, erosion control, nutrient management, crop rotation, biodiversity, buffers, and habitat for pollinators, beneficial insects and wildlife—align closely with organic practices. Recognizing this overlap, NRCS has developed programs under its Environmental Quality Incentives Program Organic Initiative (EQIP-OI) to help organic and transitional growers.

For transitioning growers specifically, NRCS has designed the Conservation Action Plan 138 (CAP 138), which focuses on developing a conservation plan that protects resources while also helping build the foundation for your Organic System Plan (OSP), which is required by certification agencies. In some cases, the CAP 138 will be identical to your OSP, and the technical service provider will even help you fill it out. CAP 138 also provides funding to implement parts of the plan and provides you with free technical assistance. A technical service provider doing your CAP 138 planning can even help you design your farming practices for transition.

NRCS District Conservationist Shemekia Mosely (right) works with Nuri Icgoren (left) of Urban Sprouts Farms, an organic operation in Lakewood Heights, Ga. *Photo by Preston Keres, USDA*

NRCS funds other plans under CAP 138, including nutrient management and pollinator habitat management. It can also help you develop management calendars and job sheets for implementing conservation practices.

NRCS can also help ruminant operations design a grazing plan for their land. This can be used to verify compliance with the organic requirements for the ruminants' feed rations from pasture as well as to complement the OSP.

Conservation Stewardship Program (CSP). This program helps farmers and ranchers who have already implemented some conservation practices on their land expand on their efforts. The whole-farm production approach to conservation that CSP encourages fits well with organic systems. When you enroll in CSP you work with a local NRCS conservation planner to identify a variety of conservation practices that you could implement to address your specific natural resource concerns while meeting your farm management goals. CSP provides financial support for the practices you choose to implement in a five-year contract with the

Alfalfa fields that have been managed without the use of GMOs and other substances prohibited by organic regulations may be able to pass through the three-year transition period more quickly. *Photo by Preston Keres, USDA*

option to renew for an additional five years. Examples of eligible practices include:

- Grazing management to improve wildlife habitat
- Extending filter strips to reduce excess sediment, nutrients and chemicals in surface water
- Planting cover crops to improve soil health
- Planting range grasses to reduce erosion and develop wildlife habitat

Conservation Reserve Program (CRP) land. If you have CRP land and can document it hasn't received prohibited inputs for three years, it may qualify for immediate certification. However, be fully aware of why the acreage was originally put into CRP. There may have been a production issue that prompted this action, including susceptibility to erosion, wetness or soil never meant to be cropped in the first place. If your CRP land was placed there because of low productivity, you'll want to ease into organic management with a legume, such as field peas, which can provide its own nitrogen, as it will take time to build healthy soil on the land. Also consider planting a cover crop in the fall to boost soil activity for a spring crop. A SARE-funded study on Iowa CRP land (LNC99-160) showed that there was virtually no economic loss when transitioning using soybeans. By the third year, the economic returns in the certified organic soybeans were 180% above conventional.

As of 2021, the USDA is considering a proposed rule change that would discourage the practice of turning native ecosystems into organic farmland by requiring a 10-year waiting period to gain organic certification. Under this proposal, CRP land would likely be affected if it has regained important characteristics of a native ecosystem. Be sure to consult with an organic certifier to learn about current regulations—and consider your own land stewardship goals—before you consider bringing CRP land into crop production, particularly if your CRP land is considered highly erodible or is best used as a buffer strip. On marginal land, livestock grazing may be the best option for organic production, as it can be done without degrading the land's condition as a native ecosystem.

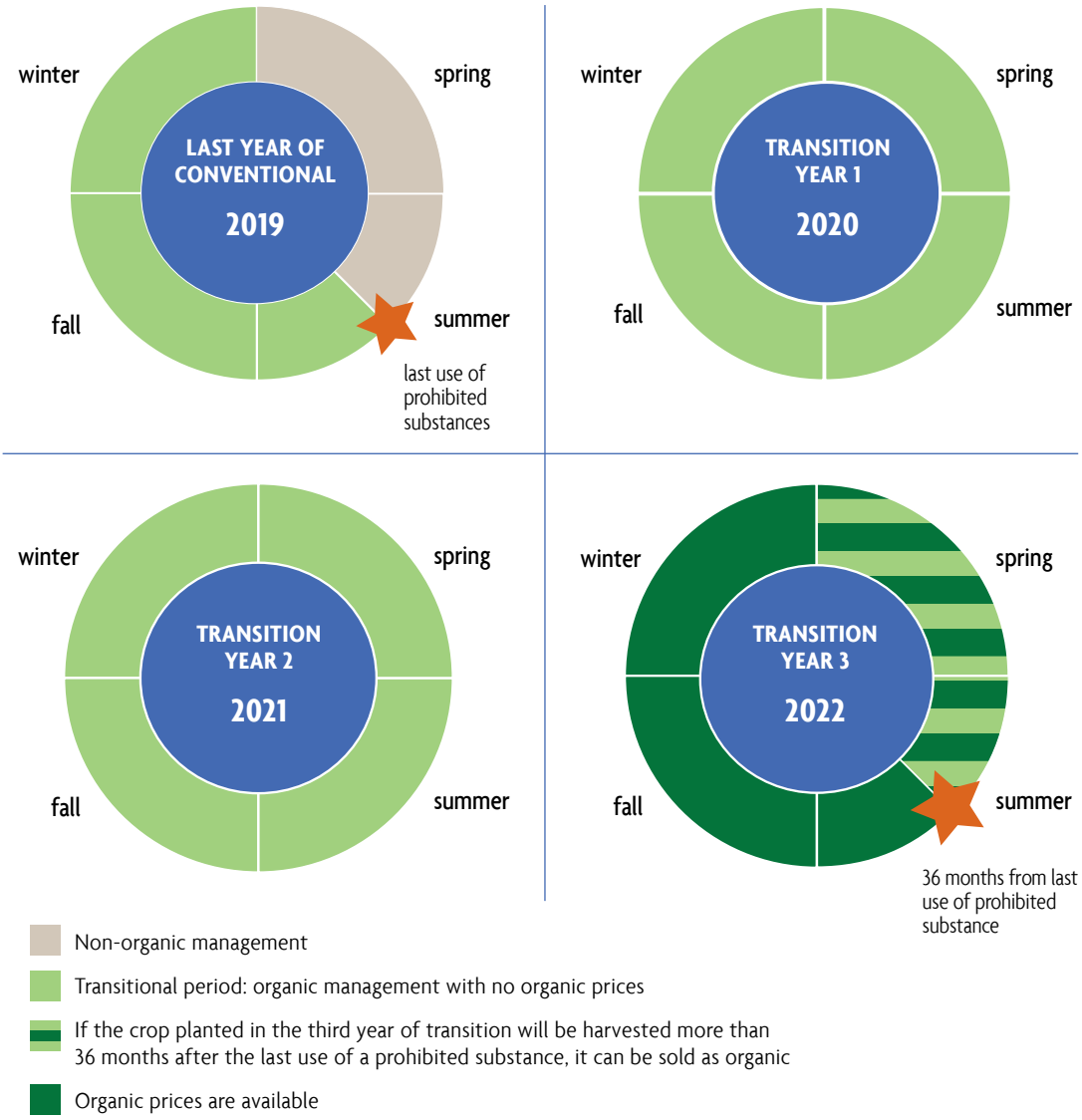
Hidden Acres

One of the biggest challenges in transitioning is the three-year period (36 months) known as the "dead zone" of transition. This is the period when you may have a three-year yield drop, increased costs and no access to organic prices, making them very difficult years. By searching your farm for "hidden acres," you may be able to partially transition some of your land in less than three years. Keep in mind that if the date for crop harvest occurs 36 months and one day after the last prohibited practice on the field, that crop can be certified organic and receive organic pricing, thus shortening the "dead zone" in many instances (Figure 1).

You can find these hidden acres in:

- **Alfalfa**. If your alfalfa has been grown for three years using non-GMO seed and without prohibited substances as listed by the NOP, you can transition this land directly into organic. The land will be in excellent condition for organic production since alfalfa improves soil structure and suppresses weeds.
- **Fallow land**. If you have any acreage that hasn't been planted and hasn't had any herbicides or prohibited substances applied, you may subtract those fallow years from the three-year countdown. Of course, you'll need to do soil testing to evaluate fertility and, following that, decide how to transition crops into this land.
- **Winter wheat**. If you've grown winter wheat with no prohibited substances, this can also reduce your time to transition. You can also consider moving toward transition by growing winter wheat using only approved NOP materials. Either of these approaches will cut the transition time.
- **Grazed fields**. Any fields/pastures that have been grazed and have not received any prohibited materials, such as GMO seeds, fertilizers or pesticides, may be able to transition into organic immediately. You'll want to evaluate soil health

FIGURE 1. A SAMPLE TIMELINE OF THE THREE-YEAR TRANSITION TO ORGANIC



carefully and make a plan to increase soil health, particularly if you placed those fields into grazing because of low productivity in the first place.

» **Cover-cropped land**. If you start with a warm season cover crop in the spring on land that has received no prohibited inputs since the fall, you can plant a cash crop into this land after a second year of cover cropping. In order to qualify as organic, cash crops only require three years from the time of application of the last prohibited substance to the time of harvest, not to the time of planting. This means that the cash crop can be planted after two cover crop cycles, so long as it is harvested at least 36 months after the last prohibited substances were applied.

If you want to use any of these strategies to cut down your transition time, be sure to keep careful records of everything you've done, from the seeds you've planted to all materials applied. All certifiers will require you to verify everything you've used in fields that you want to transition early. Search online for the National List of Allowed and Prohibited Substances maintained by the NOP to understand which substances you need to avoid. Also, you should get assurance from your certifier as early as you can that the practice is allowable, and include it in your OSP. Interpretation of rules and regulations may vary

slightly among certifiers, so having documentation can prevent disappointment or confusion later. If the land hasn't been under your management for the transition period, a signed affidavit from the previous landowner or land manager is required as verification that no prohibited materials were applied during the transition period.

—Adapted from *Hidden Organic Acres? 6 Scenarios For a Faster Transition* (AgriSecure)

Don't Start From Scratch: Use Existing Resources

In the early days of organic certification, farmers had to rely on each other and a scarce supply of data. The knowledge base is considerably larger today and continues to grow; for example, the 2018 Farm Bill allocated $395 million over the next 10 years to organic research through the USDA's Organic Agriculture Research and Extension Initiative. Likewise, the number of people who can work with you as consultants has grown significantly since the early days of organic. Tips for learning include:

- Many state Extension offices have organic specialists and knowledgeable county agents. In addition, many organic agriculture associations exist at the state, regional and national levels. Reach out to local organizations to find specialists and farmers you can begin networking with.
- Visit eOrganic.org, which offers an expansive collection of information on organic agriculture–including dairy, grain, fruit, vegetable and poultry production–collaboratively developed by university researchers and Extension specialists from around the country. The site includes articles, videos, webinars, courses and an "ask an expert" tool.
- Look for field days, farm tours, conferences, winter workshops and on-farm trials that focus on organic and provide an opportunity for networking with others who are either interested in transitioning or are experienced organic farmers.

To be successful through the transition, you'll want to be clear about your goals, the strategies that you put in place when making the switch and your ability to manage unexpected challenges as they arise.

Part Four: Business Planning

As with any type of farming venture, your success with an organic operation will depend on your ability to be a good business manager. To be successful through the transition, you'll want to be clear about your goals, the strategies that you put in place when making the switch and your ability to manage unexpected challenges as they arise. Farming organically is a shift that requires a willingness and ability to rethink many aspects of your farming system—not only farming practices, but marketing and business planning as well.

Equally important to planning your transitional farming strategies is having a business plan to guide you. The plan should include strategies related to operations, marketing, human resources and finances. It should list the resources you'll need and how you'll acquire them. A full, detailed plan will allow you to see if your cash flow is sufficient to get you through a transition now, or if you might need to wait. If your business plan suggests you're ready, be sure it includes a strong balance sheet to get you through the financial shortfalls that are common to transitioning. Have strategies in place that will account for the possibility of lost revenues during the transition, and consider using free and reduced-cost NRCS programs and/or transition premiums from specific buyers.

Be sure your business plan leaves time for recordkeeping, which in organic systems is time consuming. You'll be required to keep accurate post-certification records on the production, harvesting and handling of any agricultural products sold as organic. Also, do not underestimate the additional time needed to gain new skills, such as managing crop species, controlling weeds mechanically and undertaking new marketing strategies. Organic farming requires preventive rather than prescriptive strategies as well as a considerable amount of planning ahead.

"Walk through your fields often," advises Carmen Fernholz, who farms 360 acres of organic small grains, corn and soybeans in Madison, Minn., and who regularly counsels other farmers on organic production. "Take pictures. Take notes often about what you see in the fields or what thoughts go through your mind while on the tractor. This can easily be done with today's cell phone apps, and it makes excellent reading and reviewing when

the snow is flying. It also gets you planning for the next season, especially in decision making about different crops or different equipment you see as needed."

Beyond Profits: Why Do You Want to Transition?

Developing a business plan is also a good opportunity to dig deep and consider why you're planning to transition to organic. It's not a decision to take lightly. To gauge your readiness, ask yourself the following:

- Do you enjoy walking your fields and monitoring your animals on a regular basis?
- Can you distinguish pests from beneficial insects?
- Are you curious about why things happen on your farm?
- Can you tolerate a field that isn't weed free?
- Do you have the patience to trade short-term economic returns for the longer-term resilience that you get from having healthier soils?
- How will the transition period, where yields sometimes decrease and organic prices are not yet available, impact you and your family?
- What resources are available? Consider your access to labor, your borrowing capability, the knowledge base of local Extension professionals and whether there's local information exchange happening on the topic of organic production.
- How will you develop the new types of relationships required to market organic products?
- Are you going into this strictly for yourself, or are your goals and mission well beyond your farm?

If your only motivation is to improve profits, your likelihood of success may be low; transitioning to organic often requires a huge range of economic, social and production changes. The transition period can be particularly stressful because of the need to develop and implement new management skills. In fact, you should be prepared to survive a short-term financial loss if yields drop and costs increase during this period.

At the same time, some farmers view this transition period as an investment in education and growth. During this period, when you may experience declining profits, consider that you're learning new skills and networking with new farmers and professionals in ways that can benefit your farm—and you personally—long into the future. You're also building what economists call "natural capital." This refers to improved physical characteristics of soil, plants and other natural resources, such as better soil water infiltration, increased microbial populations, more natural predators, and better control of weeds. Like investing in a new stock, you may not see short-term profits, but you're setting the stage for long-term gains via the sustainability of your land and farm. For example, many of the soil health improvements and biological diversification that we associate with organic agriculture can make farms more resilient to extreme weather events associated with climate change.

Reduce the Cost of Organic Certification

You may be able to get a portion of your certification costs reimbursed through the USDA Farm Service Agency's Organic Certification Cost Share Program. This program will reimburse 50% of the costs associated with certification up to $500, with eligible costs including application fees and inspection costs. Learn more about eligibility, how to apply and application deadlines at https://www.fsa.usda.gov/organic.

Luke Peterson (left) and Carmen Fernholz (right) farm together in Madison, Minn., where they produce organic grains, hay and beef. *Photo by Dodd Demas, Forever Green Partnership*

Risk Management and Crop Insurance

On the surface, organic farming may seem to be riskier than the conventional approach: You're limited to a much smaller range of input materials, are learning a new management system and may be subject to pest and weed outbreaks during the transition period. However, to some extent, the nature of organic farming and its reliance on preventive practices, such as crop rotation, reduces your vulnerability to risk. As diversity on the farm increases,

For Steve Ela, crop diversity and direct marketing are critical risk management strategies. He grows more than 55 varieties of tree fruit on his organic farm in Hotchkiss, Colo., including many varieties that are well adapted to his climate. Direct marketing allows him to sell less common varieties that wholesale buyers may not want.
Photo by Laura Lengnick

production risks get spread out and market opportunities expand.

This is the view taken by Charlie Johnson, the organic grain farmer from South Dakota. Johnson's fertility sources include purchased chicken manure, composted livestock manure from his herd, and the legumes in his rotation. This means he's minimally impacted when input prices change radically. "What my rotation does is it really reduces my risk," he says. "When fertilizer prices tripled this year [2022] in a lot of cases throughout the country, my chicken manure went from 9 cents a pound to 10 cents a pound. Well, I can live with that."

This diversification is paramount for economic security in any agriculture production system. Because organic prices can fluctuate, it's important to plan carefully. A high-value crop will help, but it's equally important to count on the more modest prices of a variety of crops than on just one high-value crop, as market oversupply at times can decrease the prices of even higher value crops. During transition, increased costs such as re-tooling, purchasing additional equipment, extra storage requirements and additional labor may be substantial. Some organic growers have formed marketing co-ops to share some of those risks. Co-op members share the labor associated with marketing, such as promotion and sales. And by working together on quality control, codification of nutrition and crop genetics, the co-op members gain access to bigger markets. Moreover, this gives each grower more time for their individual operations.

Crop Insurance

The USDA Risk Management Agency (RMA) provides risk management tools and crop insurance coverage on over 100 crops for both organic producers and those transitioning into organic farming practices, and over the years it has expanded the number of acres that are covered by the program. However, many of the organic crop policies are only available in a limited number of counties in the United States. Check with your crop insurance agent about availability of crop insurance protection in your county.

While RMA has steadily increased price and yield coverage for organic and transitional growers, it still has a long way to go. For example, organic growers can get price premium elections for several organic crops, but they rarely reflect actual prices available in many markets.

Organic crop insurance also does not cover pesticide drift from neighboring farms. RMA also doesn't recognize certain practices or it puts restrictions on how certain farming practices are implemented, such as cover crop termination timing. RMA doesn't cover crops where interseeding is used to potentially provide fertility and weed control. Check with your crop insurance agent to see if using a farming practice may conflict with crop insurance coverage.

That said, there are plenty of reasons to get crop insurance. For one, you may have a market dip while looking for new buyers. You can also have price volatility. The two most-used insurance programs for organic and transitioning farmers are revenue- and yield-based multiple peril crop insurance (MPCI) and/or whole-farm revenue protection (WFRP).

RMA requires several documents, including:

- Records from the certification agency showing the locations of fields that are transitional, certified organic, buffer zone acreage and non-organic
- Written documentation from a certification agent showing an organic plan
- All records of the types of crops you're growing, your yields and whether the crop is irrigated or non-irrigated
- Planting dates for crops

Yield loss often impacts revenue during transition. According to Tervor Findlay of the Organic Farming Research Foundation, while crop insurance may not guarantee payment for your yield or revenue losses in all cases, it can help compensate you for insurable losses at a price that reflects the higher prices for transitioning to

THE VALUE OF ON-FARM RESEARCH

When considering major changes to your farm or ranch, you can clear up a lot of uncertainty by working with Extension educators to conduct on-farm research. Starting small, with well-designed research trials, will give you data that can help you make decisions that will improve your success during the transition to organic. Learn more about how to conduct replicated research, demonstrations, variety trials and market studies in SARE's bulletin *How to Conduct Research on Your Farm or Ranch* (www.sare.org/conduct-on-farm-research).

organic, and it can provide an underlying safety net that mitigates some of the inherent risks of farming.

During your transition to organic, the most useful approach is to use the contract price-addendum option and WFRP. The contract price option allows you to insure a crop at near the price for which you already have a contract. During the transition period, a contract price is more likely to recognize the higher price that products produced during the organic transition may garner. Similarly, WFRP may provide coverage at a level that more accurately reflects the premium for transitioning to organic. After the transition, it's useful to keep these two options or to accept the organic price election, which allows you to insure your product at closer to the organic market price. Crop insurance benefits are heavily dependent on the agent you use. Make certain that your agent is knowledgeable and fully acquainted with how organic systems fit the policies and regulations they work under.

Transition Strategies: Business Planning and Risk Management

- Read SARE's *Organic Transition: A Business Planner for Farmers, Ranchers and Food Entrepreneurs* (www.sare.org/organic-transition-planner), which is specifically designed to help you explore a transition from the business side. Read it before you begin transition. The planner is filled with tasks and key business concepts, such as mission statements or strategic planning. It also includes worksheets at the end of each task to help you explore various ideas through important business questions, and develop and test your ideas before you finalize them.
- Use the spreadsheets in the planner to compile current and five-year projected whole-farm income and cash flow, balance sheets, inventory changes and depreciation expenses.
- Read about how other farmers have made the switch at the Tools for Transition Project, hosted at eorganic.info. The project provides online and print materials to help with the business side of transitioning to organic production, including farm transition profiles, whole-farm and enterprise financial analyses, and business planning materials.
- Use other resources such as *Farm Performance during the Transition to Organic Production: Analysis and Planning Tools Based on Minnesota Farm Record Data* from the University of Minnesota, which provides listings of enterprise costs and returns, as well as whole-farm financial performance measures, from transitioning and recently certified organic farms. It also has crop and dairy enterprise data from farms under conventional, transitional and certified organic management.
- Use the two spreadsheets provided by the Tools for Transition project at eorganic.info, *Enterprise and Whole-Farm Analysis Tables* and *Farm Planning Example*.
- Use the *Introduction to Crop Insurance for Organic and Transitioning Producers* guide from the Organic Farming Research Foundation to familiarize yourself with the types of available insurance.
- The Center for Rural Affairs offers publications and case studies to help organic producers understand the crop insurance options available to them, available at www.cfra.org/crop-insurance-resources.
- Check USDA's RMA website for the most recent updates about insurance for organic.
- Talk to your local crop insurance agents. The 2018 Farm Bill required additional training on organic for crop insurance agents, so they should be a helpful resource.

Organizations and Resources for Transitioning Farmers

USDA Resources

The National Organic Program
The USDA Agricultural Marketing Service has comprehensive information about the NOP on its website, including regulations, enforcement, the certification process and training resources.

www.ams.usda.gov/about-ams/programs-offices/national-organic-program

Sound and Sensible
The Sound and Sensible Initiative was a collaboration between USDA and 14 organizations that produced a set of resources to help make the certification process more attainable for those interested in the organic program.

www.ams.usda.gov/reports/sound-sensible

Natural Resources Conservation Service
The USDA NRCS's portal on organic includes fact sheets, training opportunities, and technical and financial resources.

https://www.nrcs.usda.gov/organic

Farm Service Agency
The USDA FSA's portal on organic includes financial assistance and loan programs that can support farmers who are transitioning to organic.

https://www.fsa.usda.gov/organic

Transition Resources

Tools for Transition
The Tools for Transition project includes educational modules and case studies to help guide producers through the organic transition. It was developed by the University of Minnesota, the Midwest Organic and Sustainable Education Service (MOSES), the Center for Integrated Agricultural Systems and eOrganic.

https://organictransition.umn.edu

Rodale's Transition to Organic course
The Transition to Organic course offered by the Rodale Institute addresses many key topics related to the organic transition, from soil and pest management to business planning, marketing and the certification process. It is available as both a self-paced online course and as a PDF guide.

https://rodaleinstitute.org/education/organic-transition-course

Organic Transition business planner
The SARE book *Organic Transition: A Business Planner for Farmers, Ranchers and Food Entrepreneurs* can help you develop an actionable business transition plan that's suitable for yourself, your management team or a lender.

www.sare.org/resources/organic-transition

Organic Management Topics

eOrganic.org
This website, maintained by university researchers and Extension specialists, includes information on organic agriculture, including dairy, grain, fruit, vegetable and poultry production. The site includes articles, videos, webinars, courses and an "ask an expert" tool.

https://eorganic.org

SARE's organic portal
SARE's portal on organic production includes resources produced by both SARE and SARE grantees on a wide range of topics related to organic farm and ranch management, business planning, marketing, certification and the transition.

www.sare.org/resources/organic-production

ATTRA's organic portal
The National Center for Appropriate Technology's ATTRA program publishes dozens of guides and videos on a wide range of topics related to organic farm and ranch management, business planning and marketing.

https://attra.ncat.org/topics/organic-farming

Crop Rotation on Organic Farms: A Planning Manual
This book provides in-depth guidance on how to develop crop rotations that improve soil health and manage insect pests, diseases and weeds, with real-world sample rotations provided by experienced organic farmers. It's most applicable to the Northeast but is useful for farmers in other parts of the country.

www.sare.org/resources/crop-rotation-on-organic-farms

Manage Weeds on Your Farm: A Guide to Ecological Strategies
This definitive book offers comprehensive information on how to manage weeds using cultural and mechanical practices instead of herbicides. It emphasizes the use of an integrated set of control strategies that exploit the weaknesses of problem weeds, and it includes a reference section that describes the identification, ecology and management of 63 of the most common and difficult-to-control weed species found in the United States.

www.sare.org/resources/manage-weeds-on-your-farm

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