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Growers Transition to Organic

The ins and outs of registration, certification and building your soil

by Glenn T. McGourty

The use of cover crops, animals and compost are hallmarks of organic growing at Jim Fetzer's Ceàgo Vinegarden (above). "In the 1980s... chef John Ash used to make outstanding meals for our guests. We thought, 'If organic vegetables taste so good, how would organic winegrapes taste?'" Fetzer said.

In California, more than 9,000 acres of vineyards have been certified as organically farmed. During the past 20 years, practical grower knowledge backed by university research has helped to create organic farming practices that allow the production of high-quality fruit at yields comparable to vineyards farmed with conventional farming practices. At the same time, (in my experience) growers have never lost a crop because they were using organic techniques to control pests and diseases.

Jim Fetzer was among the earliest pioneers of organic winegrowing, and remembers Fetzer Vineyards' first attempts. "In the 1980s, when Michael Maltus was managing the Valley Oaks Garden Project at our Hopland facility, we were having great success in growing very tasty produce that chef John Ash used to make outstanding meals for our guests. We thought,

Part 1 in a series on organic winegrowing

In this series of articles, we will present information for growers and wineries interested in farming their vineyards organically, based on the author's knowledge and experience

'If organic vegetables taste so good, how would organic winegrapes taste?' That was the beginning of our wholesale conversion of all the Fetzer properties to certified organic farming," he recalls.

The interest in organic methods continues to grow. The stated goals of winegrowers using these systems include:

- Creating sustainable farming systems that are economically viable, socially responsible and environmentally friendly
- Farming in a way to grow fruit and wine that expresses the unique *terroir* of their properties
- Potential market niches (The organic food industry is growing at double digit percentages each year.)
- Concerns about the environment, including reducing the use of toxic chemicals, and protecting ground and surface water supplies
- Improving energy efficiency and reducing off-farm inputs by using cover crops and compost made from recycled farm waste products (such as manure and grape pomace)
- Protecting the health of vineyard workers, people and communities in areas near vineyards
- Enhancing biodiversity and conserving natural resources in farmland.

during the past 20 years of working with organic winegrowers in Lake and Mendocino counties. Glenn T. McGourty is a winegrowing and plant science advisor with the University of California Cooperative Extension in Mendocino County, Calif. The four parts of the series are:

- *Going through transition and building your soil*
- *Disease management*
- *Pest management*
- *Viticultural practices*

Dr. Ann Thrupp, manager of sustainability for Fetzer Vineyards, says, "Becoming organic is not just substituting organic chemicals for conventional chemicals. You have to start thinking differently, and use a systems approach where you begin to understand how everything in your vineyard is interrelated. As an example, if you are having leaf hopper problems, maybe you should evaluate your irrigation and fertilizing practices, as these pests like vines that are vigorous and leafy. In some ways, you have to learn to farm all over again. Start slowly, and work on just part of your vineyard. There are no standard recipes, and your management choices have to be pretty site-specific."

First steps for vineyards

In 2002, the United States Department of Agriculture (USDA) established the National Organic Program (NOP) for producers and handlers of agricultural products who sell and label their products as organic. The intent was to set consistent national standards for the production and marketing of agricultural products labeled as organic. Also, the laws assure consumers

HIGHLIGHTS

- Goals for organic growers include creating socially responsible farming systems, reducing the use of chemicals, conserving natural resources and protecting vineyard workers.
- Certification and registration are two separate processes: Growers register with their county's agricultural commissioner, but they voluntarily enroll with third-party certification agencies.
- The use of compost, soil amendments and cover crops can increase soil's carbon content.

that organically labeled foods represent these consistent standards. The USDA NOP laws are enforced by individual state agriculture departments.

In California, growers producing organic winegrapes must become both *registered* and *certified*. The California Department of Food and Ag riculture (CDFA) regulates organic producers. All organic growers, regardless of gross sales, must be registered with CDFA. In addition, any producer that grosses more than $5,000 per year in direct retail sales must be certified through an Accredited Certification Agency, whose job is to assure that producers are using practices that comply with organic farming laws.

It takes time to go through the process, and while it is not complex, it is rigorous. California Certified Organic Farmers (CCOF) inspector John Trinterud reminds people: "This is a volunteer process. No one is making you be organic, so you need to approach certification in a cooperative and positive way. Otherwise, the process gets pretty tedious."

Lake County winegrower and CCOF inspector Lars Krail also notes, "Do your homework. If you talk to other organic farmers and inspectors as you get started, you can avoid a lot of mistakes and headaches that might hold up your certification and cost you down the road."

Registration is through your county agricultural commissioner, and involves providing that office with a map of the production area, a list of crops intended to be produced as organic, and a three-year history of substances/materials applied. Verification of land-use history must be established, and an initial minimum registration fee of $75 is required. The actual registration fee is set by the value of the crop.

Certification is a process separate from registration. It is the *certifying agency* that monitors grower practices to assure that the grower is in compliance with NOP regulations. As a third-party agent of the NOP, the certifier provides information to the producer about the certification process and the legal requirements for maintaining certification. The certifier should know the client's operation in detail, and have current knowledge of NOP regulations, but may not act as a consultant to the grower.

Certifying agencies assure that growers follow the NOP standards. They also schedule inspections of their clients' fields and packing areas, as well as fertilizer and pesticide use records. Finally, they review growers' Organic System Plans (OSP), which describe farming practices used to produce the crops. Well-known private certifiers in California include California Certified Organic Farmers (CCOF), Oregon Tilth and Organic Certifiers Inc. Marin and Monterey County agricultural commissioners also are certifying agents in their respective counties.

Thrupp offers another important suggestion about certification: "Make sure you check with your buyers if they are planning on exporting wine, because organic certification laws differ in other countries slightly, particularly in the materials that they allow you to use for growing and processing fruit."

The first phase of organic certification is known as *transition*, which usually lasts for three years. A grower begins this process by choosing a certifier and registering his production area. He also develops an OSP that details his farming practices, including soil and pest management practices and materials. Growers develop the OSP by consulting with other growers, crop

consultants and their certifying agency.

To begin the process, growers stop using conventional agricultural chemicals and begin farming organically. During transition, growers implement organic farming practices to build soil organic matter (compost applications and cover crops), and employ pest management practices compatible with organic farming regulations. If the grower can offer documentation that the land he intends to farm organically has not been treated with conventional agricultural chemicals, the transition period can be shortened at the discretion of the county agricultural commissioner and the certifying agency.

Starting the transition

Organic farmers are very concerned with soil protection and improvement. Some stated goals in most OSPs include:

- Increase soil organic matter levels (SOM)
- Improve soil physical conditions
- Provide adequate nutrition using naturally occurring substances
- Increase the number and diversity of soil organisms
- Protect the soil from erosion and exposure to sunlight
- Address imbalances in the soil that interfere with root growth and nutrient uptake.

Noted author and Biodynamic winegrower Paul Dolan writes: "Organic farming focuses on the life of the soil. Soil develops its own richness by providing a home for plants, insects and microorganisms that feed each other. If you put healthy soil under a microscope, you can see that it is literally crawling with life. The living things add all kinds of substances to the soil, including oxygen, water minerals and decomposing plants and insects. The microorganisms and subsurface inhabitants, such as earthworms, break up the soil and reduce the organic matter into nutrients that are then taken up by the plants on the surface, starting the process all over." (From *True to Our Roots: Fermenting a Business Revolution.*)

Self Reseeding Annual Cover Crops

Cover crops used for no-till vineyard floor management	Height (cm)	Seeding rate (kg/ha)	Comments
Subterranean clover	20-30	15-30	Long winter dormant best
Bur medic (Medicago polymorpha)	20-30	15-30	Good for low rainfall areas
Rose clover (Trifolium hirtum)	20-30	15-30	Good for low rainfall areas
Balansa clover (Trifolium michelianum)	25-40	15-30	Produces most biomass
Persian clover (Trifolium resupinatum)	25-40	15-30	Limited reseeding
Crimson clover (Trifolium incarnatum)	25-40	15-30	Limited reseeding
Zorro annual fescue (Festuca vulpine)	20-30	5-10	Earliest to mature

Blando annual brome (Bromus mollis)	20-30	5-10	Good for low rainfall areas

Source: University of California Cooperative Extension Mendocino-Lake Office

Tillage and soil amending

Initially, an organic grower deep-rips the soil to loosen compacted substrata to assist in vine and cover crop root penetration. Large tractors pull tillage implements with steel shanks spaced 24 inches apart in two directions perpendicular to each other (cross ripping). The purpose of this deep tillage is to insure that vines and cover crops can easily penetrate the soil profile, and that there are no layers of soil to restrict root expansion. Water infiltration and water storage may also be improved by this operation. It is highly desirable to have an expansive root system that explores the soil profile to absorb water and nutrients (especially since organic methods typically do not use high levels of soluble fertilizers that are easily leached in the soil profile). Normally, this tillage is done when the soil is dry (August and September) with implements that penetrate down to around 24 inches. Care is taken not to pulverize soil aggregates, and excessive tillage is avoided.

The grower then applies soil amendments if required (as determined by soil testing). The purpose of soil amending is to improve soil reaction and balance the cation exchange complex with base minerals to assist in soil flocculation and aggregate formation. Ultimately, this also will improve nutrient exchange and availability in the soil. In high rainfall areas, limestone ($CaCO_3$) is applied at rates ranging from 1-4 tons per acre to deacidify the soil and raise the pH. In more arid areas with soils that have a high pH or high sodium level, soil sulfur (S) or gypsum ($CaSO_4$) is applied to lower the pH and help precipitate sodium (Na) from the soil profile, improving soil structure and drainage. Rates vary from 1 to 10 tons per acre depending on material and soil chemistry. In areas affected by high magnesium (Mg) from parent material rocks (serpentinite), gypsum might also be used at similar rates to replace magnesium with calcium (Ca) and improve soil structure as well as potassium exchange rates.

The goal is to improve the cation exchange complex so that it is at least 90% base saturated, with 70% of the bases being Ca, and a ratio of 5:1 of Ca with Mg. Often, compost is applied at this time ranging from 1 to 10 tons per acre depending on the organic matter content of the soil. Many California soils range between .5% and 1.5% organic matter. Organic growers would like to see levels of 3% to 6% organic matter.

Following ripping and the application of amendments, and prior to planting, the grower works the soil to create a smooth surface for vineyard layout. This is usually started with disks and harrows, then smoothed with implements including ring rollers, land planes and other grading devices. This also helps the seeding of cover crops to protect the soil from erosion. Normally, fast-growing covers of small grains, mustard and large seeded legumes are used and planted by Nov. 1 to germinate with the first autumn rains.

Cover Crops Requiring Annual Seeding

Cover crops used for tilled vineyard floor management	Height (inches)	Seeding Rate (lbs/acre)	Comments
Bell Beans	36+	100-150	Large & Upright

Purple Vetch	20	40-60	Sprawling, good in mixes
Common Vetch	20	40-60	Sprawling, good in mixes
Winter peas	18	70-100	Sprawling, good in mixes
Oats	48	100-120	Very upright
Barley	36	80-100	Good for dry conditions
Triticale	36	100-120	Excellent root system
Mustard	48	5-10	Quick cover, reseeds well
Daikon radish	36	5-10	Large tap roots
Phacelia	20	10-15	Absorbs nitrogen

Source: University of California Cooperative Extension Mendocino-Lake Office

Vineyard floor management

During the first two growing seasons, many growers will completely cultivate their vineyards to eliminate any weed competition with the young vines for water and nutrients. Thereafter, if the vineyard is in an upland area with high rainfall where erosion may be a problem, they will plant self-reseeding annual cover crops to protect the soil from erosion. The cover crops grow during the wet months (starting in late October to early November) and are mowed and grazed. Self reseeding annual legumes are often used--they complete their life cycle around the time of vine bud break, and they are not competitive with the vines for moisture. They can also fix atmospheric nitrogen, producing between 10-30 pounds/acre of nitrogen annually. These cover crops also can be useful as habitat for beneficial insects, mites and spiders (generalist predators and parasitoids). Annual grasses also may be seeded to help aggregate the soil with their roots and create biodiversity by providing pollen and structural habitat. Usually, a "sward" of many species will form from both seeded cover crops and native plants.

Fetzer vineyard manager David Koball likes to say, "Your job as an organic vineyard manager is pretty similar to being the conductor of an orchestra. You have to get all the living things in the soil--the vineyard floor, the vines and the canopy--to work together in harmony and time. Cover crops are an important part, since they affect so many different vineyard processes ranging from soil fertility to vine vigor and pest management."

In vineyards planted on more fertile sites, and in situations where larger grape crops are desirable, annual legume and small grain mixes are planted between vine rows in tilled soil. These mixes can easily generate 30-60 pounds/acre of nitrogen on a fertile site with good winter rainfall. The cover crops are mowed during bloom and then tilled into the soil while there is still adequate moisture for the cover crop to decompose. This usually occurs in mid-April in Mendocino County. Sometimes growers will till alternate rows only, seeding the untilled rows to an annual self reseeding cover crop. This helps to conserve organic matter and minimize the amount of tillage in any one year.

Some cover crops are grown for soil protection and carbon, such as mustard and radish species. Others, such as *Phacelia sp.*, are useful for attracting beneficial insects and absorbing nitrogen to prevent leaching.

Biomass Cycling: Comparing Farming Methods

Material	Conventionally farmed (kg/ha)	Organic/Biodynamically farmed (kg/ha)
Prunings	1,000	1,000
Leaves	1,400	1,400
Weeds, cover crops	1,200	1,200-12,000
Compost	0	2,300-6,900
Total, kg/hectare	3,600	5,900-22,500
Total, tons/acre	.75	1.2-5.5

Source: University of California Cooperative Extension Mendocino-Lake Office

Managing organic matter

In California's sunny and dry climate, organic matter is easily lost when soils are exposed by tillage to sunshine and warmth. Growers want to accumulate soil organic matter (SOM) over time, as increased SOM will offer these benefits:

- Improve soil tilth, soil structure and the creation of stable soil aggregates
- Improve water infiltration and moisture retention
- Increase cation exchange capacity of the soil
- Increase biological activity and biodiversity in the soil macro- and microflora
- Reduce soil strength
- Improve soil fertility.

Organic matter is added by applying compost and growing cover crops. Organic and Biodynamic growers differ from conventional growers by these practices. See the accompanying table for a carbon budget comparing conventional with organic and Biodynamic vineyards.

Bell beans (above), winter peas and barley are commonly used cover crops in North Coast.

Cover crop mixes and decomposition

Legumes often are planted with grasses to provide nitrogen while the cover crop is growing. When the crop is plowed into the soil, the legumes decompose, insuring that there is adequate nitrogen to assist in the decomposition of carbon-containing compounds (often produced by the grasses and forbs). Legumes usually have a C/N ratio of less than 20:1, whereas grasses and many other forbs have C/N ratios of more than 20:1. The combination of grasses and legumes in mixes assures that cover crop decomposition is fairly rapid when it is incorporated into the soil. An example of a common cover crop mix for tilled vineyard floor management in the North Coast is bell beans, common vetch, winter peas and barley. "Blando" brome, subterranean, rose and crimson clover are planted for non-tilled vineyards.

Dr. Bob Bugg, one of the University of California's cover crop specialists, likes to say, "Legumes and grasses when combined in a planting are kind of like a 'dream team,' an agronomic Gilbert and Sullivan. They are complementary, and seeding them together creates diversity and makes each other more effective."

Carbon is a basic fuel for soil microorganisms, which utilize this element both as an energy source and a substance to build cell walls. Carbon alone is insufficient for growth. Nitrogen and other elements are needed to build proteins, enzymes, DNA and other compounds essential for life.

In general, microbes living in the soil use about eight parts of carbon for about every one part of nitrogen, reflecting that many soil-borne microbes have an average C:N ratio of 8:1. In addition, only about one-third of the carbon consumed by microbes is assimilated into their cells, whereas two-thirds are used for respiration and lost as CO_2. This means that, for every 8 parts of carbon metabolized, 16 parts are given off as CO_2. Thus, one gram of nitrogen is used for every 24 grams of carbon by soil microbes.

Normally, if the organic material added to the soil has a ratio that exceeds 24:1, the microbes will have to find nitrogen from other sources in the soil, and the rate of decomposition will be slowed considerably. As the microbes utilize free nitrogen in the soil, it becomes unavailable to higher plants. Consequently, nitrogen deficiencies most likely will occur. This happens when mostly mature grasses that are high in cellulose are plowed into the soil. This can be a

technique to devigorate a vineyard if there are high nitrogen levels in the soil.

Compost additions

Finally, compost additions to the vineyard serve as a source of nitrogen. Compost may stimulate the growth of cover crops, as it contains significant amounts of nitrogen, P (phosphorous), and K (potassium). If incorporated into the soil, comp ost can contribute to the soil nitrogen pool necessary for the decomposition of carbon containing crop residues. Compost C:N ratios range between 10:1 and 20:1. Carbon in well-made compost is fairly stable and contains humus that helps to build SOM. Compost is an obvious source of both macro and micronutrients. It is cost-effective for most nutrients, especially if the blend contains grape pomace and animal manures, as potassium levels are normally elevated compared to compost made from green waste.

Practical experience in the North Coast of California has shown that compost rates of 1 ton per acre applied annually often give adequate nutrition to the vines when nitrogen-fixing cover crops also are grown. Numerous side benefits accrue to the environment and soil health by using compost in the vineyard, including recycling a waste product that otherwise would end up in landfills, improving soil structure, increasing the amount and diversity of soil microflora and fauna, and improving soil water and air infiltration and water-holding capacity.

Nutrient Budget for Organic Vineyard

Inputs (source of minerals) for 1 acre of an organically farmed vineyard, North Coast	**N**	**P**	**K**	**Ca**	**Mg**
Compsted pomace and manure	49	8	62	59	22
Rainfall deposition (EPA estimates)	11	0	0	2	
Nitrogen from cover crops (half of rows, every other row)	10	0	0	0	
Soil tillage and mineralization from soil organic matter	10	1	5	5	
Total Input	**80**	**9**	**67**	**66**	
Estimated available for current season*	**38**	**2**	**57**	**56**	
Outputs (based on 3 ton winegrape yield)	**N**	**P**	**K**	**Ca**	**MG**
Wine grapes	8	4.3	21	12	1.6
Trunk, stems and leaves	15	1	1.8	11	3
Leaching and mineralization	15	0	5		
Estimated total mineral removal	**38**	**5.3**	**28**	**33**	**4.6**

*Compost availability estimated at N=15%, K=85%, Ca=85%
Source: University of California Cooperative Extension Mendocino-Lake Office

Conclusions

During the past 20 years, California organic and Biodynamic winegrowers have developed soil-management practices that are based on increasing carbon content in the soil by additions of compost, soil amendments and using cover crops, reduced tillage and other practices. There is no simple formula, and winegrowers develop programs that are adapted for their specific sites. Experience has shown that by implementing these practices, winegrowers are able to produce

winegrapes and wines of the highest quality using economically and environmentally efficient ways.

The positive effects from farming organically can be very striking. Paul Dolan remembers, "There was a Sauvignon Blanc vineyard we used to farm that really wasn't very good. You would taste the fruit some years and it would be flat and insipid. We started farming the vineyard organically, and it was amazing how much the fruit quality improved. We moved it from one of the winery's lowest value programs to one of the top tier levels after three years of organic farming."

The proof is in the seal: How to certify your winery

If you are making certified organic wine in California, you must register with the California Department of Health Services (DHS) Organic Processed Product Registration Program and pay an annual registration fee. In addition, you will have to certify your production with an organic certification agency. It will require you to develop an OSP that details your winemaking process, including equipment and materials that you use. You can use the same facility to make conventional and organic wines, but you must clean and rinse everything in preparation for making organic wine to ensure there are no residues from restricted materials. Records of all procedures also must be kept. Anticipate periodic spot inspections from Cal DHS, which will look at your production area and review written records.

Most wineries that make "organic" wine in California produce it in the category of "wine made from organically grown grapes," which restricts many additives (such as diammonium phosphate, synthetic clarifying agents and other chemicals), but allows the use of sulfites. Wine labeled organic prohibits the addition of sulfites, and is very perishable and somewhat unpredictable in terms of shelf-life. These wines have limited appeal, but some have a loyal following.

Winemaker Bob Blue of Bonterra Vineyards, which produces "wine made from organically grown grapes," has found that organic winemaking has some challenges. "We don't have the same tools that conventional wineries have, since synthetic chemicals are not allowed. We can use sulfites at lower levels than conventional wine. We use hydrolyzed yeast instead of diammonium phosphate for yeast nutrients, and egg whites for fining. We can use our regular production lines, but everything has to be cleaned before organic fruit and wine come into the winery, and we have to really keep an accurate paper trail on keeping the organic products separate. But none of this keeps us from making very good wine."

G.M.

Glenn T. McGourty *is a winegrowing and plant science adviser with the University of California Cooperative Extension in Mendocino County, Calif.* *He wishes to give special thanks to Ann Thrupp, Dave Chaney, education coordinator for the UC Sustainable Agriculture Research and Extension Program, and Ray Green of the CDFA for information on*

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