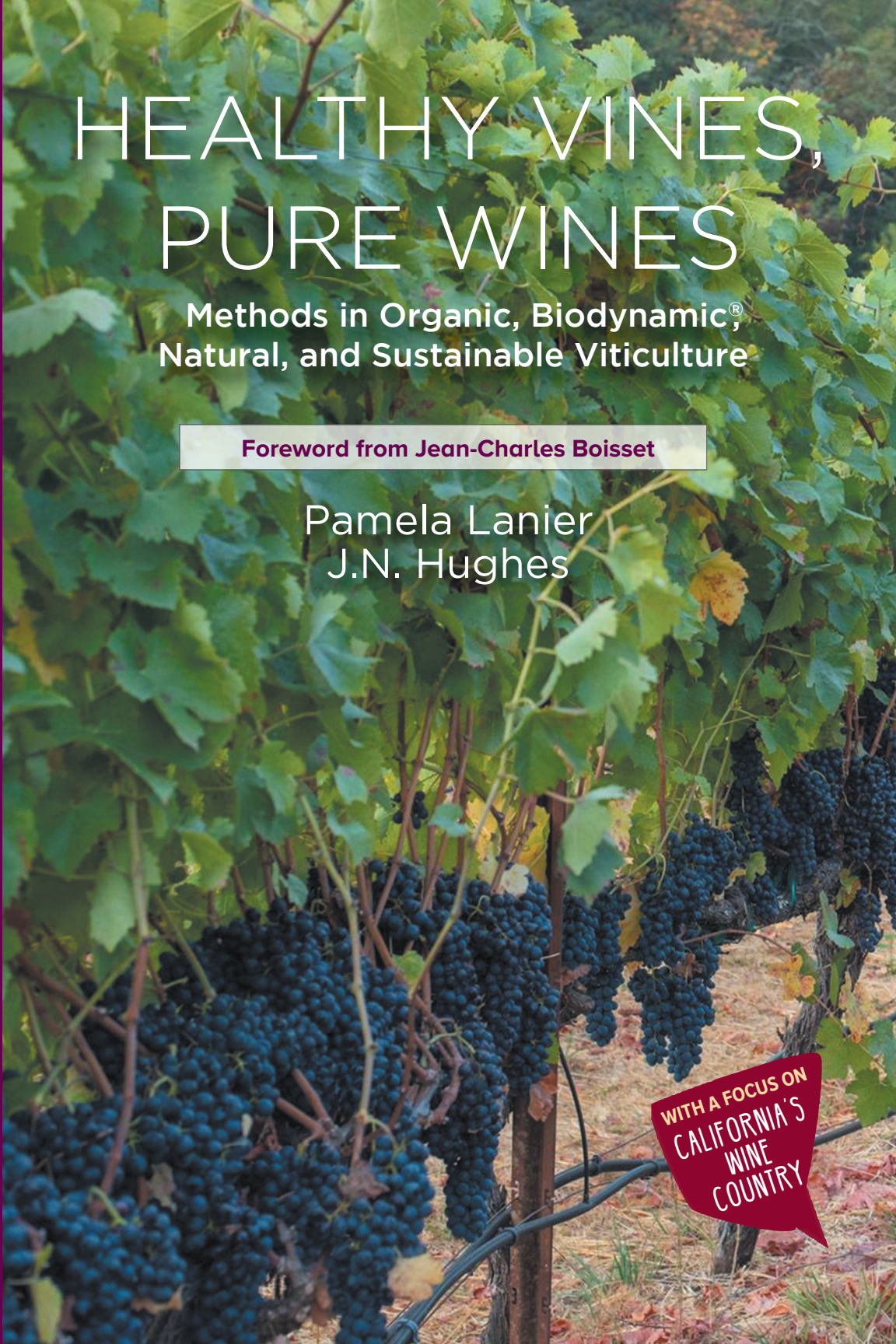
HEALTHY VINES, PURE WINES
Methods in Organic, Biodynamic®, Natural, and Sustainable Viticulture
Foreword from Jean-Charles Boisset
Pamela Lanier
J.N. Hughes
WITH A FOCUS ON CALIFORNIA'S WINE COUNTRY

Healthy Vines, Pure Wines

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Methods in Organic, Biodynamic®, Natural, and Sustainable Viticulture

Pamela Lanier and Jessica N. Hughes

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Healthy Vines, Pure Wines:
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For Amigo Bob Cantisano, who inspired so many through his commitment to organic farming and viticulture. This publication would not be what it is without his knowledge. We are so thankful we had the opportunity to meet you, Amigo.

I dedicate this book to the Sonoma Sustainable Tourism Observatory, and to Luna and all in her generation, in the hopes that this magnificent Creation they will inherit will sustain and delight her and generations to come.

—Pamela Lanier

I dedicate this book to my wonderful, supportive family, my mother Deborah, brother Jason, sister Jeanine, sweet old kitties, Kaila and Larka, and to my newest family member, the lively calico Meekla.

I also have to thank my co-author, Pamela, for bringing me onto this project, and for all I have been able to learn in writing this book. Thank you Pamela!

—Jessica Hughes

Description

Healthy Vines, Pure Wines serves as a guide, which derives its information from real-world sources to share green practices in sustainable viticulture in a practical way. Including a how-to on treating vineyard issues organically, a look at how climate change is affecting viticulture, and a special focus on women in the field, this handbook maintains a forward focus.

Also included are 16 case studies on successful organic, biodynamic, and sustainable wineries from the San Francisco North Bay Region, focusing on how what each has done can be replicated.

Keywords

green wine; organic viticulture; biodynamic®; sustainable farming; natural wine; Napa county; Sonoma county; wine country

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Acknowledgments

Writing this book has been a roller coaster amid fires, floods, power outages, and the entirety of 2020, but we persisted and have made it to the finish line. To say we got here without help would be selfish, foolish, and factually incorrect. We are so incredibly thankful for the many vineyardists, winemakers, and passionate owners who put their hearts and souls into their products and properties. They took time to meet with us, speak with us, and share what they do and why they love doing it. Thank you so much!

To those who have helped us in various capacities: Inga Vesik who served as our cover artist, Jenifer Bliss, who helped us stay in contact with her partner and collaborator, Amigo Bob Cantisano, and Amigo himself, who was perhaps the single greatest resource in the creation of this book. Thank you to Joe Papendick and Sophie Drucker, who contributed a full timeline of a year in a Biodynamic® vineyard, and Rickey Trombetta, who helped us to understand the marketing side of this field.

We also thank our editors whom we would have been lost without: Laurence Blanchette Hamel, Esther Woll, Lora Templeton, and Rochelle Craig. Thank you too, to the team at Business Expert Press, Scott Isenberg, Betsy Stringam, Charlene Kronstedt, and Sheri Dean. We are so grateful for all you have done. Thank you!

—Pamela & Jessica

Foreword by Jean-Charles Boisset

A few words I would use to describe Jean-Charles Boisset would be passion first—about life and about wine. A second word would be idealism. And a third would be hard worker… with a light heart.

—Pamela

I had the great fortune starting from birth to experience first-hand the full grape-to-wine cycle at my grandparents farm in Burgundy. This intimate connection and my grandparents' careful teaching was a methodology of learning through ancestral demonstration.

When I visited California I saw that people were willing to try new approaches to farming and winemaking, and really, that's what brought me to transplant my roots to Northern California. I was inspired to create quality-driven wines, with a lot of expression, affected by every part of the terroir. By finding that rhythm of nature—a principle of Biodynamic® farming—I was guided to create wines that demonstrate the difference in the wines produced.

Also, the opportunity to create wines from better soil—and the New World vineyards do have newer, better soil. People in the region picked up on these new ideas of having the "whole vineyard" dynamic and understood that the long term needs to be prioritized because great fruit makes great wine.

As a vintner and human being I grieve for Mother Nature. I say "thank you" to the bees. Most of all we need a steady path to respect the environment. Perhaps Organic should be the rule. As Voltaire said, "we must cultivate our garden".

Our bodies were created to eat seasonally, consume the foods where we live, and drink our local wines. That makes our system—our bodies—stronger, which in turn makes the whole world better.

My motto is taste it, feel it, sense it, and enjoy.

To your health, *Sante!*
Jean-Charles Boisset
Sonoma, January 2021

Introduction

The inspiration for this book came when we were establishing the Sonoma Sustainable Tourism Observatory for the International Network of Sustainable Tourism Observatories (INSTO), an affiliate of the United Nations World Tourism Organization (UNWTO).

As we looked at the economic and conservation drivers in the Sonoma and Napa regions, it became apparent that the two dominant industries are wine and tourism. The number of jobs, the amount of money they bring into the counties, and the amount of land devoted to these industries, are significant. Wine and tourism are closely aligned, with wine tasting and other related activities enticing visitors to come from near and far. Knowing that Napa and Sonoma are vying to be the nation's first 100 percent sustainable winegrowing region only added fuel to our energy for this book—a natural follow up from our last book on sustainable travel.

What we set out to do with this book was to get boots-on-the-ground information from real, practicing winemakers and organic leaders. At the first winery we visited, Martorana Family Winery in the Dry Creek Valley, we were given the name and contact information for "Amigo Bob" Cantisano, the consultant responsible for guiding Martorana through their conversion to organic farming. Over the next few months, we conducted a series of interviews with Amigo, who lives in the Sierra Nevada foothills near Grass Valley. From him, we received thorough and tested methods in sustainable viticulture, which became our chapters entitled "Farming Techniques and Practices" and "Organically Treating Common Vineyard Issues". He gave us a detailed history of his involvement in farming, in establishing California's strong organic tradition, and some of his specific experiences over his long career.

We interviewed Martorana in late August of 2017, and just over a month later, on October 8th, fire broke out in both Sonoma and Napa. Homes and wineries burned, evacuations were ordered, schools closed, and smoke filled the skies for weeks. 43 lives were lost. For all of us in the San Francisco North Bay, this conflagration snatched our attention

and disrupted our lives for months. That year, we thought the fire was a one-off disaster, like an earthquake. A year later, on November 8th, 2018, Northern California saw yet another fire, which this time razed the city of Paradise, CA to the ground, tragically taking with it eighty-five lives. Smoke filled the skies once more and we knew then that this may very well be the new normal. 2019 and 2020 saw immense fires as well, confirming that new normal. Climate change is real, and this is what it looks like.

We knew we needed a perspective on how climate change is affecting viticulture, and how winegrape growers can adapt to this warmer, climate. A whole book could be devoted to this subject, but we wanted to keep our focus on organic and sustainable viticulture and how to practice it. Some of our included properties, such as Matthiasson and Enterprise Vineyards, are already taking measures for the changing climate in their varietal choices, and Deerfield Ranch Winery was within the burn zone and shared their experience with us during the interview with proprietor PJ Rex.

The second half of the book is a series of case studies of various wineries and vineyards, each of whom practice sustainable, natural, organic, or Biodynamic® viticulture beginning with a series of outstanding women-led, natural wine producers. Examples from the SF North Bay follow, each of which is based on an in-person visit and interview conducted with the owner, winemaker, or vineyardist.

Following the case studies is a guide on how to make wine as a home winemaker and a terroir-focused look at one of Sonoma County's newer viticulture areas, the Petaluma Gap and the process for that AVA to be recognized. For definitions of terms used throughout the text, see the glossary after Petaluma Gap AVA.

This book is a concise and well-researched overview of the types of sustainable wines and how to nurture healthy vines, particularly in the Sonoma and Napa regions today. It includes the accounts of more than a dozen diverse voices and fascinating individuals—all of whom share a common love for the land, the grape, and the joy of bringing vibrant wines to life!

We hope you enjoy reading the case studies as much as we enjoyed preparing them.

CHAPTER 1

Standards and Certifications

For a bottle of wine to carry a sustainable label, all components of the process must meet the certification requirements, meaning there's a difference between organic wine and wine made from organic grapes.

California Certified Organic Farmers (CCOF) and United States Department of Agriculture (USDA) Organic:

California Certified Organic Farmers (CCOF) is a USDA-accredited organic certifying agency and trade association, located in Santa Cruz, California. Formed in 1973, CCOF was the first organic certification entity in the United States,[1] though it operated only in California until the USDA created its own organic certification.

Due to this decentralized approach, there was a lack of clarity about what *organic* meant from state to state. A movement grew to develop a national organic standard to help facilitate interstate marketing. In response, Congress passed the Organic Foods Production Act (OFPA) in 1990 to develop a national standard for organic food and fiber production. OFPA mandated that USDA develop and write regulations to explain the law to producers, handlers, and certifiers. After years of work, final rules were written and implemented in fall 2002.[2]

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[1] Biodynamic® Wines & Vines. n.d. "Biodynamic® Wines & Vines Exclusive, Insider Info on the Wines + Wineries." Biodynamic® Wines & Vines | bd.wine, https://bd.wine/certification

[2] Sustainable Agriculture Network. January 2007. "History of Organic Farming in the United States." *SARE*, https://sare.org/publications/transitioning-to-organic-production/history-of-organic-farming-in-the-united-states/

For wine to be sold as organic, both the growing of the grapes and their conversion to wine must be certified. This includes making sure grapes are grown without synthetic fertilizers and in a manner that protects the environment and preserves the soil. Other agricultural ingredients that go into the wine, such as yeast, also have to be certified organic. Any nonagricultural ingredients must be specifically allowed on the National List of Allowed and Prohibited, and can't exceed 5 percent of the total product. And while wine naturally produces some sulfur dioxide (sulfites), they can't be added to organic wine. Sulfites are commonly added to wines to stop the fermentation process, preserve the flavor profile, and keep the wine from oxygenating.

Wines that are sold as "made with organic grapes" have different requirements than organic wine. When a wine is labeled as being made with organic grapes, 100 percent of those grapes used must be certified organic. Yeast and any other agricultural ingredients aren't required to be organic, but have to be produced without excluded methods (like genetic engineering). As for nonagricultural ingredients, these have to be specifically allowed on the National List. Finally, sulfites may be added to wines that carry the "made with organic grapes" label, up to 100 parts per million.[3]

Organic certification is generally focused on prohibiting the use of nonsynthetic materials on plants and soil, while sustainable certification includes issues like energy use, waste management, water conservation, and human resources.

The Sonoma County certification program does include a prohibition of certain *red listed* pesticides and other materials, and a *yellow list* of discouraged but allowed materials.[4]

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[3] Miles McEvoy and National Organic Program Deputy Administrator. February 21, 2017. "Organic 101: Organic Wine." *www.usda.gov*, https://usda.gov/media/blog/2013/01/08/organic-101-organic-wine

[4] Sonoma County Winegrowers. 2020. "Certified Sustainable Wine | Sonoma Co Sustainability Program." *Sonoma County Winegrowers*, https://sonomawinegrape.org/growers/sustainability/

Demeter Biodynamic® Certification

Demeter USA is the only certifier for Biodynamic® farms and products in America. It is part of a worldwide organization, Demeter International, which was first formed in 1928 to advocate Biodynamic® agriculture and to certify Biodynamic® farms. Demeter remains the oldest ecological certification organization in the world, active in 50 countries around the globe.[5]

Two criteria distinguish it from other forms of organic farming[6]:

- The use of a complex system of herbal sprays and composting techniques, known as *preparations*
- The timing of the operations on the land, which is strictly regulated by the movements of the spheres

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[5] Demeter U.S.A. n.d. "Demeter Biodynamic® Certification—Demeter USA." www.demeter-usa.org, https://demeter-usa.org/certification/

[6] Morethanorganic. n.d. "Biodynamic® Viticulture." morethanorganic.com, https://morethanorganic.com/biodynamic-viticulture

LODI RULES for Sustainable Winegrowing:

LODI RULES began as a mission in 1992 to educate others and diminish the use of pesticides, eventually turning into a formal certification program with more than 1,000 certified vineyards to date. The LODI RULES program was launched in 2005 and is headquartered just south of Sacramento in one of the few American viticulture areas (AVA) with ancient vines that survived through the Prohibition era.

LODI RULES has six areas of focus: (1) business management, (2) human resource management, (3) ecosystem management, (4) soil management, (5) water management, and (6) pest management; and over 100 sustainability practices that are called *Standards*, which have been peer reviewed by scientists, academics, and environmental organizations. Annual verification is required.

Today three variations of those rules exist: LODI RULES, CALIFORNIA RULES, and a universal RULES seal. Each seal has the same requirements for certification; seal usage will differ based on where the winery or vineyard is located.

Regenerative Organic Certified (RGO)

Regenerative Organic Certified was established in 2017 by a group of farmers, business leaders, and experts in soil health, animal welfare, and social fairness collectively called the Regenerative Organic Alliance.

Their goal is to heal a broken system, repair a damaged planet, and empower farmers and consumers to create a better future through better farming.

By adopting regenerative organic practices on more farms around the world, they hope to create long-term solutions to some of the biggest issues of our time, including the climate crisis, factory farming, and fractured rural economies.

Sustainability Certifications

While organics mainly concerns a focus on products used, sustainability certifications are concerned with water and energy efficiency in the vineyard and winery. They vary greatly because of the environmental needs of differing regions and how organizations have decided to measure efficiency.

California Sustainable Winegrowing Alliance (CSWA) and Certified California Sustainable Vineyard and Winery (CCSW)

CSWA started as the Sustainable Winegrowing Program in 2001. Members of Wine Institute and the California Association of Winegrape Growers (CAWG) created the program to promote vineyards and winery practices that are sensitive to the environment, responsive to the needs and interests of society-at-large, and economically feasible to implement and maintain. CAWG is a public policy advocacy group of wine grape growers, representing more than 60 percent of the total annual grape crush. Together, the Wine Institute and CAWG developed the Code of

Sustainable Winegrowing Practices workbook as the basis for the Sustainable Winegrowing Program, providing a tool for vintners and growers to assess their practices and learn how to improve their overall sustainability. Wine Institute and CAWG formed the California Sustainable Winegrowing Alliance to assist in program implementation.

Several of the state's winegrowing regions and other organizations have sustainable and environmental certification programs, many of which provided the foundation for the statewide California Sustainable Winegrowing Program (CSWA), and all of which play an important role in the ever-expanding tapestry of the California wine community's efforts to produce high quality wine. California wine grape growers and vintners have multiple factors to consider when choosing the right certification program, and we encourage growers and vintners to consider all options available before choosing.

CCSW has eight years of recognition in the marketplace and was ranked as the most known sustainability certification program by 457 US wine trade in a recent trade survey (December 2016, Wine Opinions). CSWA expects that recognition to grow, as the program's growth continues to increase every year. In addition, CCSW is included in the domestic and international communications efforts of CSWA and Wine Institute, which has export marketing programs in 25 countries. The further the distance from California, the more important it becomes for wine regions and AVAs to identify as being under the California umbrella.

While CSWA advocates for the adoption of sustainable practices regardless of vineyards' and wineries' decision to pursue certification, CCSW can add credibility to sustainability claims. The new CCSW logo for wine labels indicates that both the winery is certified and 85 percent or more of the grapes are from certified vineyards. CSWA accepts Lodi Rules and SIP-Certified in the 85 percent rule for certified grapes because the programs also cover the 3 E's of sustainability and include comparable required practices, transparent standards, continuous improvement, and annual third-party audits.[7]

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[7] The California Sustainable Winegrowing Alliance (CSWA). n.d. "California Sustainable Winegrowing Alliance." www.sustainablewinegrowing.org, https://sustainablewinegrowing.org

Napa Green

According to their website, Napa Green Land is currently an umbrella program that recognizes growers with validated environmental compliance and verified Farm Plans as meeting our standards for watershed stewardship. These vineyard owners and managers develop custom, whole-property Farm Plans to:

- Prevent erosion and sediment runoff
- Reduce and eliminate potentially harmful inputs
- Conserve water resources through efficient irrigation and frost protection
- Protect and restore riparian habitat
- Contribute to a healthy and thriving Napa River watershed

Napa Green also certifies wineries, with a separate label.[8]

Sonoma Sustainable

In 2014, Sonoma County's Winegrowers made a bold commitment: to become the most sustainable winegrowing region in the world, and to that end they created Sonoma Sustainable, a label supporting a countywide effort to reach 100 percent sustainability in Sonoma County. The first phase of this effort focuses on helping winegrowers assess their sustainable vineyard practices through trainings and educational sessions. Over 200 best management practices are taken into account, such as land use, canopy management, energy efficiency, water quality assessments, carbon emissions. Vineyard acres are then assessed, and phase two involves the Sonoma County Winegrowers working with vineyard owners to achieve certification.

Land-Smart and Fish Friendly

Fish Friendly Farming, run by the California Land Stewardship Institute, was the sole path to Napa Green Land certification. The inclusion of LandSmart®

[8] Napa Green. n.d. "Napa Green—Caring for Nature Elevates Quality & Experience." *Napa Green*, https://napagreen.org

is intended to provide landowners with an additional certification option, with the goal of increasing the overall Napa Green acreage in Napa County and helping land owners become certified more quickly.[9]

Salmon-Safe

Focused on areas with fragile riparian areas, Salmon-Safe works with West Coast farmers, viticulturists, developers, and other environmentally innovative landowners to reduce watershed impacts through rigorous third-party verified certification. In particular, rainwater runoff, long-term soil conservation and a "whole farm," approach which includes nonvineyard crops and any noncropped areas, all aimed to support salmon populations. Most recently, Salmon-Safe and Demeter have harmonized standards so that West Coast vineyards that achieve Biodynamic® certification also earn Salmon-Safe certification.[10]

SIP Certified (Sustainability in Practice)

SIP Certified is a rigorous sustainable vineyard, winery, and wine certification with strict, non-negotiable standards based on science and expert input, independent verification, transparency, and absence of conflict

[9] Patsy McGaughy. June 23, 2016. "LandSmart® Program Offers Additional Path to Napa Green Land Certification." napavintners.com, https://napavintners.com/press/press_release_detail.asp?ID_News=3621812

[10] Salmon-Safe Inc. n.d. "Salmon-Safe Protects Rivers, Native Salmon and Watersheds in the Pacific Northwest." Salmon-Safe, https://salmonsafe.org

of interest. Certification addresses the 3 Ps of Sustainability—People, Planet, Prosperity—ensuring that both natural and human resources are protected. The rules, called Standards, require a measurable, holistic set of practices addressing habitat, water, energy, soil, recycling, air quality, packaging, pest management, social equity, and business management. Participants document over 50 requirements and implement practices to achieve 75 percent of the total available points. Practices are verified through independent records and on-site inspections, and receive final approval from an independent advisory board.

SIP Certified launched its pilot program in 2008 with 3,700 acres of vines between Monterey and Santa Barbara counties. Today, there are 43,600 vineyard acres in California and Michigan, two wineries and more than 43 million bottles of wine that have been SIP Certified. Consumers around the world can now find a wide array of sustainably produced wines to fit their needs, budgets and stylistic preferences.[11]

On Label Clarity

Different wineries and vineyards featured in this book have chosen to pursue various standards in line with their own personal goals. For instance, there is a distinction between Certified Organic Wine, Certified Organic Grapes, and Farmed Organically but not certified, each of which tells the consumer how the grapes are grown and how the wine is made.

Under the USDA National Organic Program, sulfites are classified as a synthetic food additive and therefore are not allowed in organic wine. Because of this, many winemakers do not pursue an organic wine certification as they cannot guarantee a quality final product without the addition of sulfites. Instead, many have chosen to farm their grapes organically and use certified organic grapes in their winemaking.

Some have chosen to farm organically or Biodynamically but not go through the certification process with reasons behind that choice as varied as the winemakers themselves.

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[11] SIP Certified .n.d. "Sustainable Vineyards, Wineries and Wines | SIP Certified." www.sipcertified.org, https://sipcertified.org

Operating in the organic movement for more than 40 years, *Amigo Bob* Cantisano has become *the* name in the field. In conducting research and winery visits for this book, we discovered that Amigo Bob was instrumental in transitioning many of the organic vineyards in the Napa/Sonoma area. We spoke with Amigo Bob at length about the early organic movement in California, learned his history, and got details on organic farming methods currently in practice. Amigo Bob has been an invaluable resource for writing this book.

CHAPTER 2

Profiles in Sustainable Viticulture: "Amigo Bob" Cantisano

Amigo Bob is a ninth generation Spanish Californian, related to José Joaquín Moraga, a founder of San Francisco. Amigo learned to garden from his Spanish grandmother, without pesticides, organic gardening before organic farming had entered the public consciousness. In his teens and twenties, he was broke and living in communes teaching gardening for food to other residents. During that time, his girlfriend nicknamed him *Amigo*, and the name stuck.

Amigo got his start in the green movement, when he and some friends started a natural foods buying club called "We The People Natural Foods Cooperative". They were some of the first natural food suppliers in California.

In the mid-70s he received an opportunity to get into the farming industry with 6 acres of vegetables, including 1 to 1.5 acres of table grapes. The land had long been conventionally farmed with chemicals and the effects of such farming on the land were evident to Amigo. The soil was dry and depleted of nutrients and the plants struggled. Stephen Pavich of Pavich Farms, an organic leader in the 70s and a friend of Amigo's, helped him transition to organic farming. Stephen, at the time, operated the largest-scale organic farm in California of around 700 acres. Through trial and error, Amigo found his footing as an organic farmer, and when he couldn't find the seeds and tools he needed to run an organic farm, he turned his barn into an organic supply store. Soon Amigo Bob was offering advice and supplies to other farmers in the region as more and more began to notice the change conventional farming brought on the land.

Simultaneously, a burgeoning demand for organic food from consumers made organic farming all the more attractive, pushing some who were on the fence to begin looking at transition.

In the late 70s, he had begun consulting on organic farming for small growers, but it wasn't until the mid-80s that he received his first big contract, converting Fetzer's 1,000 acres of vineyard to organic. Because Amigo's approach was to counter the conventional practice at the time, Fetzer's vineyard manager was against the transition. With the backing of Fetzer's owners, Amigo successfully converted the massive vineyard to organic farming, though not without any losses or trouble.

Because organic farming at the time was new and little was written on how to be successful, as issues sprung up, creative solutions had to be found. Many such solutions are in this book in the chapter *Organically Treating Common Vineyard Issues*.

Inspired by Fetzer and what they had done, Frog's Leap Winery was the next big property to hire Amigo for his organic expertise. On his first visit to Frog's Leap, Amigo discussed his views on organic farming. "He talked about the soul of soil, how it's alive with fungus and bacteria; how it will live and be healthy if we feed it properly," said John Williams, the owner and founder of Frog's Leap. He became Amigo Bob's first client in Napa Valley and the valley's first wine-grape farmer committed to organic methods.

What John says gets to the heart of Amigo's organic philosophy. For Amigo, being organic is about building healthy soil through the use of cover crops, compost, and encouraging biodiversity. The result is healthy plants that naturally resist disease and produce flavorful grapes that express the local terroir. Amigo doesn't believe in transitioning to organic because it's a selling point or a label winemakers can slap on their bottles. He says it's worth doing *because* you get better grapes. Most importantly, it's better for the land, the plants, and the people who live and work in the wine country.

John wanted not just his property, but also the growers who supplied some of his grapes to make the organic transition. He worked with Amigo to orchestrate those transitions as well.

As Amigo became more well-known and his name tied up with the organic movement, professors began inviting him to speak. He co-coined

the term *sustainable agriculture* and was involved in the early efforts to certify organic farms and products, helping to found California Certified Organic Farmers (CCOF). In 1981, he helped organize the first EcoFarm Conference, a conference that continues today and is coming up on a 40-year anniversary at the time of this publication. He continued his involvement in the planning process for subsequent years of EcoFarm's Conference.

He founded his organic consultant organization, Organic Ag Advisors, in 1988. As it turned out, the timing for this organization was very good as chemical use in farming came under scrutiny in 1989 after *Alar Sunday*. Alar was a chemical used in apple farming (Huffpost has an interesting article detailing this scandal, listed in the appendix of this book). A year later, Amigo sold his organic supply company, Peaceful Valley Farm Supply, to devote more time to Organic Ag Advisors.

Amigo's work now is divided between consulting and the organization he began in 2003, the Felix Gillet Institute (FGI). The goal of the Felix Gillet Institute is to discover, identify, preserve, and propagate varieties of fruit and nut trees that were planted in the early days of the gold rush and then abandoned and left to their own devices. Trees that have withstood time and the elements to continue to thrive in the mining camps, farms, homesteads, and towns of the Sierra Nevadas. True permaculture plants, these 125+ year survivors show great resistance to harsh weather, drought, insect and disease attack, and often produce remarkable, extremely flavorful crops with little or no human assistance. By cataloging these hearty varietals and propagating them for sale, the hope is for better, more resistant trees to find their way into the mainstream.

Advice From Amigo, Organic Leader

For this book, we met Amigo through Organic Ag Advisors, as he assisted many of the properties in this book in their transition to organic farming.

The goal of Organic Ag Advisors is to move farms, and farming as a whole, toward organic, without sacrificing livelihood or taking unnecessary risks. Conversion always carries some risk, so Amigo prefers vineyards to be transitioned on a smaller scale to start with, in case something goes wrong. By transitioning about 10 percent of the

planted acres to organic to start, Amigo can demonstrate with that year's crop the quality difference between organic and conventional results.

Amigo strongly believes education and farmer knowledge is where organic truly shines. In organic farming, a farmer is still treating issues as they crop up, still applying amendments to the soil (in the form of compost rather than fertilizer), and still dealing with whatever the weather of that year throws at them. Many new farmers or owners have to learn the ins-and-outs of viticulture on the job, and when they encounter a problem, it's easier to ask their supplier what to use to treat the issue, often leading them to use conventional, chemical treatments.

Conventional treatments can create a runaway treadmill effect, that is, a positive feedback loop, where the farmer has to apply more and more treatments to alleviate those negative effects. Each conventional application can have side effects. Using chemical fertilizer depletes the soil of nutrients, degrades organic soil matter, and alters the biological composition. Additional nutrients then have to be applied to remediate. Depleted soil doesn't drain water as well as rich, healthy soil, so water pools on or near the surface, which drives the root systems of the vines to stay shallow. Shallow roots are more susceptible to insect and vermin attacks, which can distress vines, making them more vulnerable to disease and forcing them to require more frequent irrigation.

Organic Farming Saves a Struggling Vineyard

Amigo aims to teach farmers how to work in a closed system.

He told us about a large and well-known Napa Valley Vineyard he had worked with some time ago. They had been farming conventionally, and the vineyard was *addicted* to chemicals. To keep the vines producing, the vineyard manager had to fertilize 3 to 4 times a month because the soil was so depleted. They had previously employed two different consultants to try to get the vineyard back to health, but they continued to operate under the old way of thinking, to annihilate anything that came into the vineyard. Animals, insects, and weeds would be killed before they had a chance to do damage, and the vines remained on life support.

Transition began from the ground up, with soil ecology and an emphasis on biodiversity, exactly the opposite of the *destroy all intruders* approach previously taken. They started by encouraging the soil's natural fertility through increasing diversity, helping the soil to work within the system as it once did. Slowly, they worked their way to create a new, closed system that no longer required constant outside inputs to produce fruit, while increasing the quality of the grapes and greatly increasing the value and quality of the wine.

Amigo learned how to farm organically from a variety of sources. He started by picking the brains of organic leaders and longtime farmers, those who remembered the old ways of farming before chemicals became the norm. He learned much from trial and error. Sometimes things worked, sometimes they didn't. He read agriculture books from the 20s and 30s, in particular, *Green Manuring: Principles and Practice* (1922) by A. J. Pieters and *Soils & Men: a Yearbook of Agriculture 1938* put out by the United States Department of Agriculture.

Green Farming in Practice and How to Make the Change

To succeed in transitioning from conventional farming to organic or sustainable farming, the owners and managers have to be invested in and driven to change. They have to want, for any variety of reasons, to do things differently.

When Amigo starts with a vineyard, his first step is to find the root of the problem: neglect or overattention. Neglected soil is easier to transition, it may be a bit depleted but vines do well in poor soil and soil is easily remediated with the application of compost and other specific amendments.

Conventional overattention is characterized by high usage of fertilizers, water, and chemical additives. These vineyards can be difficult to transition in part because the soil is soaked with chemicals. Populations of beneficial insects, fungi, and bacteria are decimated, and vines are often in very poor condition. Amigo has identified three main subgroups on the overattention side based on a simple metric: how many products are currently used.

- Minimalists (~10 products)
- Moderates (11–25 products)
- Intensivists (25+ products)

All can make the switch to organic farming, though Amigo notes that the Intensivists can have the most trouble making the transition as there is a psychological reliance on products and inputs such as fertilizers and *-cides* (herbicides, fungicides, pesticides, insecticides), and a more depleted system overall.

For instance, in 1996, John Williams made a purchase of a long-time conventionally farmed vineyard for his property Frogs' Leap. The vines present on that property were nearly dead from Phylloxera because glyphosate use had been so excessive. His first step to bring the the vineyard back to life was remove the old vines and plant new ones. Over the lifetime of that vineyard before John acquired it, the field had been replanted three times over 30 years due to illness and poor soil health. Since replanting and being organically farmed, those vines replanted 25 years ago continue today, as healthy as ever.

Amigo prefers to start his transitions with a smaller section, keep the changes simple, and measure the difference. He usually starts with about 10 percent of the planted acres, in case something goes wrong the whole harvest won't be ruined. Doing so also gives a comparison between the quality of the vines and grapes between what they were doing and where they are going. It also helps to wean owners and managers off the mentality of conventional farming, slowly. Vineyard managers in particular often have serious concerns with transition, which they are pushed into doing by owners who may not be very involved with what happens in the field.

It takes 3 years from the last chemical input date to make the official transition to certified organic, but Amigo notes that many chemicals take much longer than that to decompose. For instance, a study by Cornell University found that Roundup®, specifically, can take anywhere from 1 to 174 days for half the product to break down in soil, meaning it takes about a year at maximum to fully break down.[1] Compare that to DDT

[1] Hessong, A. 2020. "How Long Does Roundup Stay in Soil? | Hunker." *Hunker*, https://hunker.com/12216862/how-long-does-roundup-stay-in-soil

(Dichlorodiphenyltrichloroethane), which can still be found in the soil 50 years after it was outlawed.

Conscientious farmers can help increase the breakdown of chemicals through their practices. Certain cover crops, hemp for instance, can sequester chemicals, removing them from the soil and forcing them to decompose faster.

When brought in on a project, Amigo usually starts with a soil analysis. He takes approximately 10 samples per section of the vineyard, from various positions within each block of the vineyard. He uses a shovel or soil probe, goes about 12 inches deep, filling a cup with dirt for each sample. Then all the samples from that block are mixed together and each block's soil is chemically analyzed. Results will be unique for that section on that particular day, but it provides an excellent starting point. Results of the analysis tell Amigo what nutritional deficiencies or chemical abundances are present, which informs what soil amendments and cover crops to use for the first year. A geologic or soil map may be referenced as well to look at what type of soil is present and where it may have originated. For new vineyards, 12 to 36 subsoil samples, in addition to the topsoil samples, are usually taken before planting.

The soil analysis informs which remediations should be employed in the first year or two. Other changes will be made to address the known vineyard problems and to correct for any issues that crop up. Solutions are implemented as needed, as opposed to preemptively addressing every potential problem that could happen.

Some labs are doing pioneering soil microbiome DNA research to get a clear and precise look at the soil. Biome Makers is one company focused on viticulture, while Trace Genomics works on the general soil biology for multiple crops. Both are located in San Francisco.

Compost, soil amendments, cover crops, and beneficial insect habitats will be implemented for every property, though particular cover crop choices may differ. Irrigation is reduced or eliminated, requiring closer monitoring and management but making for more potent, high quality grapes.

Leaf and petiole analyses are done to track vine status during the transition and see how the changes affect them. Corrective action may be taken if needed for that particular season. For instance, nutrients may be added to the irrigation lines or foliar may be applied.

Amigo usually stays involved for about two or three years, although he has worked with certain clients for nearly 30 years.

Amigo's 3-Tiered Approach to Vineyard Management

Water management: Keep water use low. Dry farming is preferred if the climate, soil type, and rootstock allow.

Weed management: With machine tilling, botanical herbicide, permanent ground cover, or with grazing animals, such as sheep or goats.

Pest management: Encourage biodiversity by providing habitats for beneficial insects, predatory birds, and so on. Establishing hedgerows and planting insectary plants will help draw in and maintain populations; also, consider what encourages common vineyard infestations and alter management to keep those pests from thriving.

Climate and Temperature

Sometimes things like weather and climate take things out of your control. For instance, if temperatures reach 102 or higher while grapes are ripening, the grapes will be damaged and won't be able to create great wine.

Due to climate change, the ideal location to plant certain varietals may be changing. Amigo notes a vineyard he knows in Carneros, a cool climate, where they planted Zinfandel, a varietal known for warmer climates. Although this seems counterintuitive at this time, the hypothesis is that in 20 to 30 years, it may be just the right climate for Zins there, although this is still very much an experiment.

Amigo's Big Tip

Empower your labor. Vineyard workers see the vines every day. If taught what to look for, they can become the most valuable part of a vineyard operation. Additionally, if possible, employ a small year-round staff for the fields.
Amigo notes particular success with the following method:

Create pages, note cards, or even just use yellow legal pads and distribute them to workers. Each card/page/pad is for a particular row

of vines. As workers move through the row doing regular maintenance, they can make note of anything out of the ordinary and write down what they see and which plant it was (For instance: "number 23: bit of mildew on the stem") and that localized issue can be treated before it becomes widespread. Cards or pages can be filed at the end of the row so the vineyard manager can walk just the ends while still getting a clear picture of what is occurring deep in the field with each individual plant.

To incentivize vineyard workers to look closer, not just for issues but any changes out of the ordinary, consider offering a bonus when something is found.

Amigo Bob in France

In the South of France, the largest collection of grape varietals is grown, just a stone's throw from the Mediterranean. The water there is salty, making the grapes themselves salty. Despite the mediocre grape product, wine was still made from them. Amigo learned two important lessons from that experience:

1. Wine is considered such a valuable commodity, growers will make it from any wine grapes, regardless of quality.
2. Vines can grow just about anywhere; they aren't picky.

Why Invest in the Land Rather Than the Grapes?

Farmers can be the best stewards of the earth by leaning on their close working relationship with it. By keeping the land healthy, farmers will be rewarded in the long term. Vines will live longer lives, without the need to replace them frequently from illness or poor general health. Replacing vines is expensive and forces the vineyard to start from scratch. Farm hands will enjoy better health and will be able to stick around and tend to the land longer, keeping the education and knowledge they have gained with the vineyard.

With a system in balance, grape vines won't be the only species to thrive. Animals, other plants, stream and river systems, and the soil

microbiome, which supports the vine's roots, will all benefit from maintaining the vineyard ecosystem.

Amigo Bob on Terroir

"Terrior is described as some characteristic of the land that can be coaxed out of the grape into the wine". In Amigo's experience, it's more about the talents of a winemaker. For instance, he recalled two neighboring vineyards that began at the same starting place. Same dirt, same vines, same approach to farming. As for the resulting wines, one sold bottles for $60, the other $200. Due to the winemaker, a vastly different product was produced. One wine tasted much better.

Amigo Bob on "Sustainable"

Many vineyards rely on vineyard management companies, not all of which prioritize long-term health over immediate results or the bottom line. The average cost of such a service is $7,500 per acre, while high end management companies can run up to $40,000 per acre (Amigo calls this "The Napa Valley Discount"). They make more money by using more chemicals because short term costs are lower and they aren't on the hook for the long term health of the vineyard. In Napa, there is just one farm supply store to cater to the owners and managers who tend their vineyards themselves, which is not encouraging.

Much of the region's viticulture is treated as an investment, and losses can be written off in taxes. Property in wine country is becoming prohibitively expensive, inviting long-distance investors rather than dedicated farmers. Many investors won't visit their vineyard more than once or twice a year, and even fewer take a hands-on, conscientious approach to farming. As Napa and Sonoma push toward becoming 100 percent sustainable, some of those investors are doing the barest minimum to meet that sustainability requirement, without thinking deeply about why some actions are preferred over others.

Having been a part of the early organic movement, Amigo has strong opinions on recent efforts, on what being "green" *should* mean, and how

businesses are taking advantage of the word *sustainable* without putting in a real effort.

Greenwashing is a deliberate misleading of consumers to make them believe a business is greener than it is. Specifically, the terms *green* and *sustainable* are not particularly well defined. While organic and Biodynamic® have very strict requirements, especially in regards to the usage of chemicals and sprays, many other certifications still allow chemicals like glyphosate to be used regularly. For smaller, local, sustainable certifications, some have justified the use of sprays like Roundup® because it has a much smaller carbon footprint than tilling, which requires gas to drive tractors up and down the rows. Amigo notes that this view is surprisingly narrow, as it doesn't factor in the carbon cost of manufacturing and transporting the chemical spray, nor the long-term carbon cost of frequently replanting vines or the vineyard as a whole due to prolonged chemical use.

"Sustainable should be whole, long-term health of a system," says Amigo. And when asked about various efforts regions are making to go 100 percent sustainable, he asks in return, "Is it real change or does it just want to look like it is?"

CHAPTER 3

Farming Techniques and Practices

Included in this chapter are the methods viticulturists use to practice green farming along with the explanation of why they are used.

Beneficial Insects

Insects can support the vineyard by being pollinators, hunters, and bioturbators. Pollinators, like honeybees, help flowers fruit and breed. Hunters are insects that consume pests as their food source, like ladybugs eating aphids. Bioturbators are bugs like worms that help till the soil, break down detritus, and transport nutrients from the surface of the soil to the root systems.

These insects are supported by planting cover crops that feed or house them, supporting biodiversity, and, perhaps most importantly, avoiding pesticide use. Pesticides, even those that say they don't target beneficial insects, affect animals and people where these are sprayed. To keep insect populations healthy, pesticide use is discouraged (and not allowed with certain certifications).

Cover Crops and Living Mulch

Cover crops, also called green manure, are beneficial plants that are planted between rows for a specific purpose. Cover crops can be used to help fix nitrogen or remove excess nitrogen from the soil, keep water from pooling on the surface, decrease runoff and prevent erosion, suppress weeds, and many more specific purposes.

Cover crop choice will be dependent upon the variety of vines and soil composition present in that location. For instance, if an area is particularly dry, cover crops that use little water and retain soil moisture

are helpful, whereas if an area is particularly wet, crops that are vigorous growers improve competition and force the vines to work harder, producing better grapes. Striking the right balance for the land being farmed is key for cover crop use.

Timeline: Plant in September through November to grow over winter and then till, mow, or graze in the spring.

The University of California, Davis, maintains a database of common cover crops used in farming, which was created in conjunction with Amigo Bob, California's sustainable farming expert. To find it, google "cover crop database" or go to https://ucanr.edu/sites/asi/db/covercrops.cfm

In-House Composting

In an effort to get away from commercial fertilizers, many vineyards with wineries are composting their own green waste and directing those nutrients back into the soil. This creates a closed-circuit, reducing the need for inputs like fertilizer or chemical additives.

Vineyard waste, especially grape pomace, is excellent for compost. Grape pomace is the primary byproduct from vineyards and wineries and it is high in proteins that fuel the composting process. This kind of *waste* possesses moderate acid content and has a low carbon-nitrogen ratio, great for composting.

Irrigation Methods

Wine grapes tend to be water-efficient crops that don't require very much additional water. In Sonoma County, grape irrigation uses only 6 to 18 inches per year, much of which is recycled water. Tertiary-treated water from the City of Santa Rosa is being used now for watering vineyards in St. Helena, South Sonoma, and Petaluma.

Technology

Various new inventions aid in vineyard management, allowing for more precise weather monitoring and better application of water on an as-needed basis. Such technologies include:

Weather stations: Modern stations not only track weather data, but also act as information hubs providing key data on water pressure, well depth and flow rates.

Soil moisture probes and sap flow monitors: Probes tell growers exactly how much moisture is in the ground and sap flow monitors deliver real time data about a vine's specific water needs. Together, these tools show how much water a vine is using, what depth it is drawing water from, and help the grower determine precisely when to apply water and what amount is required.

A new version of the sap flow monitor (still in testing at the time of this publication) measures not only the amount, but also the speed of water traveling through a plant, in the form of sap. It sends the information in real-time, to a device, allowing digital records to be created and ensuring only as much water as is needed is administered via irrigation.

Studies have shown that of California's total water use, agriculture makes up approximately 80 percent.[1] If sap flow monitors are implemented throughout the state and water is dispensed only as-needed, Amigo Bob estimates the state could cut agricultural water usage by millions, perhaps billions, of gallons.

Pressure chambers: Vine leaves are measured with pressure chambers that track the water potential of each leaf and porometers that measure the opening and closing of the leaf's tiny pores. This information is most often used to predict the need for water, but also helps growers understand how the vine is responding to the current application of water and any environmental stresses, which is immensely valuable for precisely reducing water use while maintaining vigor and quality.

Dryland or Dry-Farming

Cultivating crops without irrigation in regions of limited moisture (typically less than 20 inches of precipitation annually) is dry-farming. Dry-farming requires the planting of vines with deep root systems and

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[1] Natural Resources Defense Council and Pacific Institute. June 2014. "Agricultural Water Conservation and Efficiency Potential in California." *nrdc.org/issues/water*, https://nrdc.org/sites/default/files/ca-water-supply-solutions-ag-efficiency-IB.pdf

soils that trap moisture, which makes it easier to plan for before a vineyard is planted, although it is also possible to implement with mature, established vines as long as it's done incrementally. The success of dry-farming relies upon efficient storage of the limited moisture in the soil, and the selection of vines and cover crops that make the best use of this moisture.[2] Note: Typically, cover crops are tilled in dry-farmed vineyards.

Dry-farming can save 16,000 to 25,000 gallons of water per acre annually by conservative estimates. In California, rain doesn't usually fall in the summer months and rainfall levels can vary wildly year to year, making dry-farming more of a risk than in locations that receive year-round rainfall. That water stress, however, can produce very flavorful grapes.

Frost Protection

Frost is a danger in the early spring. The emerging buds that form the first leaves are very susceptible to freezing. If they are killed by frost, they will not bear fruit that year. In the Napa/Sonoma area, bud break occurs sometime in March to April and the risk of frost usually ends around May 10th.

Historically, grape growers have relied almost exclusively on water to protect tender young vine tissue from being damaged by spring frost, by setting up a grid of sprinklers set on top of pipes that cover the entire vineyard. The water generates a minute amount of heat at the point of freezing; so, as long as water is continuously applied and continues to freeze, the plant will stay just above 32 degrees. If the water stops before the ambient temperature is above freezing, the buds will freeze. This method also requires access to a lot of water, usually requiring a pond, lake, or wells to draw from, and isn't ideal in periods of drought.[3]

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[2] The Editors of Encyclopedia Britannica. April 8, 2019. "Dry Farming." In *Encyclopædia Britannica*, https://britannica.com/topic/dry-farming

[3] Clay, M.H. March 6, 2012. "How Does a Vineyard Actually Work?" *sonomavineyardland.com*, https://sonomavineyardland.com/how-does-a-vineyard-actually-work/

Today, many growers are converting from sprinklers to wind machines for frost protection. Large vineyard fans that disturb the cold air that has settled near the ground, aim to mix it with the warmer air above (heat rises after all). These fans are effective down to about 28 to 29 degrees Fahrenheit, but below this temperature, there is no warmer air to mix. The other major drawback is that they are incredibly noisy and therefore not very popular among neighbors, who claim they sound like a 747 plane parked and running just down the road.

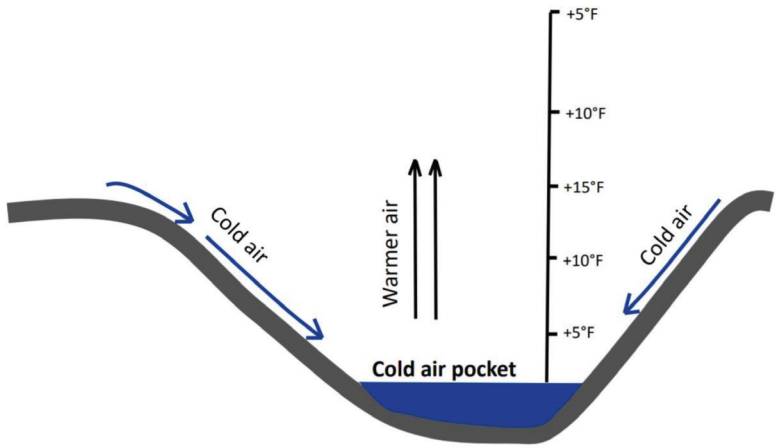

Figure 3.1 Cold air movement—Justin Scheiner, PhD, Assistant Professor and Extension Viticulture Specialist; Department of Horticultural Sciences

Wherever possible, cold air drainage is included in vineyard plans as a frost protection measure. Cold air drainage is the natural movement of cold air down gradient, where it will pool. With planning, vineyard geography can include natural or built geography such as creeks and valleys to move cold air away from susceptible vines.

Sprays

A variety of sprays are used to assist farmers, especially in dealing with recurring problems such as mildew. Sulfur, oil, and newer biological controls are usually sprayed once every few weeks from early in the growing season through fruiting. Bacillus thuringiensis (Bt) spray is comprised of a natural occurring, soil-borne bacteria consisting of a spore and a

protein crystal within the spore. BT spray is not toxic to humans or other mammals but is toxic to certain insects when ingested. Nitrogen-rich fertilizers are also commonly sprayed, though many sustainable growers are now aiming to forgo fertilizer use. Nutrients can be sprayed along with most treatment sprays, directly assisting the depleted vines.

CHAPTER 4

Organically Treating Common Vineyard Issues

This chapter lists some common vineyard issues and outlines the recommended organic treatments. The issues are listed in order of prevalence, with the most common issues listed first.

Weed Control

The most common conventional method for controlling weeds in the vineyard is to use the controversial herbicide product, Roundup®. Roundup® and other herbicide sprays are inexpensive and easy to use, but it has been linked to illness in humans and can also kill beneficial plants, fungi, and insects. Studies by the International Agency for Research on Cancer (IARC) determined in 2015 that the active ingredient in Roundup®, glyphosate, is a carcinogen and linked it to Non-Hodgkin's Lymphoma.[1]

The most common organic method for weed management is tilling or mowing the weeds growing beneath plants and along rows. Of those, mowing has a lower impact on hill slopes than tilling, as tilling can loosen the topsoil to be washed away by rain, however, both options involve higher upfront costs than chemical sprays in terms of time and labor.

Other organic methods of weed control include planting permanent groundcover, propane flamers, raising or renting grazers such as goats or sheep, and manually taking them out with weed whackers, trowels, and shovels.

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[1] International Agency for Research on Cancer. 2017. *Some Organophosphate Insecticides and Herbicides*. International Agency For Research On Cancer.

Powdery Mildew (Uncinula Necator)

This is potentially the most devastating disease found in California grape production. Powdery mildew prefers damp, shaded leaves and canes, and cooler climates, but will grow in hot climates and full sun. This issue is especially common in coastal vineyards, like Sonoma's North Coast, but can occur anywhere (and does). It occurs with less severity in hot, dry areas, like California's Central Valley, but is ever-present in any vineyard.

Amigo Bob has many measures that he uses to prevent and treat powdery mildew. Changing the trellis shape, the spacing of the vines, and even the directional orientation of the vine rows can reduce the occurrence of powdery mildew.

Planting & trellis design: the goal with planting is to maximize sun exposure and air circulation. The current trend is for higher density planting, but for areas with powdery mildew issues, vines should be planted slightly further apart.

Rows can be angled to maximize sunlight exposure, which can minimize dampness and mildew growth and trellis design and management should keep the vine from shading itself. For vigorous growing vines, the trellis should be expanded, allowing more space between canes and plants.

Amigo's Example

The common "California Sprawl" trellis system was expanded by adding two additional horizontal wires and two vertical wires in a "V" shape to allow more light and air, and offers better spray coverage. Spray coverage is important to increase the effectiveness of organic and conventional sprays.

Reducing vigor is essential; more leaves and stems can create cool shaded spots that help mildew thrive. Nitrogen fertilizer should be used only as absolutely needed because it causes excessive growth. Good irrigation management can stress the plant in a positive way, leading to less vigor and more potent, flavorful grapes, all while reducing mildew pressure.

Pruning back plants cuts foliage and makes fewer shade spots. This goes along with the practice of leaf clearing or removal, which involves removing laterals and leaves to keep grape clusters in the light.

Spraying oil: a better option for cooler coastal regions where mildew is a greater threat. Usually, vegetable oil or petroleum oil are sprayed. Oil stifles mildew spore germination and growth, but requires careful application in particularly hot areas as it can heat up and burn the plant under brighter, more direct sun.

The first spray should be done in the late fall or early winter, as that stifles the winter mold spores, which germinate in late winter and early spring. The second spray should be after pruning, usually around February or March. It is recommended not to spray if the temperature will be above 95°F within 48 hours after application. Look up local spraying rules as rules and regulations vary by region.

Sulfur application: an option that can be sprayed or applied as a dust. It's inexpensive and generally works if sprayed regularly. Spraying should occur approximately every two weeks until veraison. For wettable sulfur application, as with oil, temperatures cannot exceed 95°F within 48 hours after application.

Dusting sulfur may exacerbate mite problems, so for areas where mites are a serious problem, other options may be preferable, like oil. Some wineries won't accept grapes that are treated with sulfur after veraison.

Beneficial bacteria and biological controls: Serenade, Sonata, and Actinovate are just some of the organic, biological fungicides now available on the market. These are made by fermenting beneficial organisms like *Bacillus subtilis, Bacillus pumilus*, and *Treptomyces lydicus*. For instance, *Treptomyces lydicus* is a naturally occurring soil bacterium that was originally isolated from the roots of a linseed plant in England.

These kind of controls are gaining momentum as they are fully organic and lack the side effects common with sulfur and oil use. However, if disease pressure is very high, other more powerful products are utilized.

Whey: A cheese byproduct that can be used as a mildicide and fungicide when applied wet. Whey can be expensive to buy in the market, but if there's a strong dairy industry near the vineyard, it's worthwhile to explore a partnership.

Milk: Recent research out of Australia has identified milk as a potential replacement for synthetic fungicides and Sulphur in the control of powdery mildew. Far less expensive than whey, milk was found to increase the control of powdery mildew as the concentration increased.

The efficacy of milk tended to decrease as the fat content of the milk was reduced.[2]

Eutypa Dieback

Eutypa dieback, Botryosphaeria dieback, Esca, and Phomopsis dieback are all varieties of *trunk diseases* caused by different wood-infecting fungi. They are spread by airborne spores that can be released during pruning. Eutypa is the most common for grapevines in California.

Prepruning just after harvest and pruning again in February, leaving roughly 6 to 8 buds unpruned, reduces exposure time. Cuts made later in the season heal faster than those made early in the winter. The longer that the cut takes to heal the greater potential for infection by the fungus. Sap can protect open cuts from infection, as can biological agents. Pruners and shears should be sterilized after pruning an infected plant as the spores can be transferred from plant to plant. Pruning should never occur when it's raining.

Insects, Arachnids, and Infestations

Potentially harmful insects and organisms in the vineyard can include cutworms, nematodes, leafhoppers, beetles, borers, spiders, mites, fruit flies, moths, thrips, sharpshooters, and aphids. Of those, the most disastrous was once phylloxera, which nearly wiped out the world's wine industry in the mid-late 1800s and has returned every few decades in the west. Now, across California, insect infestations of leafhoppers, sharpshooters, mites, and mealy bugs are the biggest problems. Like most problems a vineyard can face, infestations are primarily climatical issues. These vine damaging bugs thrive in dry and dusty climates, causing widespread harm to vineyards.
A big picture approach to fighting infestations

- Encourage polyculture—the planting of different varieties of flowering plant species. Monocropping reduces the presence

[2] Crisp, P. 2004. "Sustainable Control of Grapevine Powdery Mildew (Uncinula Necator Schweinitz Burrill) in Vineyards in South Australia." *digital.library.adelaide.edu.au* http://hdl.handle.net/2440/59636

of beneficial organisms that help control pests and increases the risk of pest infestation.

- Invite birds, bats, spiders, and beneficial insects to curb pest populations
  - Purchasing insects can be expensive but may be worth it once habitats are established
- Encourage beneficial insects to stay and reproduce by providing habitat, insectaries, and by planting the right cover crops, hedgerows, borders, and trees
  - Plants should bloom in succession to keep nectar flowing and beneficial insect populations healthy
  - Avoid broad spectrum insecticides as they kill beneficial insects as well as the targeted pest
- Let the system do your work for you
  - Increase biodiversity—invite beneficial critters to the vineyard with specific cover crops, owl boxes, hawk perches, and so on. See the chapter on Tres Sabores for specific ideas on attracting local birds to the vineyard.
  - Maintain habitats—consider what plants and environments are native to the area. Riparian and oak savanna ecosystems are common in the Napa and Sonoma region and are naturally diverse

Amigo Bob on Infestation

Act with tolerance. Don't feel the need to destroy every bug that enters the vineyard, even the destructive ones. Monitor their populations and when/if they become a problem, then take action. If only one block or one section has issues, only treat that block or section. Try to avoid spraying the entire vineyard for a problem that may be localized. Resist the urge to shoot first and ask questions later.

Mites

Mites feed on grape leaves, reducing photosynthesis and resulting in economic losses in winegrapes due to a drop in grape yield and quality. Mites prefer hot plants, so warmer climates see outbreaks more frequently.

Dusty areas are also at increased risk, as dust can clog the pores of the plant, heating it up.

Oils are usually used to treat mite infestations, such as organic stylet oil. Biomite Organic Miticide is a botanical miticide also commonly used to control mite issues.

Releasing predatory mites when populations of the pest mite are low is a very effective biological control, however, not advised when pest populations are already high. Monitoring is key.

Downy Mildew

Downy mildew is a fungus, which will appear with lesions that are yellowish and oily or angular, yellow to reddish and brown and limited by the veins. Treat with wettable copper or liquid lime sulfur in the winter and early spring. Stylet oil, *Cueva Fungicide Concentrate, and Kocide* (a copper hydroxide bactericide/fungicide) can also be used to treat downy mildew.

Fan Leaf and Nematodes

A virus transmitted root-to-root, often by nematodes. Manage nematode populations before planting, and try to get nematode-resistant rootstalk if possible.

Shrimp shells encourage nematode-eating fungi that can curb nematode populations. Planting certain botanicals can keep them away, such as nemacidal biofumigant mustards which are toxic to nematodes but not toxic to other soil microbes or grapevines. Increasing organic matter in the soil is also recommended as that increases the nematode trapping fungi.

Leaf Roll

A virus spread by propagating new plants from infected vines. Either the plant has it or it doesn't, and though it can be managed, it cannot

be cured. Monitoring for and controlling mealybugs and soft scales is particularly important in vineyards with confirmed grape leafroll disease.

When planting new vines, buy Certified Leafroll-free Grapevine Stock. Otherwise, monitor for signs of the virus, such as leaf discoloration (red, violet, or yellow) with green veins and curling of the margins. Late season foliar feeding can partially compensate for virus infection.

CHAPTER 5

Climate Change Changes Wine

"What will be in the 2119 bottle?"

Dr. José Vouillamoz, geneticist and Deputy Director of DIVO Club de Vin, asked his audience at the 2019 Tasting Climate Change conference in Montreal, Canada.

This question not only evokes an awareness of the known and growing threat that climate change poses to winemaking but also affirms the industry's collective hope and belief that, come what may, wine will continue to be produced. At least a century of wine lies ahead, Vouillamoz seems to promise, but we all have work to do now on its behalf.

From traditional and emerging regions alike, innovative winemakers are acknowledging the crisis while accepting the challenge to produce sustainable, high-quality vintages. Joining their efforts are key voices in scientific research, consumer outreach and education, and industrywide alliances dedicated to sharing knowledge and committing to action. Here is a brief review of some trends to watch.

Stateside: Preparing for the Change

Winemakers in the United States are able to experiment with new and imported grape varieties, and given the current climate outlook, creativity is much needed. According to research conducted in part by Cooperative Institute for Marine and Atmospheric Studies and the National Oceanic and Atmospheric Administration (NOAA), an increase in extreme heat-waves across the United States that are driven by human-caused emissions has moved from an *if* possibility to *when* certainty. For California and Oregon as well as surrounding western states, the study has set that *when* to as early as the end of this decade. The Great Lakes region is projected to

be next in the 2030s with the Northern and Southern regions following in the 2050s and 2070s, respectively.[1]

Mindful of this rapidly rising thermometer, leading voices in California's winegrowing industry are moving forward into advocacy for carbon-emission reducing protocols that can be adopted industrywide. In 2019, California Sustainable Winegrowing Alliance (CSWA) announced that their third-party certification program had a 50 percent increase in the number of certified vineyards and a 4.2 percent increase in the number of certified wineries. With their introduction of specific performance metrics in the certification program, CSWA aims to drive further innovation in sustainable practices that can be shared throughout the agricultural field.

CSWA also works with international partners to develop an international greenhouse gas protocol with a common measurement system. Executive Director Alison Jordan has acknowledged that while there is much still unknown about carbon footprint factors, winemakers can start by tracking the easy things such as fuel and water use. She recommends the DNDC (i.e., DeNitrification-DeComposition) model as a useful resource to this end.[2]

Research in California is also underway in rootstock selection practices. A company called *Progressive Viticulture*, working out of Lodi, provides site-specific consultations to winegrowers throughout the state to match appropriate rootstock to vine. To that end, they employ a series of ranking criteria including soil-born pest resistance, influence on grapevine growth and vigor, and tolerance of soil limitations. Detailed research of rootstock selection at this level but specific for each winemaking region would be the next logical step.

Another significant development led in part by California's Jackson Family Wines is the emerging consensus that winemakers globally must change their business practices not only to survive the effects of the

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[1] Lopez, H., R. West, S. Dong, G. Goni, B. Kirtman, S.K. Lee, and R. Atlas. May 1, 2018. "Early Emergence of Anthropogenically Forced Heat Waves in the Western United States and Great Lakes." *Nature Climate Change* 8, no. 5, 414–420, https://doi.org/10.1038/s41558-018-0116-y

[2] Institute for the Study of Earth, Oceans, and Space, University of New Hampshire, "Home Page." www.dndc.sr.unh.edu, http://dndc.sr.unh.edu

climate crises but to actively join in the fight against it. Working together with Miguel Torres, of Familia Torres, Vice President of Sustainability Katie Jackson cofounded the International Wineries for Climate Action (IWCA), which seeks to build a coalition of environmentally committed wineries worldwide. Members who wish to join are asked to commit to "overall reduction in greenhouse gas emissions (GHGs) of 80% by 2045, with a shorter-term target of 50% by 2030".[3]

At his own properties and through his advocacy, Miguel Torres outlines potential practices that winemakers seeking to reduce their own carbon emissions can adopt. These include investment in solar energy at the winery's facilities, exploring options in reusable wine bottles or bottles requiring less energy to produce, storage of mountain water from winter snows where possible, and forestation. At Jackson Family Wines, Katie Jackson illustrates public accountability and communication through the company's annual Family Responsibility Report, which tracks comprehensive 5-year goals that outline the Jackson family's commitment to reduce its environmental footprint.

In Traditional Regions: Creating New Ways of Farming Old Vines

As temperatures climb, winemakers in traditional regions are focusing first on options that maintain the character and history of their harvests. For many, introducing a new grape in a world-famous terroir is a step not taken lightly.

Nowhere is this more apparent than in France, where strict rules govern the grape varieties and winemaking practices for each region. Only last year did the Union of Bordeaux AOC (Appellation d'Origine Contrôlée) and Bordeaux Superior winemakers allow an addition of "seven varieties of interest for adapting to climate change" to the list of varieties acceptable to that appellation.

With this primary goal to preserve heritage grapes distinct to the terroir in the face of changing climate, research, and experimentation in

[3] Torres, M. n.d. "International Wineries for Climate Action." *International Wineries for Climate Action,* https://iwcawine.org

France focuses instead on the aspects of the industry, including studies in microbiology, rootstock, and growing methods. Ann Dumont, microbiologist at Lallemand, a global leader in the development, production and marketing of yeast, bacteria, and specialty ingredients, notes the shift in studies in her field over the last 15 years from regional research in terroir selections to addressing specific issues arising from climate-driven conditions, including higher levels of alcohol in early ripening grapes. In their viticulture nursery model, Pépinières Viticoles Lilian Berillon encourages the winemakers to invest as much in their planting materials as they do in their facilities and cellars. In vineyards throughout France, harvests are happening on an average of 13 days earlier and long-established practices, such as striping the grape leaves before harvesting, row direction, and pruning techniques, are being abandoned or adapted.

One prominent voice arguing against introducing new varieties in France's warming regions is Jérémy Cukierman, MW, founder of Des Mets des Vins, journalist and director of the Kedge Wine & Spirits Academy. In Hermitage, where average temperatures have increased more than 2 degrees Celsius over the last 40 years, Cukierman believes the Syrah grape is still viable. In Southern Rhone as well, it is not the grape that needs to change, Cukierman advises, but harvest schedules. Picking earlier in the harvest cycle has the potential to reduce the grape's alcohol content.

Cukierman also highlights the ongoing work of French producers implementing other solutions in soil management, canopy management practices such as delaying leaf removal, clonal selection, and backcrossing Dureza and Mondeuse to create a "Syrah Sister".

Despite keeping traditional varietals in place, vine diversity is still an acknowledged goal. In France, research and a return to intensive cultivation in rootstock may hold the key to hardier, disease-resistant vines. It can also influence key parts of the growth cycle, such as bud break.

In the last decade, nurseryman Lilian Berillon led the trend toward *séléction massale*, or propagation from old vine cuttings as opposed to clones. He moved away from intensive chemical practices common in French nurseries in 2003 and reintroduced older methods of grafting in his own nurseries. His subsequent work has been instrumental in rescuing older varieties such as counoise, clairette rose, carignan, vaccarèse, grenache

gris, and others. These varieties, in turn, can provide solutions to heat-driven issues. Blending grapes like carignan and counoise, for instance, help produce a finished wine with higher acidity and lower alcohol.

Much like *Progressive Viticulture* in California, Berillon also stresses the importance of building a rootstock foundation that is specific to a site's characteristics and needs. Berillon works with wineries in Bordeaux, Champagne, the Loire Valley, and Burgundy and consults with the growers outside of France as well. In 2019, Berillon announced plans to develop a new nursery and conservation center, fully self-sufficient in the raw materials needed to produce rooted grafts.

French winemakers are also embracing the natural wine (vin naturel) movement. With a production technique developed by 16th century Limoux monks, natural wines can claim their heritage in French viniculture even as they enjoy the freedom of being an innovative, even nonconforming, product within the rigid certification strata of French terroirs. Vin naturel is compatible with organic and Biodynamic® methods, which focus on sustainable practices in the vineyard because it takes the next logical step into the production of the wine itself.

One practitioner is François Saint-Lo, owner of a small, eponymous winery about 15 miles south of Saumur, who created *Rue Des Belles Caves* as a place where natural winemaking and small-scale sustainable methods are joined closely together. Working with like-minded colleagues, Saint-Lo expanded his property's high-ceiling cave system, restored old, handcrafted winemaking equipment, and introduced other low-impact practices including hand-harvesting and composting his own crushed grapes, rather than selling them as a by-product to other industries as is common in France. In Saint-Lo's vineyard, horses have replaced machinery in row maintenance and vine pruning schedules are set by the waxing of the moon.

Natural winemakers in France also champion older or obscure grape varieties overlooked by others. Indigenous varieties such Ondenc, Mauzac, Zelen, Godello, or Gringet are returning to prominence as a result of their efforts. And since fermentation does not require secondary yeasts or sugars, the resulting wines tend to have a lower alcohol content. For winemakers who wish to preserve heritage grape varieties of their own region as they adapt to rising temperatures, natural winemaking offers possibilities.

Another initiative dedicated to the revival of older and unknown vines is being led by the Plaimont collective of growers in South-West France. Through small-batch testing, or microvinification, at its experimental conservatory vineyard, Plainmont has successfully reintroduced two varieties, Manseng Noir and Tardif, back into production.

New Regions—and Techniques—Emerging With Changes in Climate

Key developments are happening in new winemaking regions as well. Innovations and trends in South America, South Africa, and Israel have created interest in new techniques in water conservation, awareness of social and economic impacts, and experimentation in areas formerly judged unsuitable for winemaking.

In Chile, winemakers combatting drought conditions have recently expanded the existing wine-producing areas in the north into neighboring regions such as Biobio and Nuble. Miguel Torres has taken this initiative one step further with an experimental vineyard deep in the cold and high-altitude southern region of Patagonia. Torres has planted traditional varieties in a hostile environment that he believes will become more favorable as climate shifts continue. It is an investment of 50 million Euros for a wine that might not be drinkable within his lifetime.

Similar experimentation is happening in Israel in the Negev desert. While the cool-climate of the Golan Heights region is an established terroir for winemakers, Aaron Fait, associate professor at Ben-Gurion University of the Negev, is working with students on irrigation techniques, canopy techniques and grafting to develop varieties capable of thriving in higher levels of saline soils.

At Nana Estate Winery, Viticulturist and Owner Eran "Nana" Raz finds that dry, nutrient-deprived soil and lack of rain is an opportunity to have absolute control over soil enrichments and the amount of water each vine receives. It's no surprise that drip irrigation, an Israeli innovation, is being adopted in other regions now struggling with inconsistent rainfall, drought, and rising temperatures.

Other work in Israel includes rediscovery and restoration of ancient local varieties. Elyashiv Drori, a molecular biologist at Ariel University,

conducted a study of over 600 grapes and identified six that showed promise for producing wines. Similar research conducted by Dr. Shivi Drori, Agriculture and Oenology Research Coordinator for Samaria and the Jordan Rift, has brought the varieties of Hamdani, Jandali, Dabouki, Maraw, and Bittuni into production.

Like their colleagues around the globe, South African growers are facing the growing challenge of water conservation. While most of the country's farmers have already implemented water-conserving irrigation systems, water source rationing in South Africa can become a factor for months at a time forcing winemakers to do more with less. Paul Cluver Wines, a 2,000-hectare estate in the Elgin Valley, implemented a program to clear alien vegetation, increase mulching, irrigating at night, and using materials to catch and use natural condensation. Clearing alien species surrounding a natural water source at Rustenberg Wines in Stellenbosch increased the spring's flow from 6 liters per minute to 12.2.

Another trend to note in South African winemaking that may spread to other regions is a focus on ethical employment, labor, and business practices that work toward both long-term sustainability and equitable social representation. Industry and nonprofit organizations Wine and Agricultural Industry Ethical Trade Association (WIETA), Wine Training South Africa (WTSA), and Cape Winemakers Guild (CWG), as well as worker-led organizations like the Fairvalley Farm Workers Association, stress the importance of social development through improved labor practices and opportunities for education and training within the industry. Another initiative led by Backsberg Wine Estate, Freedom Road, aimed to move their worker housing model from an employment-based system of risk to a permanent, debt-free ownership of property.

It's notable that the South African wine industry contributes 4 percent to the global wine production, but is the largest producer of Fairtrade wine globally. In this endeavor, South African winegrowers have provided a template that other regions are invited to follow.

Finally, critical work in developing consumer awareness and industry advocacy for sustainable winemaking is another key trend to watch. The natural wine movement in France, for example, thrives through the championship of Joel Wright, who imports and distributes only natural small-grower produced wines and has been instrumental in building

their reputation among the bars and retailers in the United Kingdom. At New York's Rouge Tomate, master sommelier Pascaline Lepeltier, demonstrated that a restaurant can lead changes in consumer tastes through a local wine program reflecting the venue's mission of social and environmental consciousness. She advises that it can be as simple as asking patrons, "Do you want to try something new?" At Jackson Family wines, Katie Jackson incorporates consumer education on sustainability into her company's sales training program. As the industry introduces unknown varieties, experiments with new production methods, or asks its customers to consider kegs or reusable bottles, consumer allies, and support will be key to our success.

Toward the Future

A consistent theme in the work being done today is that there will be no single, universally applicable solution to climate change's impact on winemaking. In established and emerging regions alike, experimentation and research in local or adaptable weather-resistant varieties, growing methods, soil conditions, and planting materials must focus on the characteristics of the specific site at hand. Rootstock research in California and France, for instance, provides a criteria system and methodology for other regions to follow. The work needed to adapt these models elsewhere has only just begun.

Even current innovations that have been successfully adopted in multiple regions will require ongoing attention as rising temperatures and more extreme weather conditions continue. The Israeli irrigation system may be a viable solution for growers focused on water conservation, but as the multiyear drought in South Africa that led to water-shortages and rationing illustrates, there will be vulnerabilities.

With each region and each terroir requiring its own unique solutions to ensure the next century of wine, the existence of that bottle of 2119 vintage that Dr. Vouillamoz asks us to imagine, a commitment to winemaking as a sustainable practice that not only survives climate change but also works to reverse its course must be a universal goal.

Contribution by Lora Templeton

CHAPTER 6

Women, Regenerative Agriculture, and Natural Wine

Natural winemaking is on the rise in California and other states. While the wine industry, natural or otherwise, continues to be dominated by men, more women are not only following their dreams but are leading the charge, especially when it comes to regenerative agriculture. Women have played an influential role in farming and winemaking from the onset of the natural wine movement in the United States.

Before discussing the work of some of these pioneers and mavericks, we need to consider the conditions under which people make wine in the United States, especially California, which is not only the biggest wine-producing state but also the most expensive.

Unlike European wine regions, buying vineyard land in California is often cost-prohibitive. In France, Italy, and other European countries, family land gets handed down from one generation to the next and winemaking is often a family occupation. While California has some old wine families, they are in the minority. Vineyard prices in places like Napa and Sonoma make vineyard ownership out of reach for many interested in entering the wine industry. Land values started escalating in Northern California decades ago, now even the Central Coast is catching up. Calaveras Country and other inland areas, as well as a few spots all the way north such as Trinity County and much further south, near San Diego, are less expensive, but buying land still requires having substantial savings.

As such, most winemakers buy, rather than grow, grapes. Buying grapes often means relying on the grower and having less control. If you

are looking for organic or Biodynamic® vineyards, the pickings are slim though improving. Many natural winemakers are less concerned with certification than with practices that experienced winegrowers and makers can discern by taking a walk through a vineyard. Chemical sprays like Roundup® leave a ring around a vine. Cover crops are a sign that the grower believes in biodiversity and enabling a natural habitat to thrive. Discovering fruit sources requires having one's ear to the ground and getting to know networks of winegrowers. Yet even when winemakers have ample resources, buying grapes involves trust, not only insofar as farming is concerned but also in the business relationship. Very few winemakers and growers have actual contracts. Winemakers can decide not to work with growers from one year to the next. Still, growers can sell to the highest bidder, effectively shutting winemakers out just as their businesses are finding their footing.

To have greater control over farming methods, picking times, and a guarantee of fruit availability, winemakers are increasingly leasing parcels. While less costly than purchasing land, it still requires a cash infusion that is beyond the means for many new winemakers. Another option is to help conventional growers transition to organic conversion. In this sense, winemakers are change agents and creating more organic viticulture in the state. The vast majority of natural winemakers in California employ one or more of these methods.

With the high cost of working in this state, there is a constant challenge to maintain what Anna deLaski calls a triple bottom line approach that values people, the planet, and profits. California continues to be the most popular—and the most expensive—winemaking state, so many aspiring winemakers are looking elsewhere, where land may be cheaper. For instance, Krista Scruggs, one of Wine Enthusiasts' 40 Tastemakers Under 40 in 2018, moved from California to the northeast and now makes her natural wine in Vermont.

Contribution by Pamela Busch

Donkey & Goat Winery

Natural | East Bay | Winery

"Bringing philosophy to the vineyard and the bottle."

Any discussion about women making wine naturally in the United States usually starts with Tracey Brandt of Donkey & Goat winery. Before there was even a natural wine scene to speak of, Tracey and her husband Jared put a proverbial stake in the ground, becoming natural wine pioneers in California. Now 16 years old, the business has gone through some shifts, but they have stuck true to their *manifesto*, which Tracey wrote in 2009.

In 2003, Tracey and Jared moved abroad to work under Eric Texier in the Rhône Valley of Southern France. They were already somewhat versed in aspects of natural wine farming but had yet to make the connection to viticulture and natural winemaking. "We did not understand there was a movement to make sure philosophies in the vineyard went all the way into the bottle. We learned that at Texier." A year later, they returned to the United States and started Donkey & Goat. For years, they did not pay themselves, instead relying on income Jared made working outside of the winery. With two young daughters, it was a precarious position to be in, especially after the recession in 2008. "It wasn't until 2010 or 11 that we hired anyone and 2012 or 13 that we knew we weren't going under."

In the beginning, people told them they were crazy for using native ferments, but they were committed to following the prescriptions laid out by Texier. They did not own any vineyards, so they had to be meticulous about choosing growers who shared their values. In 2004, very few farmers worked organically, and purchasing land was beyond their budget. However, they managed to find several growers who did not use synthetics and, as the years went on, nurtured relationships with these and other farmers. In the past, they farmed some vineyards themselves,

including the Broken Leg Vineyard in Mendocino County, but living three hours away (the winery is in Berkeley) and having two children made that increasingly difficult. While not dogmatic or concerned about certification, they will only work with growers who practice organically at a minimum and preferably incorporate polyculture into the vineyards. They currently work with biodynamic growers, one of which maintains Demeter Biodynamic® Certification.

As the winery matured and growers could taste the quality of their wines, new fruit sources opened up to them. Now, they have long-term relationships with many of their growers, which Tracey says is pivotal. "Having relationships matters." In the beginning, they had frequent disagreements with growers, but now, she says, arguments are rare, if at all. Building mutual trust is critical in the winemaker/grower relationship, especially when there's a lot of distance between vineyard and winery.

> When we were young, we had ideas and some education behind those ideas, but it wasn't like we were experts on anything in winemaking our first five to ten years. We were still doing things by-in-large the same way we are doing things now. But there was negative energy. That was not easy in 2008 after four years of moving a boulder up a mountain. Today, I don't have to argue about anything with growers. We used to argue about picking. Now that's not even part of the conversation. Life is easier as you get older, and people respect you more.

Their winemaking philosophy, Brandt explains, is similar to the farm-to-table approach employed by many chefs. Some wines they make every year, such as Eliza's cuvee, a Clairette based blend, but as each vintage is different, they make adjustments year-to-year.

> We talk about the things we want to try and play with and look at what we did last year. Some like Eliza is always the same. We have it mapped out, but until we get the fruit that was farmed, we might pivot dramatically, we might pivot a little. We have plans, we have ideas, we have dreams, desires, and experiments, but at the end of the day, we're small enough where we can do whatever we want.

Brandt is adamant that sustainability extends to fair labor practices. Most of her growers run businesses with people who work for them year-round. With recent vineyard labor shortages, finding seasonal workers has become more complicated than it was in the past. She's flabbergasted when she hears young winemakers talk about the low cost of fruit. "Labor is not cheap or free. It seems at odds to be able to brag that way. We want a living wage for all humans." Given the COVID-19 induced economic crisis of 2020, Brandt was also concerned about growers getting paid, which might affect whether they could continue to farm the way they have. They are committed to helping their growers as much as they can. "We want to work with individuals that we can weather storms with."

Donkey & Goat's business model had shifted over the years. Though they have grown, they still maintain a small, "scrappy" operation. While their wines can be found in stores throughout the United States, most of their sales are direct to consumers. They decided to be more direct-to-consumer (DTC) focused about six years ago, a move that paid off during the COVID-19 pandemic. Distributors expect to carry the same wines year after year, but with so many low production skews, moving the focus to direct sales made sense. Even though DTC is a mainstay of their business, Jenny & François, one of the earliest and most respected natural wine importers, carry their wines in New York. They work with other well-established distributors elsewhere, including Amy Atwood Selections in California.

In addition to the manifesto and their lived experience, Donkey & Goat practices sustainability in the winery. With 40 foot ceilings, they do not need a cooling system. Doubling as a tasting room, the facility has long glass panels providing ample natural light. They use steam instead of water to clean wood vats. The press is cleaned first with an air compressor, then water, which Brandt says has a sizable impact on their water usage. They use cardboard packaging and lighter-weight glass bottles. Next year, when Donkey & Goat signs a new ten-year lease, they plan to attach solar panels to the roof. That might seem like a big financial commitment to a building they do not own, but given their track record and continued success, they are confident about their future. "One of the reasons we did this was to have a sustainable business that can last for generations. The human connection is fundamental."

Manifesto — November 02, 2009

"We make our wines for the table not the cocktail glass. We make Rhône varietals in both colors plus an unusual Chardonnay. We (my husband and winemaking partner Jared and I) strive to make wine as naturally as possible. We've done so since day one. Of late, natural is fashionable, which we do of course appreciate, but the reality is we've done this from the start because we feel it makes a superior wine while aligning with our environmental objectives.

We pick early, often weeks before anyone else considers it. Our whites are frequently at and under 13 and some of our reds are at/near 13.5 (both directions). Many of our vineyards are cool climate—we grow Syrah in Anderson Valley in order to get the profile we want at a low alcohol. That said, we also don't adjust alcohol to meet our goals. We have seen our wines end up higher in alcohol than other wineries in the same vineyard (who picked later) because we let the native yeast do their thing and don't add water or use reverse osmosis. So, yes we would love to make under 12.5 wines but to make wines naturally at that alcohol level in California is impossible. We believe alcohol is a byproduct of our winemaking decisions and we try to live with the repercussions of our decisions rather than cover them up after the fact.

We have vineyards that are organic and even have a new one that was effectively abandoned—closer to the ideas of Masanobu Fukuoka. Biodynamic® is very interesting to us but we are hesitant to adopt a management system that is dependent on copper sulfate due to health concerns. We are not alone in these. Alice Feiring blogged about Eric Texier's thoughts around this last Feb. We also strive to find vineyard managers who share our overall concern with the environment and desire for growing natural wine grapes. We struggle with doctrine that ignores excess and risks simply because it was determined to be okay for THAT doctrine. The religious analogies are so plentiful that I won't bother but I'm sure you get the idea. When it comes to dogma, the road to hell is paved with good intentions.

In the winery, we are extremely careful with our winemaking to ensure we encourage but not manipulate the wines expression of origin (terroir and varietal). We also make decisions to ensure our wines

belong on the table with food and not in cocktail glass in advance of anything edible. That means we pick based on flavor and acid. We ignore brix. We picked Syrah this year at 21.5 brix and it is gorgeous. We also picked Syrah at 23 brix and it is equally gorgeous. In both cases we were examining acid structure and flavors.

We ferment all wines (red and white) in wood vats. This is so key and no one is talking about the vast amounts of small lot wine made in plastic in this country. We abandoned plastic in our personal lives when we had our (first) daughter and discovered the extensive research around chemicals like BPA leaching into liquids. We NEVER considered a square plastic bin for fermentation because it's plastic and it's entirely the wrong dimension for vinification and IT IS plastic. But look in most US wineries and you will find a square plastic vat with fermenting must.

We add nothing at the vat after crush save the occasional minuscule dose of Sulfur Dioxide (SO_2) if we have a rainy year where rot is an issue. That means no enzymes to enhance color and extraction, no tannin, no commercial yeast, no nutrients to feed the super yeast and 95 percent of the time no SO_2, until after malolactic fermentation (MLF) completes. We can control temperature via manipulating ambient temperature with a refrigerated container and warm rooms within the winery. That's it. For the labor it's all manual. Picking. Sorting. Foot stomping. Punch down. Our hands are in the wine each day and we taste each day and the only time we've ever had a problem was in 2004 when we inoculated a few vats as an experiment to prove our wild yeast preference. The inoculated vats had stuck fermentations and we later dumped the wine rather than fall down the slippery slope of additions to correct additions (we dumped the equivalent of 50 cases).

That is one of the problems we have with inoculations. Winemakers choose cultured yeast for various attributes that include performance and aromatic profile. But the lab yeast need huge amounts of food. So the regimen becomes, kill the microbial life with SO_2 & Lysozyme, add super yeast, add vitamins and nitrogen (DAP or diammonium phosphate being very popular) to feed these hungry microbes. Then hope the yeast don't put off any off aromas like H2S because of the imbalance in their diet. If they do, add Copper. Then rack and filter

and add more SO_2… it never stops. And don't get me started on the great irony of adding vast amounts of DAP to the vat to feed yeast. Guess which yeast also LOVES DAP and for that matter any additive rich in thiamin. Read the ingredients on most wine additives and you'll see thiamin at the front. That would be brettanomyces, the dark angel.

Back to us, we complete primary fermentation with just wild yeast sometime near the end of the year although in warmer years like this one I expect to be done going into December. MLF is also natural or with wild bacteria. This is easy for us because we do not buy ANY new oak barrels. We buy a supply of 1 year old barrels each year from a single source (relevant for cleanliness) and rotate them in. Our lots see from zero to 35 percent one year old barrels. As a result we have plenty of Lactobacillus in our used barrels so again, no inoculation, no nutrients and no problems. We have one wine (our Brosseau Vineyard Chardonnay) that does not complete and rarely starts MLF. We do not kill the wine with SO_2 and we do not filter. The pH on the wine is in the 3.1-3.2 range which is a natural prohibitor of MLF and we've never had a problem with bottle ferm and have been making this wine since 2003. We do make it in an unusual manner. Again back to France. Eric taught us a trick he uses in warmer years. Pick the vineyard twice and blend to lift acidity. It's that simple. The first pick happens to be hugely unusual at veraison but still, pretty simple.

The rest I'll just list and save you the rationale given my dense e-mail. We stay sur lie until the wines tell us not to (no prophylactic racking or micro-oxygenation). We do not clarify or heat/cold stabilize and we almost never fine or filter. On the occasions we have we've labeled accordingly.

I do hope if nothing else I've managed to convey we are hugely passionate about what we are doing and why we are doing it."

— Jared & Tracey Brandt

Donkey & Goat Winery, Tasting Room & Wine Shop
1340 Fifth St,
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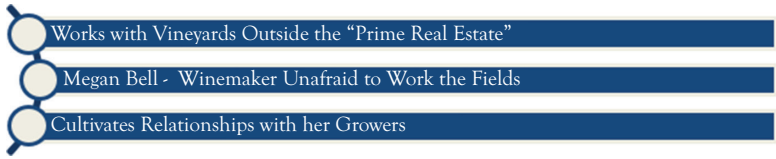
Contribution by Pamela Busch

Margins Wine

Natural	Santa Cruz Mountains	Winery



"*Vines can and do flourish in the margins.*"

Megan Bell of Margins Wine is one of the rising young stars in the natural wine movement. She's been written up twice in *Forbes,* first in 2018 in an article on Wine Women of the World[1] and again in 2020 with a single piece focused on her work, "*Meet The Winemaker Working With Vineyards On The Margins.*"[2] She reiterated her philosophy in a 2020 *Food & Wine* article on young California upstarts, saying, "My most important mission is getting more small farmers to farm organically." One of her goals is to take growers who are not already practicing organic farming and show them why and how it can be done. While she is less dogmatic than some of her contemporaries, she shares a long-term commitment to regenerative agriculture and sustainability.

> Rather than write people off who don't have interest in farming organically, I try to share why I believe so strongly in organic practices so that the grower will give it a try. I don't think I am making any kind of change if I only support growers who already agree with me.

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[1] Huyghe, C. 2018. "Weekend Wine Inspiration: Wine Women Of The World." *Forbes*, March 26, 2018 https://forbes.com/sites/cathyhuyghe/2018/03/30/weekend-wine-inspiration-wine-women-of-the-world/

[2] Barth, J. 2020. "Meet The Winemaker Working With Vineyards On The Margins." *Forbes*, April 28, 2020, https://forbes.com/sites/jillbarth/2020/04/28/meet-the-winemaker-working-with-vineyards-on-the-margins/

Bell became interested in fermentation as a high school student. She made beer at home and dreamed about starting a joint winery/brewery. After studying viticulture and enology at UC Davis from 2008 to 2012, she traveled the world, working wine jobs in France and California, including a stint at Pithon-Paillé, a natural wine producer in the Loire Valley. It was here that she fell in love with Chenin Blanc. She started Margins Wine in 2016 with the money from a Kickstarter campaign and has worked multiple jobs, from babysitting to bussing tables, to keep Margins floating and slowly grew her business. While Bell grew up around environmentally conscious people, she did not initially make the connection between winemaking and sustainability. "Once I had a bit more experience, the direct link between agriculture and winemaking could not be ignored," she says, "and I began to seek out certain types of vineyard and wine jobs." Yet, instead of setting a hard line in the sand, she has a set of fixed principles that allow for flexibility. "I live by respect toward others regardless of their position or rank, not spending energy/money/product trying to fix problems that don't exist, and not wanting to be part of the group that makes our planet less pleasantly habitable."

From Margins' inception, Bell wanted to work with vineyards that were "on the margins," meaning from less desirable regions and not yet at their full potential. With her eyes set on Chenin Blanc, she sourced fruit for her inaugural vintage from Wilson Vineyards in the Clarksburg AVA, well east of Napa Valley in Solano County, CA. It was not organic at the time, but it was in organic conversion in 2017 and 2018. Then in 2019, the grower sprayed Movento, an insecticide. Bell is fully transparent about this and the few other inorganic practices employed by her growers on her website. She uses fruit from this vineyard for both the whole cluster pressed Clarksburg Chenin Blanc and a skin-fermented Chenin Blanc. While many natural winemakers would stop working with a grower under these conditions, Bell is willing to make allowances if all other solutions are exhausted before turning to synthetics to save the crop, and there is complete transparency. She stopped working with one grower who was not upfront about using a synthetic product in 2019.

Bell works six vineyards in addition to Wilson, three of which are certified organic. Two are practicing organic, and another is in organic

conversion. She also cofarms the Makjavich Vineyard in the Santa Cruz Mountains, one of the certified vineyards. Planted in 2011 on one of the oldest registered organic farms in the United States, Bell started farming this parcel in 2017. Just two acres in size, she uses most of the fruit for her rosé and a sparkling petnat made entirely from Pinot Noir. Working with this vineyard has shown her one of the biggest challenges facing California winegrowers: climate change. "I am continually worried about the changing/increasing temperature in our area and concerned about our ability to use irrigation long term responsibly." The Zayante Vineyard, which she sources for Barbera, is dry-farmed, but the others irrigate. With California's drought-like conditions, the long-term sustainability of irrigation is questionable, meaning both winegrowers and winemakers are facing tough choices. Dry farming has not been a pillar of natural winemaking in the way that organic farming and manual harvesting are, in part, because many wine regions have ample rainfall. However, as the natural wine movement broadens to include other notions of sustainability, water usage becomes a more significant part of the conversation.

Bell has also spoken out on another conversation in the natural wine scene, that of the inequities between men and women. Having worked numerous production jobs, she saw that she had to work twice as hard as her male colleagues to gain their respect. "Working in wine production can be a dehumanizing and infuriating experience for women. Women are evaluated on their performance; men are evaluated on their potential." She advises women who are interested in making wine to give up socialized female passivity and "just go for it."

In addition to cofarming the Makjavich vineyard, Bell works in the others, without compensation, because she "loves being out there." Doing much of the vineyard work herself allows her to save money and keep her business viable. It also helps her foster relationships with growers and build mutual trust and move them toward organic methods. However, she feels the best way to convince them to work organically is to give them a bottle of a tasty wine she made, to show them the potential of their fruit. At the same time, she also realizes the importance of "listening to where they are coming from." While her willingness to work with conventional growers shuts some of her wines out of natural wine venues and fairs, she

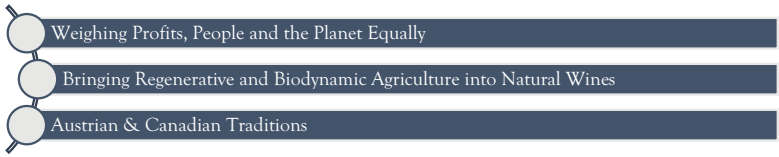
is ardently committed to seeing through its long-term benefits. “I’m not sure I’ve been able to influence folks in the area of sustainability as much as I would have liked, but I hope this is something I can accomplish in my long-term career.”

Margins Wine
2487 Freedom Blvd,
Watsonville, CA 95076

Contribution by Pamela Busch

Solminer

Natural	Southern California	12-acre Vineyard



"We think wine should be an expression of the sun and the soil and as little manipulation as possible in the winery to create good wine."

Anna and Dave deLaski met in 2009. Three years later, they purchased a farmhouse with a two-acre vineyard and started Solminer. From the outset, they farmed organically, receiving CCOF certification in 2014, and became certified Biodynamic® in 2018. Yet, this is only a part of Solminer's story. By employing what Anna calls a triple bottom line approach that equally weighs profits, people, and the planet, they are now one of the leading regenerative wine farms in California, a result of many years of hard work, uphill challenges, and determination.

Anna deLaski, who is from a town 20 minutes from the Wachau in Austria, has always been passionate about nature and sustainability. She hiked around Austrian wine regions and visited wineries while studying wood engineering at the University of Natural Resources in Vienna. deLaski wrote part of her thesis in Vancouver and then spent 10 years in Calgary, working in sustainability focusing on Green Building, Environmental Life Cycle Analysis, and Forest Stewardship Council, and other certifications. After meeting and marrying Dave, they knew they wanted to start a business where they could put their values to the test. They visited Austria, came back to Los Angeles, and started exploring the possibilities when they came upon an old farmhouse in Los Olivos with a small vineyard.

The name Solminer means sun and dirt in German. "We think wine should be an expression of the sun and the soil and as little manipulation as possible in the winery to create good wine," deLaski says. Anna and

Dave do much of the farming themselves in the home vineyard, called "Delanda," (a combination of their names). In the beginning, Solminer faced a challenge familiar to regenerative farming: changing the status quo.

> Conventional farming uses herbicides to kill weeds in the vineyard. The first thing you do when you go organic is to get off the herbicides. For us, that meant we needed to hand weed under the vines; which is a lot of hard work for the crew and definitely an increased cost. Converting a vineyard requires patience.

Organic or Biodynamic® certification is not a prerequisite for many natural winemakers, but deLaski sees it as essential. "Certification makes you accountable—an independent third party auditor goes over the current standard with us every year to make sure we comply with everything. They often also make us aware of upcoming changes."

> In 2012, we started working on converting the existing Syrah vineyard to organic. In 2014 we got CCOF certified organic. Then we started to learn about Biodynamic® farming and included BD (Biodynamic®) sprays and composting. We officially got certified Biodynamic® (Demeter) in 2018. We currently farm our vineyard Biodynamically and are implementing some regenerative practices such as grazing sheep in our cover crop. Regenerative agriculture focuses on soil health, but also the fact that healthy soil can sequester carbon from the air and store it in the soil through photosynthesis and root exudates. There is a UN report that says if we keep doing the kind of agriculture we are doing right now, we will run out of topsoil in 60 years.[3] So there is an immense call for action, but there is also a message of hope: if we change the way we grow our food and grapes, we can actually mitigate climate change.

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[3] Arsenault, C. 2014. "Only 60 Years of Farming Left If Soil Degradation Continues." *Scientific American*, December 5, 2014, https://scientificamerican.com/article/only-60-years-of-farming-left-if-soil-degradation-continues/

On their land, Solminer is working to increase soil organic matter through cover cropping, mulching, strategic mowing, compost, integration of animals for making compost, and for grazing in the vineyard at appropriate times, plus Biodynamic® preparations. They are also very interested in a new pilot program, *Regenerative Organic Certified* (RGO), which goes way beyond CCOF. As it takes off, it might help draw a distinction and better educate both growers and consumers.

> It gives a road map to becoming a regenerative farmer. It actually follows our journey in some way. The first step is to go organic, then you look to decrease inputs from outside the farm and work on compost, soil health, and biodiversity.

In addition to promoting regenerative farming, RGO advocates on the part of animal welfare and social fairness in agriculture.

Solminer makes an array of wines but is known for its work with Austrian varieties, Grüner Veltliner and Blaufrankisch, which they grow in their home vineyard. While these grapes are well suited to their site, Anna's heritage was a big reason for trying them out in the first place. Grüner Veltliner is used to make sparkling and still wines, including a skin-fermented bottling, which Anna feels uniquely expresses the terroir, saying, "The skins also have a story to tell." They also grow Riesling, Muscat, and Syrah in the de Landa vineyard. In addition to their property, Solminer sources fruit from local organic and Biodynamic® growers. They now make more than a dozen small-lot wines. All of their wines undergo native fermentations and save for minimal sulfur in some bottlings, do not have any additives.

Solminer carries its triple bottom line philosophy to other aspects of their business. They donate 1 percent of their sales to environmental organizations through One Percent for the Planet. They also use cardboard packaging.

> We switch our product design so we create products that are cradle to cradle, that is, create a circular model: at the end of their useful life, the material can be recycled or reused into something

new. I like this circular thinking model, and we try to implement it when an opportunity arises. For example, we take the pomace from the winery back to the farm, compost it, and apply it to the vineyard the following year.

Solminer Wine Company
2890 Grand Ave,
Los Olivos, CA 93441

Contribution by Pamela Busch

La Garagista

Natural	Vermont	10-and-a-Quarter Acres

"*Nature will give you all the answers.*"

Even though California is the best-known winemaking state, followed by Oregon and Washington, other states are garnering attention. While it would be an oversimplification to credit any one person for the natural wine revolution happening throughout American vineyards, no one has played a more prominent role than Deidre Heekin from La Garagista. Along with a skeleton crew including her husband, Caleb Barber, and a couple of apprentices, Deidre completely changed the conversation about what is possible in Vermont and what can be done with hybrid grapes, influencing other producers in the state and inspiring other budding winemakers throughout the country.

Originally from the Midwest, Heekin went to college at the University of Vermont, where she met Barber. After college, they moved to New York City to work in the arts and then moved to Italy with an invitation from a friend. It was here that they fell in love not only with the food and wine but the spirit of community both provided. After a few years, they started thinking about having their own restaurant similar to those they frequented in Europe, and in 1996, they opened Osteria Pane e Salute in Woodstock, Vermont. Caleb was the chef, and Deirdre ran the front of the house and selected the restaurant's wines. She became curious about winemaking and purchased grapes from California and Italy to make wine in her bathtub. "I wanted to understand the evolution of taste, and I wanted to understand the fermentation processes and doing, working with fruit from California, from Italy, bought at market." While Vermont had some winemaking, no one, including Heekin, took it seriously. That changed one night after she met with the owners of Lincoln Peak, tried a

few of their wines, and left with 100 plants. She was already organically farming vegetables and flowers for the restaurant.

> I said, okay, you know if I actually make some wine, wouldn't that be cool? We can serve it in the restaurant, you know, house red and house white. If it doesn't work out, we can make vinegar for the kitchen.
>
> It worked out.
>
> The minute I put that first plant in the ground, I was like, this is what I want to be doing. This is what I want to be in the field. I want to be growing wine. I want to watch this process. I want to understand this place through this lens of the vine.

Heekin also noticed that many of the wines at the restaurant were Biodynamic®. She investigated further, reading original texts from Rudolf Steiner, supplemented with writings from Nicolas Joly and others, and then, with a scholarship from the Vermont Farm Women's Fund, went to study biodynamie (French for Biodynamic® agriculture) at Anne-Claude Leflaive's workshop in Burgundy. There she met Bruno Weiller, an educator and Biodynamic® winemaker. He taught her that,

> Your job as a farmer is to pay attention to all these elements of terroir that we talk about, the geology, the geography, the microclimate, the variety, the botany. The botany is incredibly, incredibly important. That's the primary thing I learned in France was that it was very important to understand and catalog what's growing on n ithe vineyard floor because that tells you where your soil is going, it tells you where your vines are going, it tells you what's coming down the pike, it provides plant medicine for you. It's the cornerstone of how we approach everything we do in the vines, orchard, or anywhere on the farm.

That was in 2010, the same year, La Garagista officially opened. As is true of any new business, it took a few years to find its footing. Having

already been working organically, the transition to Biodynamic® viticulture was not as traumatic for Heekin as it would be for conventional growers, yet it still required patience. "Nature will give you all the answers. The land is going to tell you what you can and need to do, and you just have to pay attention, be its servant and be, again, patient."

Heekin started growing Riesling, which seemed to work for other winegrowers in Vermont and the Fingers Lakes in New York. However, she quickly realized that the climate in Vermont was more suited to hybrid varieties such as Frontenac Gris, Frontenac Blanc, Frontenac Noir, La Crescent, and Marquette. Once she started growing hybrids, she never looked back.

> In America, people were growing hybrid wine in all these other states, because that's what you can grow there. Even like 20 years back, 30 years back, hybrid wine was the great apology. It was like, well, here's my Frontenac Gris, I really wish I could grow Chardonnay, but I can't. They were so apologetic about what they were growing and what they could serve as wine. Whereas now we're starting to really understand the beauty and that if we treat these varieties with the same intention and respect that we might a grand cru vineyard in Burgundy, these wines will sing; they will sing, they just require the same attention.

While Vermont has a long tradition of organic agriculture, that was not true for grape growing, and no one heard about Biodynamic® farming ten years ago. Heekin felt isolated, but she put her head down and continued with her work. Although La Garagista is not certified organic or Biodynamic®, it is now a model for regenerative farming on the East Coast. She feels that years of hard work helped them get through more challenging vintages unblemished, in fact, conventional growers in Vermont are now asking her for advice.

Even in 90-degree heat, Heekin and the skeleton crew work the vineyards. For years, people have said that organic farming on the East Coast, let alone Biodynamic® practices, were impossible because of the humidity. As Heekin has proved them wrong, other growers in Vermont and down the Eastern seaboard are following suit. Having been written up in *The New York Times*, *Food & Wine*, and nominated for a James

Beard award, Deidre Heekin is world-famous in natural wine. She mentored Krista Scruggs, another noted Vermont winemaker who has gone on to mentor others. La Garagista's apprentices not only work with her to shepherd her grapes but, with Heekin's guidance, also make their cuvées.

Today, she makes small lots of pétillant natural and still wines, as well as cider and vermouth. In addition to the home vineyard at Mt. Hunger, she farms two old parcels in the Champlain Valley, which is about one hour from the home farm vineyard. La Garagista currently makes about 900 cases in a good year and is hoping to increase its production to 1200 to 1500 cases, with additional fruit from a new vineyard, across the road from the winery at Mount Hunger. Having sold the restaurant in 2017, La Garagista is Deidre and Caleb's sole focus, and, to economically sustain itself, it requires growth.

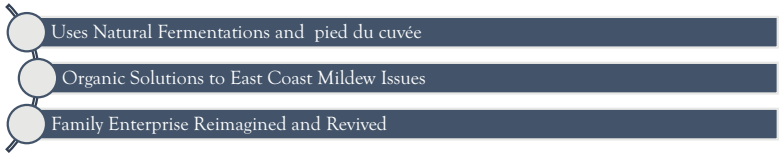
While Heekin didn't set out with the intention of becoming a leader in the natural wine world, her influence on wine growing and vinification is immense. One of her apprentices intends to make natural wine in New Hampshire. Another one is going to start a label in Vermont. Wine professionals not only from Vermont but from all over the country go to Heekin to learn from her mastery. Leading by example, with curiosity, sheer determination and conviction, La Garagista elevated hybrid wines into a category no one would have expected 10 years ago. "One of the things that I think is so exciting about where we are here in Vermont and what's happening here being a fringe region or starting as a fringe region is the varieties that we work with. And that is going to be more and more a part of the conversation."

La Garagista Winery
1834 Mt Hunger Rd,
Bethel, VT 05032

Contribution by Pamela Busch

Old Westminster

Natural	Maryland	17-acre Vineyard



"*Wine isn't just a commodity. There's something so special and unique about it that you don't want that to be removed.*"

Drew Baker, Lisa Hinton, and Ashli Johnson were in or barely out of college when they decided to revitalize the retired juniper nursery on the family farm in 2009. Drew studied business management, Lisa was becoming a chemist, and Ashli was a marketing major. They saw an opportunity to "put the land back to work" and employ their studies. After researching different flora and vegetation types, the answer became clear: they would grow grapes and make wine in Old Westminster, Maryland. They faced plenty of challenges, starting with dividing up roles, setting expectations, and managing boundaries. While all three helped out in the tasting room and would pour at trade and consumer events, Drew was responsible for the vineyard management and marketing, Lisa in charge of winemaking and production, and Ashli taking on the Jack-of-all trades role, taking on anything from human resources to operations management. With the land ready to go, an idea in place, and their responsibilities set, they planted 7,600 grape vines on 17 acres with the help of family and friends in 2011.

Old Westminster was not always organic/Biodynamic®. At first, they practiced conventional viticulture but quickly realized that from an environmental, philosophical, and taste perspective, that was not the right direction for their venture.

> I think early on while we were learning the ropes, we made a lot of decisions according to what we heard and what we were told

> 'worked,' but as our familiarity grew, we started asking 'why'? We realized that a lot of practices we'd adopted because that's how they were told… not because they could answer why you shouldn't do it,

Johnson says.

> So for us, it was really an evolution—to the point we are now, which is a focus on farming being greater than winemaking, with minimum inputs, wild yeast fermentations, no fining or filtration. We've seen it in our own wines the difference in aromas, flavors, textures—for us; there is no question about which processes are better.

Once they stopped using chemicals, the wines changed. "They have a different sense to them." says Hinton, "I very much believe that wine says something to you. And I think that the attitude and personality of the wines changed. They're very alive and fun." While not certified, Old Westminster uses only organic and Biodynamic® practices. *Everything is connected*, is one of their guiding principles. "What we do on our farm," Johnson says, "Affects the one next to us and vice versa. We are constantly learning and paying close attention to patterns, anomalies, and what is living on our farms and how they pertain to growing healthy, ripe grapes." All the fermentations occur naturally, either spontaneous or with *pied du cuvée.* There are no additions or subtractions. Old Westminster uses sulfur sparingly, if at all, but they are not dogmatic about it, acknowledging that in some vintages, additional SO_2 might be beneficial. Every year, they add a small amount of sulfur at bottling to the rosé, to help it retain its color.

Note: Pied de Cuve (also spelled *cuvée*) is a natural yeast production method; the winemaking equivalent of a sourdough starter. It is made by taking some grapes a few days before picking will begin in earnest, crushing those grapes and allowing them to begin fermentation naturally, on their own. This created a culture of native yeast that is then added to the batch of grapes once picked to start off fermentation.

Unlike California, East Coast farming benefits from ample rainfall. Even many conventional growers do not need to bother with irrigation.

Yet the rain poses other challenges, especially if it comes during harvest and at other pivotal points during the growing season. The humidity lends itself to mildew problems that many growers treat with synthetic fungicides. According to Hinton, "2018 was one of the most miserable growing years we had seen," with unusually high rainfall coming at the worst times. Frustrating as it may be, each problem becomes a lesson. "We ride the vintage and see what each year gives us," Johnson says. Each passing year, they learn more about the land, anticipate problems, and let nature do much of the work. For instance, to combat mildew, they do a lot of leaf pulling because, Hinton says, "Wind and sun are natures antibiotics. The more exposure that clusters receive, the better off they are."

In 2016, they took a major step by purchasing a 117-acre vineyard, "Burnt Hill," in Montgomery County, planting it to 100 different grape varieties. A significant undertaking from both a financial and labor viewpoint, they realize that they have to grow exponentially to maintain the economic sustainability of three families. Many in the natural wine space believe that you can only scale up so much without losing quality or compromising ethical principles. While Old Westminster's aspirations fall far short of industrial winemaking levels, they are venturing into new territory. Yet, they do not see where increased production runs counter to natural winemaking or removing the human element.

> I do think that you can grow, and you can produce more as long as you have the people to support that. But it's an interesting thing to think about because you don't want wine that just becomes a commodity," Hinton says. "You know, wine isn't a commodity. There's something so special and unique about it that you don't want that to be removed. And I think that really deep down, that's kind of what the natural wine movement is trying to preserve.

While natural winemaking informs Old Westminster's work, it is part of a more considerable effort to create a holistic, sustainable business. Old Westminster was among the earliest adherents of SIP (Sustainability in Practice) on the East Coast, which takes a holistic approach to farm/winemaking and labor. The tasting room they opened in 2015 is entirely solar-powered. They sell wine in kegs and started a second label, Better

Wine Company, of canned piquette, to cut down waste and reduce glass use. Now that they and some of their employees have children, they are converting the house they grew up in into a childcare center. While all of the offspring are still years away from toiling in the vineyards, they say that they are doing it for the next generation. "The lifestyle of raising produce on our family farm is extremely important," as such, "You're not going to let them run around barefoot in a bunch of Roundup®. Certainly not."

Old Westminster Winery
1550 Old Westminster Rd,
Westminster, MD 21157

Contribution by Pamela Busch

CHAPTER 7

Organic, Biodynamic®, and Sustainable Wineries and Vineyards of California's North Bay Wine Country

Martorana Family Winery

Organic	Healdsburg	~30-acre Vineyard

"Staying true to the history and the heritage of the land, without changing techniques for efficiency to make wine the way our ancestors would have made it."

Martorana Family Vineyards and Winery is a hidden gem in the Dry Creek Valley appellation of Sonoma County specializing in Estate produced wines and stream restoration.

Grape farming started in 1983 with organic farming beginning in 2003. Amigo Bob Cantisano was invaluable to the transition, visiting the vineyard monthly to give advice and remedies on any issues or challenges that arose. They have become great friends often laughing through their meetings in the vineyards. James King, Viticulturalist has been on the advisory Team since 2004.

In 2008 they received certification through California Certified Organic Farmers (CCOF) for their vineyard grapes, after years of practicing 100 percent organic farming methods, Gio finally filled out the paperwork with Amigo at his kitchen table. Gio Martorana is the current manager of the vineyards, and he spoke with us at length about the organic solutions the vineyard employs.

Gio's reasoning behind making the transition to organic is that many of the conventional inputs that farmers rely on are band-aid fixes. They don't target the root cause of an issue. Instead, they just treat the symptoms, never bringing the vineyard back to full health.

For instance, some vineyards suffer from susceptibility to nematodes. Nematodes are microscopic roundworms that feed on vine roots. In vineyards, they cause Fanleaf Virus and Leaf Roll to spread, damaging the vines as they munch on the plant's rootstalk. The problem is exacerbated in nonorganic farming operations when herbicides are sprayed to kill

weeds under the vines. The herbicide also kills the fungi in the root zone making the vine's root system the only targets left in the soil for the nematodes to eat.

To treat nematodes without chemicals or harmful additives, Amigo recommended tilling shrimp shells into the soil. Chitin is found in the shells of crustaceans such as shrimp and crabs. Studies have shown that adding crushed chitin to soil has been shown to reduce the number of nematodes in the soil. By introducing chitin feeding fungi to the soil through compost, the soil and then adding shrimp shells to stimulate the growth of the Chitin eating fungi, nematode populations can be curbed. Once they have consumed all the shrimp shell and built up their population, they feed on the nematodes (eggs and adults). The compost is essential to making the shrimp shells work and developing the fungi that then feed on the nematodes.

Powdery mildew is another common issue on the coastal side of California, with the rich morning fog and cooler climate encouraging its proliferation. To treat it, Martorana employs sulfur dust and wettable sulfur (both discussed in the chapter on organic treatments and remedies).

Cover crops are an integral part of organic operations, and those used at Martorana are:

- Magnus peas—peas help fix nitrogen to the soil
- Cayuse Oats—soil builder
- Mustard (specifically, Caliente 119)—which creates hot gas when tilled to kill nematodes
- Bell beans—used sparingly because it can produce a lot of nitrogen
- Purple vetch—for creating biomass to lure Ladybugs and Lacewings that combat detrimental insects like spider mites

To combat an outbreak of spider mites, Gio ordered predatory mites from a carrier in Southern California. These predatory mites arrived on tea leaves and targeted spider mites, and were easily distributed in a small section of vineyard near a road to great effect; the spider mites were no longer a problem.

Timeline of the vineyard, beginning after bud break

1. 3 to 4 inches of shoot growth start first dusting of sulfur or JMS oil and continue to verasion.
2. Suckering—The process of removing the small shoots, or suckers, that grapevine trunks put out in the spring, which will pull energy, water, and nutrients away from developing fruit
3. Wire moving—Lifting the trellis so the plants can grow in a single plane
4. Leaf pulling—To give more sun exposure to the morning side of the vineyard, some leaves are removed in fruit zone
5. Fruit thinning—for particularly prolific plants, some grape clusters will be dropped so the plant can devote more energy to other clusters. 2 clusters per shoot is ideal. Plus removing wings off clusters when grapes are pea sized.
6. Sauvignon Blanc is a vigorous grower and needs to be cane cut, so the top and sides are trimmed with a mechanical hedger.
7. Hand harvest—Grape clusters are harvested by hand for Martorana Family Winery. Machine Harvest is used for grapes going to Fetzer.
8. Apply compost (2 to 5 tons/acre) Martorana has always used Jepson Prairie to supply their compost.
9. Plant cover crop.
10. Prune in the winter back to 2 buds.

Martorana's grapes are all certified by the CCOF, the largest and arguably the most reputable organic farming certification agency in the country. All of their wines are crafted from their own grapes that have been grown without the use of pesticides or persistent chemicals for more than 17 years.

Martorana Family Winery carries a special designation as the first winery to receive the Associate of Fish & Wildlife Agencies' (AFWA) Private Lands Fish and Wildlife Stewardship Award. This is the first time a vineyard has received the award for fish habitat restoration. The AFWA's prestigious award recognizes individual or family-run farms, ranches, or forest operations that have incorporated proactive conservation and environmental protection measures.

For the Grape Creek region, action by the Department of Fish and Game began in the 1990s when they noticed declines in the fish populations from

diversions of water and loss of critical habitat in the area. Eight years later, the California Department of Fish and Wildlife (CDFW) and the National Marine Fisheries Service (NMFS) surveyed Grape Creek in 1998 and 2007 respectively and found several partial barriers along the creek limiting salmonid passage and access to stream habitat. They found adult and juvenile steelhead as well as steelhead redds (nests dug by steelhead in stream gravel[1]) present in the system. Grape Creek is classified as a Phase I expansion area for Coho salmon recovery in the 2010 NMFS Coho Recovery Plan, making it a priority watershed for near-term Coho recovery efforts.

Interest in repairing the stream system began with neighborhood watershed meetings, which Gio attended. Access was granted for the first fish stream restoration project in 1998. To support the Grape Creek and Russian River Watershed, a local by the name of Ben White began breeding Coho to release back into the main stream through his work with the Coho Broodstock Program. Now, both water level surveys and fish counts are done annually and the populations are healthier, though further efforts are needed to bring these populations to viable numbers. Their property along Grape Creek was designated a Historical Indian Fishing Village.

Stream management projects in the Dry Creek Region[2]:

- Instream habitat enhancement including large woody debris and rock structures to provide improved summer rearing habitat for juvenile salmonids
- Streambank stabilization and riparian revegetation
- Vineyard and winery water conservation
- Fish passage improvement at road crossings
- Frost protection alternatives (removal of frost sprinkler system for use of Fan)

[1] Steelheaders. 2017. "Steelhead 101: Using Redd Counts to Estimate Escapement of Steelhead." *Wild Steelheaders United*, March 11, 2017, https://wildsteelheaders.org/steelhead-101-using-redd-counts-to-estimate-escapement-of-steelhead/

[2] Russian River Coho Water Resources Partnership, "Grape Creek—Russian River Coho Water Resources Partnership," http://cohopartnership.org, n.d. http://cohopartnership.org/home/watersheds/grape-creek/

History of Martorana

With a long history of viticulture in Italy, it's no surprise that in 1939, a pair of sisters arrived in San Francisco and took up the family trade. Clara and Pierna Accornero joined their uncle Guilio Accornero at the Sonoma Hills Wine Company on SF's Embarcadero, carrying on a legacy of Italian winemaking in California's San Francisco Bay Area. Just a year later, Clara met and married Anthony Martorana, a young man from Palermo, Sicily.

Their son Anthony and his wife Diane set their sights north, buying land in the Dry Creek region of Sonoma County. The land that would become Martorana Family Vineyards was purchased in 1983, mainly as a grower for Gallo Winery.

Over the years, the operation grew to cover 50 acres in Dry Creek Valley and Alexander Valleys. Here, they grew grapes, supplying many notable wineries with the grapes that went into some of Sonoma's most acclaimed wines.

Today, Martorana Family Vineyards and Winery is run by the next two generations: Clara's son, Tony Martorana, and grandson, Gio Martorana. The operation is now 30 acres of grapes under their care, first just growing grapes, then to include olive oil processing, and on to producing their own award-winning wines.

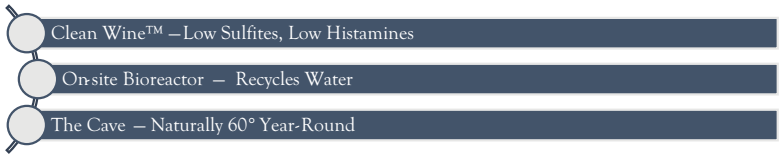
In 1996, the vineyard turned its attention to making olive oil. Small batches of olive oil were produced called Olio Di Gio, but it wasn't until the harvest of 2000 that Gio, inspired by two technical tours to Italy and Spain that he began making olive oil for sale. Olio Di Gio is now comprised of olives from Martorana and three other properties, with 14 tons processed in 2017 alone. Processing occurs for Martorana and Olive Leaf Hills using Paralesi equipment, which employs two-phase horizontal decanters to create the oil.

In 2005, the Family expanded into wine production, building Martorana Family Winery. Now they produce Zinfandel, Merlot, Cabernet Sauvignon, Petite Sirah, Sauvignon Blanc, Rose, and Chardonnay.

Martorana Family Winery
5956 W Dry Creek Rd,
Healdsburg, CA 95448

Deerfield Ranch Winery

Organic	Sonoma Valley	~7-acre Vineyard



"*Deerfield is most proud of its Clean Wine® — wines low in histamines and low in sulfites. People who have had to give up wine because of severe reactions find they're able to drink our wines.*"

Deerfield's vines are not only Certified Organic, but they also practice "Clean Wine," wine with low levels of both sulfur dioxide and histamines. They use organic, Biodynamic®, or sustainably sourced grapes in their wines, and Deerfield wines are vegan.

Winery wastewater is recycled in an on-site bioreactor that uses air and bacteria to reclaim the water for irrigation purposes. Barrels and tanks are cleaned with steam, reducing water consumption by 40 gallons of water per barrel and tens of thousands of gallons per year. They recycle 100 percent of their solid production waste, composting it to produce fertilizer for the vineyards.

In addition to the estate vineyards being certified organic, they are also farmed using Biodynamic® practices. An abundance of naturally occurring gypsum in the soil helps make water more available to the vines and improves drainage in the soil. Deerfield is in the process of restoring 14 acres of wetland habitat on their property, and they have already donated a permanent easement to guarantee the protection of the last of the Kenwood Marsh to the County of Sonoma. Kenwood Marsh is home to an endangered species, the Kenwood Marsh Checkerbloom, which grows in only two places in the world. Only 16 percent of their land is used for production while the rest is a natural habitat that they protect and manage. By proving wetlands and vineyards are compatible, they hope many other sustainably-minded vineyards join them in restoring and conserving wetlands.

In 2002, Deerfield built a 23,000 square foot cave to reduce its carbon footprint and energy consumption. It took 2 and 1/2 years to dig it and another six months to finish the inside. Deerfield hauled 5,000 truckloads of dirt off the property to make space for it. The cave is 60 degrees year-round, allowing them to save a tremendous amount of energy in cooling costs. With ample room inside along winding corridors, wine can be aged without disturbance in temperature through the seasons.

The "Clean Wine" initiative was prompted when one of the owners, PJ Rex, became allergic to sulfur dioxide (SO_2). Already in the wine business, she and her husband decided to find a way to produce good wine without high SO_2 additions. Sulfur dioxide is added to wine as it ages to prevent oxygenation, which causes the wine to sour. Most wines contain approximately 35 ppm of SO_2, but just 12 ppm would set off PJ's allergy. As the winemaker and a chemist, PJ's husband, Robert Rex, put his expertise to work to develop a way to make wine while keeping the SO_2 level below 12 ppm.

To get into the chemistry behind winemaking, sulfur dioxide is an oxygen scavenger, though it is often mistaken for a preservative. Without any SO_2, oxygen will spoil wine, as when a glass of wine is left out overnight and tastes strange the next day. Sulfur dioxide is also the culprit behind some common physical reactions to drinking wine, like redness in the face, ears, and chest, splotchiness, and hives.

To avoid the harmful effects of both oxygenation and excess sulfites, Robert's approach is to measure oxygen levels before adding any SO_2. Then only the amount of sulfur dioxide needed to neutralize the unwanted oxygen is added, usually only about 20 ppm. Then, through aging, sulfur dioxide levels continue to decrease over time as oxygen is neutralized. Deerfield Ranch doesn't release its bottles until SO_2 levels reach 12 ppm. As wine ages, the sharpness of the fruit flavor diminishes while the complexity increases, which is why older wines are so desirable.

Notes From the Winemaker:

When wine is aged in barrels, oxygen is picked up through the wood grain. Even bottled wines can take in oxygen through their corks, so trying to make wine without adding any SO_2 can be difficult. Many organic wines trying to go sulfite-free have had trouble keeping batches consistent.

Lowering histamines has also been a goal of Deerfield. Histamines are caused by bacteria, not tannins, as is commonly believed. To lower histamine presence in their wines, Deerfield grapes are meticulously sorted to ensure no grapes with any mold make it into the fermentation machine. As PJ Rex says, "nothing you wouldn't feed a baby" goes into the wine.

Deerfield previously employed a 3-tiered sorting machine in combination with a human crew of sorters. Still, during the last few harvests, PJ found herself at the end of the machine pulling out more unwanted grapes to maintain her high standards. She decided then to invest in a new machine, which she calls "The Dream," a German sorter costing $52,000. With this investment, plus a team of six hand sorters, PJ is confident of the quality of grape going into the final wine product.

History of Deerfield Ranch and Their Experience in October 2017's Firestorm

Deerfield Ranch Winery got its start when founder PJ got her husband Robert a garage winemaking kit while they were in college. Robert was a chemistry major and was able to tap into that chemical knowledge to win a home winemaker's award. With a taste for winemaking, they continued small scale production until 1999, when he and PJ created Deerfield Ranch Winery LLC. In 2000, they purchased a 47-acre parcel just south of Kenwood and committed to making wine their primary job.

Soon after, PJ began to have an allergic reaction to the sulfur dioxide in wine. This inspired the duo to look into ways to make wine with lower SO_2 levels, leading them to create the "Clean Wine" label. They've made "Clean Wine" ever since.

To expand on their vision of creating a unique winery, the idea of The Cave was conceived. During its construction, it became apparent that a left-hand turn lane on the main road would be needed so visitors could safely enter. After petitioning the city, the cost to have the road expanded and the turn lane added came to $2 million. PJ and Robert elected to spend an additional $200,000 to have powerlines put underground to preserve their view of the mountains. Almost two decades later, this significant investment turned out to be a saving grace during the North Bay Fires in October 2017.

PJ and Robert bore witness to the fire from their home just over the hill from the vineyard. Beginning on October 8, 2017, a series of 21 fires ended up burning at least 245,000 acres across Napa, Lake, Sonoma, Mendocino, Butte, and Solano counties. In Kenwood, a transformer sparked and blew, creating an ignition point and cutting power to the area. Thankfully, the power lines feeding the Deerfield's vineyard were underground, so no further sparks were created. Like many other vineyards, the vines themselves acted as a fire break, keeping the flames from reaching their property. Still, Deerfield Ranch saw losses totaling between $500,000 and $1 million dollars in lost profits from closures due to the smoke and then cancellations by visitors who were misinformed by the news coverage and believed that wine country was burned to the ground. As with all fires, there was some good in the aftermath, as ash is a great fertilizer that helps produce smaller berries with more intense flavors in the year following.

The owners have put their hearts into their wine. Even now, after harvest, when the crews have cleaned up, Robert spends another two weeks tending to the vineyards to keep the land clean and ready for next year.

An ongoing challenge for Deerfield is how to educate and inform people about their unique approach to winemaking. They want the world to know that their wine can be enjoyed by everyone, even people who have had reactions to wines in the past. To relate to a younger generation of wine drinkers, they've created a second brand called @Wine, aimed at Gen X and Millennial wine drinkers. Still, in such a dense wine region with so many voices and approaches, Deerfield continues to seek ways it can differentiate itself from the pack.

Deerfield Ranch Winery
10200 Sonoma Hwy,
Kenwood, CA 95452

Frog's Leap Winery

Organic	Napa Valley	160-acres

"*Healthy soil produces a healthy plant and a healthy plant resists disease*."

Located in Napa Valley's Rutherford region, Frog's Leap opened its doors in 1981. The man behind the venture is John Williams, an outgoing man with a passion for wine, life, and history. Frog's Leap has deep roots in Napa Valley, from the Old Red Barn to its connection to Stag's Leap Winery.

The philosophy at Frog's Leap Winery is that what is best for the earth is best for the grapes, making sustainability worthwhile. It operates 160 dry-farmed grape acres, plus 15 acres of other crops. Frog's Leap grows 30+ crops commercially, including peaches and other fruit trees. Through polycropping, Frog's Leap is able to support healthy populations of beneficial insects, birds, and soil. Diversifying crops also creates work for the permanent staff year-round by having work to do even in the vineyard's offseason.

Fruit, olive oil, and an assortment of jams and jellies, all made from Frog's Leap crops, are sold in the gift shop. They used to provide fresh produce to local restaurants but have since chosen to keep sales inhouse to avoid competing with local farmers. Doing so also cut water use because they no longer needed to plump up the fruit (peaches in particular) for aesthetic purposes. Instead, they now operate Community-Supported Agriculture (CSA) for employees, allowing workers and employees to take home seasonal, farm-grown products. CSA boxes are not uncommon in agricultural regions like Napa/Sonoma and are a nice way for Frog's Leap to reward its workers.

John started California Certified Organic Farmers (CCOF) certification in 1988 with the help of "Amigo Bob" Cantisano, and received certification in 1989; this was back when there was only a one-year waiting period, it now takes three years to be organically certified. For Frog's Leap, soil is the most important component because plants in healthy soil are better able to resist disease and attacks by pests.

A geothermal heating and cooling system is located under the parking lot and, because so little water is used for irrigation, Frog's Leap pipes their used water to a neighbor to treat and reuse.

For cover crops, selections are made based on vine petiole analysis and may differ even within a single block. Petiole tissue testing can be a reliable indicator of nutritional shortages or excesses. Nutritional expectations will differ depending on rootstalk and grape variety.

For mildew and pest control, John particularly likes mineral oils and Bacillus thuringiensis (Bt) sprays.

In 2002, John spearheaded the Napa River Restoration in Rutherford by gathering 39 properties together to do the work, which was the largest private river restoration effort in the United States. That effort evolved into the Rutherford Dust River Restoration. "To repair the main stem of the Napa River, to restore habitat, we need owner commitment, a holistic approach, and supportive government agencies," he said. "So far, we have all three."

In 2006, the new Hospitality Center was built and was the first building in California's wine industry to receive Leadership in Energy and Environmental Design (LEED) certification. John worked with Ned Forrest Architects, who designed the whole Frog's Leap master plan for a "new old winery estate" that began with the reconstruction of the Red Barn in 1995. From 2002, until this addition, the property was powered by 100 percent solar energy. Expansion plans are underway to meet 100 percent needs again.

As the first winery built with LEED standards, it was found that many of the LEED standards were not applicable to the nature of a winery and have since been changed, since the standards weren't changed until after building, Frog's Leap has a Bronze LEED rating. John recommends that builders follow the basic standards from the LEED standards for heating and cooling paths, maximizing light, and low carbon impact, even if that

property isn't pursuing LEED certification, because it can save money in the long run.

One of the largest expenditures right now is purchasing and shipping barrels, so Frog's Leap recently began experimenting with new concrete tanks for aging wine. Each tank can hold four barrels of wine, and the design of the tanks has changed through testing from egg-shaped to rectangular, which are stackable, making them space-efficient and more cost-efficient.

Napa Valley

From about 1870 to 1890, Napa Valley saw its first big wine boom, with roughly 150 wineries springing up in the Valley. The Barn that would eventually become Frog's Leap was one such property, originally built in 1884. Then, in the 1890s, the root louse phylloxera was accidentally brought over from Europe. Over the next 20 years, phylloxera would kill approximately 80 percent of the grapevines in Napa Valley. For those who were determined to make wine in the region, new methods were tried and it was found that by grafting vines onto phylloxera-resistant rootstalk, grapes could be safely grown once more. Then, in 1920, prohibition went into effect, and of the wineries that had survived phylloxera, only four survived by making sacramental church wine.

Lurching from one disaster to another, phylloxera to prohibition through the Great Depression and WWII, it wasn't until 1944 that Napa Valley was able to regain its feet in the viticultural landscape as seven wineries came together to make the best wine possible, forming the Napa Valley Vintners Association, which now represents 525 wineries and raises over $15 million for the local community each year.[3]

Then, in 1976, the Judgment of Paris, a blind taste test pitting California wines against French, catapulted Napa Valley onto the world wine stage when two Napa Valley wines, Chateau Montelena Chardonnay

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[3] WineCountry Staff. May 23, 2016. "The History of Notorious Napa Valley | NapaValley.Com." WineCountry Media, https://napavalley.com/blog/napa-valley-history/

and Stag's Leap Wine Cellars Cabernet Sauvignon, took first place in a blind tasting against the best French wines.[4]

History of Frog's Leap

Having grown up on a dairy farm, John Williams began his career in wine as an undergraduate at Cornell, with an internship at Taylor Wine Company in the early 1970s. He started his own venture in wine after traveling to Napa Valley and meeting Larry Turley, who helped John get a job with his friend Warren Winiarski at Stag's Leap Wine Cellars.

After finishing his education, John became a winemaker at the newly opened Glenora Wine Cellars on Seneca Lake in upstate New York's Finger Lakes region. In 1980, John returned to Napa Valley to become head winemaker at Spring Mountain and a year later, John and Larry Turley opened Frog's Leap Winery and made its first wines, Sauvignon Blanc and Zinfandel, with grapes purchased from Spottswoode.

Convinced that organic farming produces a healthier vine and a better wine, John was introduced to Amigo Bob Cantisano through a contact at Fetzer Winery in 1988, and a year later, Frog's Leap received California Certified Organic Farmers (CCOF) status. Realizing he was just one link in the chain, John went to his grape grower partners and pitched organic farming to them, offering a financial incentive to make the transition. Pat Garvey, Lee Hudson, Mike Wolfe, Frank Leeds, and Andy Hoxsey agreed to join John in becoming among the first to "go organic."

In 1993, Larry Turley sold his interest in Frog's Leap to John and his wife Julie Johnson (Julie would later found Tres Sabores Winery) and began Turley Wine Cellars. Frog's Leap moved to a Rutherford property called the Red Barn, which included a partially collapsed historic barn and some vineyards nearly dead to Phylloxera. Frank Leeds and his uncle, Roy Chavez joined the team and began dry farming the vines.

Two years later, John officially purchased the Red Barn from Freemark Abbey, including 40 acres of Rutherford vineyard and the restored barn.

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[4] Godoy, M. 2019. "NPR Choice Page." *Npr.org*, https://npr.org/sections/thesalt/2016/05/24/479163882/the-judgment-of-paris-the-blind-taste-test-that-decanted-the-wine-world

Finally, attaining real control over his own farming practices, John planted orchards and gardens to diversify the usual monoculture. The Red Barn vineyard blocks that had been ravaged by disease prior to 1993 were replanted to Cabernet Sauvignon and Merlot. Frog's Leap supplemented these with grapes from Louise Rossi, including Riesling, Sauvignon Blanc, Merlot, and Cabernet Sauvignon.

In 2000, Frog's Leap built their own Barrel Chai (aboveground barrel storage) next to the Red Barn, allowing all winemaking and storage to take place at the winery.

Starting in 2003, a river restoration team headed by Davie Pina, John Williams, and Andy Beckstoffer of the Rutherford Dust Society worked with a wide range of stakeholders to develop a long-range sustainability program for the Napa River as it passes through the Rutherford AVA, between Zinfandel Lane and Oakville Cross Road, south of St. Helena. John and Davie Pina spearheaded the planning efforts for the Rutherford Reach section of the Napa River Restoration Project.

The resulting cooperation along the river set the bar for public/private river restoration. 23 local growers have put aside nearly 20 acres of vineyards to restore the river to a more natural condition.

> Our mission is to work collaboratively with neighbors and agencies to stabilize river banks, reduce the impacts of flooding, protect and enhance fish and wildlife habitat, reduce Pierce's disease pressure on vineyards and provide ongoing education about the river and its watershed.

said Andy Beckstoffer.[5]

The Vineyard House began construction in 2005, ten years after it was first envisioned by Ned Forrest. The building was completed a year later and stands as the first LEED certified building in the California wine industry.

A second orchard was planted at the winery, and extensive organic gardens now produce more than 30+ different crops in rotation year-round.

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[5] Sarrow, J. n.d. "Napa River Rutherford Reach Restoration Project." www.napawatersheds.org, https://napawatersheds.org/app_pages/view/228

The garden program continued to expand, and began supplying local restaurants with organic produce and eggs, and small batch preserves seasonally.

In 2010 John received a "Susti" Lifetime Achievement Award at the Ecological Farming Conference, and three years later, Frank Leeds was named "Grower of the Year" by Napa Valley Grapegrowers.

Tastings and Tours by Appointment
Frog's Leap Winery
8815 Conn Creek Rd,
Rutherford, CA 94573

Tres Sabores Vineyards

CCOF	Napa Valley	12+ acre Vineyard

"Three Savory Flavors, or Tastes" in every glass. Those of the vine, the terroir, and the spirit that good company brings to every table.

Located in Rutherford, Tres Sabores was started by winemaker and owner Julie Johnson. Julie has been involved in wine, and organic farming, starting from her time at Frog's Leap in 1981, when she and her husband at the time, John Williams, helped the vineyards they were purchasing grapes from transition to organic farming.

Tres Sabores leadership also includes Rory Williams, the co-vineyard manager (and son of Julie) as well as the assistant winemaker at Frog's Leap, and Miguel Garcia, the assistant winemaker at Tres Sabores who also handles most of the ranch duties (animals, bird boxes, olives, pomegranates, etc.).

Tres Sabores practices a philosophy of stewardship, and if you ask why, Julie will tell you it's simple. It's the right thing to do. She and her husband live on their vineyard, she says, so why would she use synthetic inputs that could endanger the health of her family and employees?

The grapes grown at the vineyard carry a number of certifications, including, California Certified Organic Farmers (CCOF), Napa Green Land, Fish Friendly Farming, beginning when the land was purchased in 1987. The land that would become the Tres Sabores estate was purchased when Julie was still with Frog's Leap and early farming at the estate was handled by Frog's Leap until Julie and John split up in 1999 and Julie took over the property, founding Tres Sabores. Frog's Leap blazed trails with their move to organic. They were one of the first in Napa Valley to make the move and actually helped define the method as there weren't yet any bandwagons to jump on. When she struck out to found her own label, Julie stuck with organic farming, choosing to follow the Seven

Generation Philosophy. The two practices line up well. Both are holistic and prioritize the health of the land, resulting in healthier, happier plants.

Seven Generation Philosophy

Seven generation stewardship is a concept that urges the current generation of humans to live and work for the benefit of the seventh generation (or about 140 years) into the future. The phrase has been popularized by the eco-friendly brand Seventh Generation, but the philosophy originated with the Native American Iroquois Nation, which states in their Great Binding Law "*In every deliberation, we must consider the impact on the seventh generation... even if it requires having skin as thick as the bark of a pine*."

The Napa Valley Vintners' goal to certify 100 percent of the Napa Valley as Napa Green Land has spawned the nonprofit "Napa Green" organization with a third-party verification system. Tres Sabores holds a Napa Green Land certification, which focuses on native resource conservation, reuse, erosion control, and water conservation and includes "best practice" parameters along with audits of land, water, and energy use as well as recycling, human and social justice practices.

Organic certification provides a foundation for organizing farming plans and helps to sustain a special "team spirit" around wise-farming ideals. Being certified, organic establishes an authentic base from which to immerse and educate all the visitors and colleagues, while serving to push leadership to make more improvements to their practices. Implementing new approaches, refining practices that could be optimized, and a willingness to expand on existing practices keeps the vineyard on a path forward.

There are a few ways in which Tres Sabores practices its brand of sustainable farming:

Faunal Support—Tres Sabores raises Shetland Sheep and Guinea Fowl, which are good for the fields. Beneficial insect populations are encouraged with a mix of legume and grass seeds to provide cover on the soil

between the rows of grapevines. The resulting carpet of bell beans, vetch, peas, oats, rye, and grass provide nectar and rearing sites for predatory wasps and other insects that prey on leafhoppers, mites, and the notorious glassy-winged sharpshooter. The sharpshooter is particularly dangerous as it hosts the bacterium *Xylella fastidiosa* and spreads it to either growing or dormant vines when it feeds on them. Vines once infected die quickly as the bacteria multiply and block the vine's ability to move water and nutrients from the roots to the rest of the plant.

Bird populations are a priority and strongly encouraged through maintaining a diverse population of trees, bushes, and other nongrape plantings. Pomegranates, though non-native, are particularly good for insects, hummingbirds, and bird populations. Julie believes in augmenting the niches in nature that are missing in agriculture. Hawks, songbirds, hummingbirds, and in particular the Western Bluebird, an endangered species, are supported with nest boxes placed throughout the property. The farm is home to 50 Western Bluebird nest boxes alone, which doesn't include the numerous Raptor and Barn Owl boxes on the property.

Tres Sabores also conserves two-thirds of its land as native oak and conifer woodland and removes nonnative plants that often host sharpshooters, such as vinca, blackberry, and mugwort. Their efforts to affect the composition of bird and insect predators increase the health of their grapes, but they also increase the resilience of the vineyard to the vagaries of weather.[6]

In 2019, Tres Sabores hosted the ALL THINGS AVIAN MARCH, an event to bring together innovative farmers, avian researchers, and other experts to learn about practices that attract beneficial birds, which included a participatory demonstration on hedgerow planting, which serve the avian communities by providing natural nesting cavities.[7]

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[6] Marzluff, J.M. 2020. *In Search of Meadowlarks : Birds, Farms, and Food in Harmony with the Land*. New Haven: Yale University Press.

[7] Jon. 2019. "All Things Avian—Tres Sabores Vineyard Field Day." *Napa Wildlife Rescue*, March 12, 2019, https://napawildliferescue.org/tres-sabores-vineyard-field-day/

Plant Diversity—In addition to cover crops, various tree varieties have been planted, including pomegranates, lemons, and olives. Over 125 pomegranate trees are on the property and from that harvest each year, Tres Sabores makes a tasty pomegranate vinaigrette. Tres Sabores also has olive oil made from the 200 olive trees that grow on the property, and the estate garden provides seasonal fruit and vegetables.

Soil Health & Compost—Leguminous crops and other cover crops are employed for erosion prevention, water and carbon sequestration, microbial diversity for vine sustainability and health, and supporting insectaries. By planting overwintering cover crops between the vine rows, the soil has new inputs of organic matter each year, which, along with compost, helps build a vigorous microbiota. Julie and Rory believe this "allows their grapes to express their own essence during the process of making wine."

Thanks to decades of soil improvement, growing and mulching cover crops, and building water-retention capacity, the family does not irrigate the majority of their vineyard, even during the toughest droughts, making it dry-farmed. In fact, they welcome variety in weather from year to year because this gives each vintage its unique "personality." Tres Sabores doesn't strive for uniformity in taste, opting instead for a riskier approach that is economically viable while also increasing the soil health.

Keep the lands—the soil—healthy and great grapes will follow.

—Julie Johnson

It isn't about the yield; it's about looking toward the future, that's what sustainability is all about. What kind of land is being planted? Will it pass the test of time?

There is also the issue of economic sustainability; to be able to afford to take sustainable measures, some economic stability is necessary just to make the venture.

A *Human Connection*

Julie and her husband live on the property, and it gives them more insights into the goings on in the fields, both the natural cycles and the human

actions. They maintain four staff members year-round for the hospitality side of things and an additional two employees on staff as assistant winemaker and winery associate, both skilled vineyard workers with a great loyalty to the land. They often pick the grapes themselves with their team as it gives them a clear view of how the fruit is doing, if there are any problems, and ideas on what they can do better.

Tres Sabores picks their 10 acres about ten to 12 times at various points in the harvest season so they can get different varieties from one crop.

Ongoing and Future Goals

Tres Sabores' goals moving forward include improving the water-wise status of peripheral and garden plantings, improving composting practices, and continuing to teach visitors about what they're learning from the property. Improving the efficiency of inputs while reducing the amount to be added, learning more about microorganisms and avian systems in general, and expanding ongoing research projects are also goals for the coming years.

Also ongoing is the battle against chemical drift caused by nearby "nozzleheads" who regularly spray their crops. The spray can travel in the air to contaminate organic vines and disturb those with sensitivity to chemicals.

History of Tres Sabores

The property was first used for farming in the 1880s, when it was planted with olives and Petite Sirah grapes. During the years of Prohibition, the grapes were likely abandoned. When the property was purchased by Julie in 1987, the olive trees were still there, though they hadn't been tended in decades. In 1971, prior to Julie attaining the property, the owners of the time planted ten acres of Zinfandel. Since 1987, Cabernet Sauvignon and Petite Sirah have been planted, also pomegranates, lemons, and multiple hedgerows. Tres Sabores' team have also worked to revitalize the heritage olives, restoring the neglected trees to health. Since 1992, all of the vines

in the original vineyard have been dry farmed, without irrigation. These lovely, mature, deep-rooted perennial plants are resilient and have stood the test of time.

Tres Sabores' goal is simple: nurture the soils and fauna habitats of the property so it can continue to be vital and productive seven generations into the future. They began the organic certification process with CCOF in 1987 and achieved certification early in 1991; in fact, the Tres Sabores property, farmed for Frog's Leap at the time, was the first vineyard to be certified in the region. The philosophy surrounding certification is not for the sake of the "O" word, just to get that label, but rather to foster diverse, integrated viticultural and farming practices in harmony with nature's patterns.

The Wine

Tres Sabores is known for its Zinfandel and Cabernet Sauvignon estate wines. They also produce a "dedicated" Rosé, as well as Petite Sirah from the Guarino Vineyard in Calistoga.

A particularly celebrated blend at Tres Sabores is ¿Por qué no?, which is made from Zinfandel, Cabernet Sauvignon, and Petite Sirah. They also make a Sauvignon blanc from the Farina Vineyard on Sonoma Mountain in Sonoma Valley, also farmed organically.

The Rutherford appellation in the Napa Valley is particularly well known as "Cabernet Country." Indeed, Tres Sabores is proud of its Cabernet but is also dedicated to its old and precious Zinfandel.

To make many of their wines, Tres Sabores also buys from other vineyards in Napa and Sonoma, including the Ferino Family's Sauvignon blanc and the Guiriro Family's Cabernet.

Tastings by Appointment
Tres Sabores
707.967.8027
1620 S Whitehall Ln
St. Helena, CA 94574

Marimar Estate Vineyards and Estate

CCSW	Green Valley AVA/ Sonoma Coast	80-acres

"The wine is an extension of the farming in the vineyard. The grapes are the stars."

In April 1993, far-flung members of the Spanish winemaking family Torres gathered in Green Valley, Sonoma as Marimar Estate opened the doors of its newly built 16,000-case winery and 56-acre vineyard. Over time, Marimar Estate would expand its main property to 81 acres, acquire additional 180 acres in a West Sonoma property for a second vineyard, launch a popular wine-club program noted for its celebrations of food and wine, welcome Spanish royalty as guests, and champion the introduction of Spanish varieties to the region, eventually becoming renowned for its high-quality Chardonnays and Pinot Noirs. Rooted in centuries-old European traditions while breaking new ground for women in the wine industry, Marimar Estate is the lifelong work, passion, and namesake of Marimar Torres.

The first thing that greets visitors on the hillside drive to Marimar Estate is an elegant line of solar panels. As part of its commitment to sustainability, the Estate became 30 percent solar in 2007. It completed the transition in 2015, when the entire winery and the two houses on the property became 100 percent solar-powered. Behind the scenes, other natural farming practices are at work as well.

After working as a business assistant to her father and as an export director for Torres wines for over two decades, Marimar Torres began the journey to her own sustainable winemaking in 1983 when she purchased a former apple orchard in Sonoma. In 1986, she planted her first crop of Chardonnay. She also established her record for independence

and business acumen by introducing the then under-appreciated and relatively unknown Pinot Noir in 1988. Like other ecologically-minded growers in the region, she consulted with Amigo Bob in the mid-nineties, leading to a focus on organic practices from 2000 to 2016. Ecological farming methods were introduced in both vineyards beginning in 2003 and the estate was granted full COOF organic certification in 2006.

At the first vineyard, named Don Miguel to honor Torres' father, light and well-drained sandy loam soils and a cool micro-climate contribute to successful harvests of Chardonnay and Pinot Noir, and have also allowed for the introduction of Spanish varieties such as Albariño, Tempranillo, and Godello. Altitude, fog-cooled climate, and the indigenous Goldridge soil, which is noted for its fine, sandy loam over fractured sandstone, combine in the second vineyard, named Doña Margarita to honor her mother, to create an ideal terroir for Pinot Noir only.

Chardonnay and Pinot Noir grapes are grown in the European style, with vines trained close to the ground on vertical trellises that provide for better sun exposure and aeration of the fruit. At 2,000 vines per acre, planting density at Marimar Estate is considerably higher than commonly found in California vineyards. This European-style of planting provides low yields and has more labor requirements, but the grapes acquire greater flavor balance and concentration than with the traditional low density. Essentially, with high density, the roots grow deeper and you get better established root systems; root competition is better for water utilization and balance/development of the vines, which also live longer. Additionally, Albariño grapes are trained in a cordon style with alternating spurs to add width to the fruit zone and provide optimum air and light.

Torres also incorporates open and uncultivated spaces in her properties to support biodiversity. At the main estate, most of the cultivated area is split evenly between plantings of her signature Pinot Noir and Chardonnay grapes at 20 acres each. Smaller plantings include several acres each of Albariño, Tempranillo, Syrah, and an acre reserved for experimenting with new varieties. Remaining space on the property provides a home for free-ranging chickens, beehives, a wildflower garden, insectary strips around the vineyard perimeters, and composting areas.

At Doña Margarita, only 20 acres out of the 180-acre site is planted with vines. The majority of this estate is a dedicated conservation area

that supports a habitat for indigenous wildlife, including coyotes, bobcats, mountain lions, deer, wild turkeys, jackrabbits, eagles and red tail hawks. Groves of redwood, fir, oak, madrone, pine, and bay border the vineyard, which is planted sensitively in relation to the surrounding natural area.

In 2016, Torres transitioned from a sole focus on organic growing methods to a more comprehensive goal of sustainability throughout the facilities. This philosophy embraces farming practices that foster a self-sustaining ecosystem that operates in harmony with natural allies and conditions and, at Marimar Estates, it works in tandem with Biodynamic® practices.

In addition to successfully harnessing solar energy, Marimar Estate incorporates composting of natural waste materials on site, including postharvest grape pomace, cow and horse manure, kitchen scraps, garden trimmings, and even straw from the stables. Soil health is boosted through cover crops such as peas, vetch, oats, and clover. These crops are also chosen for their ability to provide habitats for beneficial insects and pollinators and to aid in water conservation and erosion control.

Other Biodynamic® practices incorporated into the wine production cycle include Horn Manure, which is prepared at Marimar Estate in the traditional method of burying a cow horn filled with manure at the autumn equinox. When the horn is dug out in the spring, the aged mixture is added to water, which is then sprayed throughout the property. A similar preparation is prepared in June by filling a cow horn with silica or quartz crystals. After six months, the horn is dug up and its contents are ground into a fine powder and sprayed on the vines before harvest to improve the ripening action of sunlight.

Another *compost tea* prepared on site utilizes flowers grown in the Biodynamic® garden. These include yarrow, chamomile, nettle, dandelion, valerian, and horsetail and the garden provides a source of nectar and pollen for the Estate's hives of honeybees. This mixture is sprayed throughout the vineyard in minute quantities to foster insect and pollinator biodiversity.

Predator control focuses on attracting beneficial insects and wildlife, such as barn owls to combat destructive pests including leaf hoppers,

mites, and gopher populations. Bonita, one of the winery's English Springer Spaniels, also contributes to gopher control and has earned the reward of having a vineyard hill and its harvest of seed clone Chardonnay named in her honor.

Water conservation is also a concern. To improve water retention in the soil, blocks have been converted to no-till and irrigation systems have been implemented. Canopy management is done through hedging, leaf pulling, and shoot thinning. At Doña Margarita's site, several creeks run throughout the property, feeding Salmon Creek, which naturally assists drainage and improves biodiversity.

History of Marimar Estate

In choosing to name her two estate vineyards in honor of her parents, Marimar Torres connects her California practice to the rich Spanish traditions of her renowned winemaking family. As a member in the fourth generation of the Bodega Torres wine company, Marimar had a natural interest in the business world of her fathers and brothers. As a woman in Franco's Spain, she was not guaranteed a natural place within it.

As the family groomed her brother Miguel A. Torres to be the next generation of leadership, Marimar persevered on her own path. She earned a degree in Business and Economics at the University of Barcelona at the age of 19 and became fluent in six languages. After graduating, she traveled with her father on sales trips making herself indispensable to the business by promoting Torres wines globally.

In 1975, she relocated to San Francisco and continued to work for the family. Under her sales management of Torres Wines North America, the number of cases of Torres wines exported to the United States grew from 15,000 to more than 150,000 within one decade.

Soon after, Marimar began a two-year search of California properties with a goal to establish her own winery. Consulting with her brother Miguel, Marimar chose her site with an eye to its terroir possibilities and began preparations for the initial 1986 Chardonnay planting. She further honed her knowledge by enrolling in the UC Davis oenology and viticulture program.

As the Torres family's presence in the U.S. wine market expanded and she was exploring the idea of starting a winery of her own, Torres noted that there were few dedicated consumer publications or avenues of promotion willing to spotlight new wines from regions outside the mainstream. She decided that food writing offered a solution. People interested in new or exotic dishes could be educated about the wines that accompany them.

With this inspiration, Torres launched her first full solo project of compiling authentic Spanish recipes and writing two cookbooks: The Spanish Table, published in 1986 and proudly featuring two bottles of wine on the cover, and The Catalan Country Kitchen, published in 1992. In the process of researching, Torres discovered a love of cooking, which was another passion her traditional upbringing as an upper-class member of Spanish society would have withheld from her. Both books are still in print and have since become the source of many signature dishes prepared and served at the winery.

Combining food and wine appreciation is also at the heart of Club Marimar, the customer loyalty program, which generates 25 percent of the winery's yearly revenue. Membership is offered at two tiered levels and members receive exclusive access to events featuring classic Spanish dishes prepared on site. Here again, Torres honors her Barcelona roots, with annual events featuring flamenco and menus offering tapas and paellas. In the summer, club members have the opportunity to travel to Spain with Torres as their guide through exclusive visits to her family's and other local wineries.

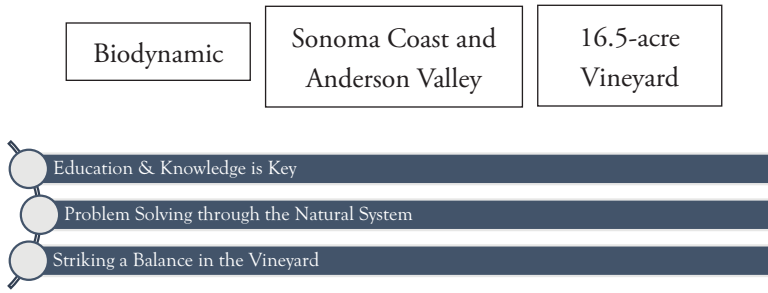
In 1991, Marimar's brother Miguel assumed the leadership of the Bodega Torres wine company as President and Managing Director. Passing the family business to the next generation is a Torres tradition. Marimar Torres plans to do the same. Her daughter Cristina has studied at Princeton and Wharton and will train to assume leadership of the Marimar Estate in time. It's another winemaking milestone that Marimar has achieved: a legacy passed from mother to daughter.

Throughout her life and career, Marimar Torres has embraced new passions and demonstrated a willingness to learn more. She is a champion of women taking leadership positions in the business and proudly notes that hers is the first winery named for a woman. Her family and the farmhouse traditions of Catalan Spain continue to be a presence in her

world, but she has ably demonstrated that independence and striking out on her own journey can create new cultural traditions for others to follow.

Seated tastings by appointment
Marimar Estate Vineyards and Winery
11400 Graton Road
Sebastopol, CA 95472
Contribution by Lora Templeton

Littorai Wines



"*What does the forest know that I don't know?*"

For Littorai Wines, the goal is to farm grapes and create wine while keeping with the Earth's natural pattern. The owners, Ted and Heidi Lemon, are driven by their philosophy of healthy viticulture. They aim to see resilience in the crop's ability to adapt to seasonal change, maintain the natural seasonal rhythm, and moderate production each year.

Littorai produces vineyard-designated pinot noirs and chardonnays from the coastal hills of Sonoma and Mendocino Counties.

Ted Lemon has yet to add a dimension to his Biodynamic® operation that he regrets; rather, he constantly finds himself asking "why didn't I do this 5 years ago?" He's seen the system continue to get healthier, even as problems arise. He was drawn to Biodynamic® farming because it is homeopathic as opposed to allopathic. That is, it aims to treat the system as a whole as opposed to treating the symptoms as they arise.

As part of their Biodynamic® efforts, Littorai makes their own compost, in addition to the required Biodynamic® preparations. They have installed bluebird boxes and planted wildflowers to support insect populations.

Littorai dry farms approximately 50 percent of their Pinot Noir. For water use, they draw from a variety of water sources to avoid depleting any one source. The Haven Vineyard and The Pivot Vineyard are Fish Friendly Farming certified, although Littorai does not generally use certification systems. Littorai has also planted perennial crops and permanent cover crops between the rows, which improves water infiltration. Even having cover crops planted every other row, permanent cover can minimize—even prevent—runoff, which improves stream health.

Ted gives an example of problem-solving by citing their work to control Oxalis, an invasive plant. Oxalis flourishes in the Sonoma Coast goldridge soils, growing fast and able to outcompete other, desirable, cover crops. It's difficult to eliminate because it grows and spreads via tubers. Littorai's solution is to allow sheep to graze on the property, reducing oxalis overgrowth but not destroying the plant entirely. Oxalis is still present in the vineyard but it's no longer an issue and other beneficial species are able to flourish again.

Ted has noticed that it's difficult for farmers of this era to see nature as an ally rather than an enemy. "The current conventional model is fear-based—if you don't use this product, you won't get the end result you aim for. In farming's case, that end result is a good harvest that makes good wine." He also suggests asking, "Is this plant right for this place?" For instance, tons of corn is grown in the southern great plains, despite insufficient rainfall. Corn requires a lot of water, which strains the aquafer and requires water to be trucked in from outside the region.

What you grow must be appropriate for the region or you'll be dependent on outside materials.

Powdery mildew, a real problem in viticulture, can become resistant when chemical products are used. That problem doesn't occur with organic practices.

Littorai employs less than 10 vineyard employees and believes changing how people think about physical labor may be able to remove the stigma associated with manual labor, which is often seen as undignified and *beneath* many in the workforce. Farming is skilled labor. It takes skill and knowledge to know the habits of the plants and to keep a vineyard in good health. Additionally, as mechanization becomes more common in wine, vineyards lose the crucial human element. Humans are more flexible and have the ability to work with many variables that can change daily; two strengths that machines and algorithms don't have.

Early on, viticulture split off from other forms of agriculture due to grapes being able to grow in more marginalized areas; it is well-suited to the kind of soil that can't be used for growing other things. Wine can be sold outside of the local region, making it a preferred crop for sale, which may lead to an eventual dead end in the form of viticultural wastelands.

History of Littorai

Littorai Wines began with Ted Lemon. Right out of high school, he started in the wine industry, conventionally farming in Burgundy for four years. He was the first American ever selected as winemaker and vineyard manager of a Burgundian estate, Domaine Guy Roulot in Meursault, and remained in Burgundy through 1984. During that time, he earned an Enology degree from the Université de Dijon.

In 1985, he came to Napa to begin his U.S. viticultural career. Most of Napa was farming conventionally at the time, and Ted began to tire of the cycle of adding more and more products to keep harvests up. He asked himself, "What does the forest know that I don't know?"

From there, he began looking into organic & Biodynamic® farming, or as he calls it, *farming the wild.* Crucial to the development of his farming philosophy was the book, *The One-Straw Revolution: An Introduction to Natural Farming,* by Masanobu Fukuoka, which presents a view of the Western model for organic practice as simply substituting more natural remedies for the currently used conventional products; with emphasis on the nitrogen, phosphorus, and potassium (NPK) energy exchange.

Learning there were sustainable farming practices beyond the Organic trend of the 1990s, Ted found himself asking a new question, "*Am I working with life or against it?*" To work with life is to work within a healthy system; to encourage plants and animals to thrive, which in turn helps the vines to thrive. This thought led him to try Biodynamic® in full, and, with the help of Professor Andrew Lorand, PhD Ag. Education, Ted transitioned a four-acre vineyard on a ten-acre parcel. At the same time, Ted joined a Biodynamic® group led by Professor Lorand, which had approximately 6 to 10 members.

Is a farmer going green because they want to; because they believe in it? Or is it because they were told to or they're trying to cash in on sustainability?

Do people want to make the change? Can you make them care?

For instance, Lodi Rules has 150 pages of guidelines with 100 *standards*. This model of sustainability is a series of checkboxes, not taking into account that different farmers have different problems, and without education,

a farmer may be at a loss for how to tackle such problems sustainably. Despite being Certified Sustainable, a grower might have drainage issues allowing sediment to enter streams or may plant non-native plants; simply because they don't have access to the pertinent information. There may be an emphasis on quantity over quality. Related to that concept, the Sonoma Sustainable initiative could go much farther in promoting information regarding nonsynthetic alternatives to conventional agriculture.

In 2003, the Lemons purchased a 30-acre farm in western Sonoma County. This property was chosen for its unique potential to demonstrate a different future for winegrowing. The property is modeled on Rudolf Steiner's vision of an integrated farm. The goal is to produce as many of the farm and vineyard needs on-site as possible in a manner harmonious with and respectful of the surrounding environment and wildlife. Six acres of the property is woods and streams, never to be developed. Fourteen acres are open pasture dedicated to providing a home for the cows, sheep, and hay, which form the basis of their compost. A quarter of these pasturelands are oversown with legumes, grains, and grasses every year. Only natural teas and compost are applied to maintain their vigor. They are re-establishing native evergreen oak grasslands on three additional acres, removing invasive species on two more and restoring Redwood forests to the stream banks.

The Lemons love having visitors come and learn about Biodynamics, and have found that most appreciate learning the why's and how's behind each practice.

Ted believes sustainability should be a choice farmers make because they believe in it. As with most things in life, you can't make people want to change, and you can't make them care. In order for a sustainable vineyard—or any operation—to stand the test of time, it has to be fueled by a genuine belief that nature knows best.

By appointment only
Littorai Wines
788 Gold Ridge Rd,
Sebastopol, CA 95472

Merry Edwards Winery

CSWA	Sebastapol	~80-acre Vineyard

"Think ahead, be proactive."

The approach Merry Edwards Winery has taken is proactive and based directly on what the vines are doing. The vineyard is Certified by the California Sustainable Winegrowing Alliance (CSWA) and is the product of Merry's long career in wine and grapes.

Heidi von der Mehden, the winemaker, shared some of Merry Edward's vineyard management style.

> It is seasonal, but we are looking at the stage of the vine to decide when to take a specific action. The exact timing changes from year to year, but the season is very similar. For example, we always prune in winter. Sometimes that could mean December. Sometimes January or even into February.

Due to the difference in climate, the Georganne Estate located north in Healdsburg begins harvest before the Sebastapol Estates.

Sustainability has been part of the long-term focus on healthy land to make expressive, terroir driven wines. As a business owner, Merry also finds that sustainable practices make sound economic sense, hence their use of proactive growing practices, deficit irrigation, solar panels, cover crop, composting, and adoption of new technologies.

When grape berries begin seed hardening, the fruit is thinned. This is done so that *green drop* isn't necessary later in the season. Green drop is the process of cutting off bunches of grapes that are ripening more slowly to keep the fruit uniform for harvest. By thinning the fruit just

as seed hardening begins, the vines don't waste resources on grapes that won't be used to create the final product. Ideally, this prevents green drop later, though sometimes a second pass still needs to be made to touch the vineyard up and drop clusters that are behind in ripening.

Deficit irrigation is practiced across estates. Different from dry farming, deficit irrigation employs pressure chambers to measure the *leaf water potential* to see how much stress the vine is under, informing water distribution. Water will be withheld or given based on the amount of water being carried in the leaf. This helps produce more intensely flavored grapes as energy is directed into the grapes rather than growing the vine bigger and greener.

Deficit irrigation is a reactionary practice. For instance, in 2016, virtually no irrigation was required at the Coopersmith Vineyard thanks to plentiful rainfall. In 2017, the Meredith Estate was watered just once late in the year.

During particularly wet years, soil erosion and oversaturation are both issues. To deal with erosion, detrital grape stems are placed as mulch to keep soil from washing into stream systems. To help suck up excess water, more vigorous cover crops are left in place longer, sometimes not tilling them at all. Normally at Coopersmith, the cover crops are mowed early in the season, but 2018 was very wet, so it was left in place to lower soil moisture content, resulting in higher quality grapes.

The water at the winery in Sebastopol is drawn from a deep well, filtered to remove excess iron and magnesium, and used to sanitize wine-making equipment, even the barrels. Water is sanitized by ultraviolet light. Because the water is so clean and good, every employee, harvest intern, and even shareholder has been issued a refillable, recyclable water bottle.

To keep grape clusters separated from each other for even sun exposure and ripening, the vines are positioned so the canes stand straight up. Biodegradable clips are used to train the plants into the vertical shoot positions. To maximize sun exposure without burning, leaves are left on the side of the plant with afternoon sun exposure to shade the plant during the brightest hours, while some leaves are pulled on the morning side to allow more light in.

Her first vineyard (Meredith) was previously an apple orchard with oak trees all around the property that needed to be removed to plant vines. Rather than cutting them down and fumigating the land, Merry

chose to pay to have them uprooted, boxed, and sold as mature landscape materials. Doing this maintained the soil quality for planting.

Cover crop practice at Merry Edwards varies by location and need. At the Meredith Estate where Sauvignon Blanc is planted, cover crops are planted to serve as root competition. Orchard grass, for example, is planted to reduce the vine's vigor.

At the Georganne Estate, insects caused the spread of Pierce's Disease. Flowers were planted there that attracted beneficial wasps, which eat the disease-spreading insects.

No poison is used to control rodent populations. Instead, owl boxes are kept and gophers are trapped and disposed of offsite.

The vineyard has teamed up with a neighbor, Gourmet Mushrooms, to create a custom compost from local horse fertilizer and grape pumice with the help of mushroom growing by-product. Compost is spread in late-November, after harvest, if needed. For instance, if a plant or part of a block is struggling, compost is directed only to those specific locations.

In partnership with Saturas (an Israeli irrigation company) and the University of California, Davis, Merry Edwards is helping to test a new water stress sensor. The sensor is placed in the vine and provides the data to a smartphone app. The sensor is just as accurate as the pressure chamber method but doesn't require a trip to the farther-flung properties and provides information on water capacity even once harvest begins. Heidi, the winemaker, said, "I would say it's just as accurate as our pressure chamber readings but takes the variable of user error out of the equation."

Data collected by the sensors is validated against the traditional tests, like pressure chambers and sap-flow monitors. As of fall of 2018, Merry Edwards had six sensors, and of those, four have failed. As bugs and hardware failures are worked out, Saturas hopes to bring these sensors to the market.

Automation cannot replace a good vineyard manager or winemaker; vines and grapes are subject to changes, sometimes day-to-day, and it takes the human eye to catch those changes. With this in mind, Merry Edwards employs VinePro, a vineyard management company.

At the event space in Forestville, there was an old cedar kit home that had been ignored and overgrown. To keep from having to tear it down and build a new space, Merry had the home restored and refurbished.

Trees were milled onsite and a barn add-on was built as storage for tractors and vineyard equipment downstairs, with an event space upstairs. Some of the home furnishings came from the land, such as a table that was furnished from a redwood tree. Now, the home is used for VIPs and is typically reserved months in advance. Stays there are auctioned for good causes a few times a year, giving wine club members an opportunity to stay there. The event space is also used for employee events and new uses are being explored.

History of Merry Edwards

At the heart of Merry Edwards Winery is Merry Edwards herself, a longtime viticulturist with a passion for trying new things to keep the vineyard healthy.

Merry's philosophy is to make wines that showcase the terroir of the vineyard. Therefore, the focus is on estate vineyards where every aspect of the wine, from grape to bottle, can be controlled.

Merry Edwards started making wine in 1974 at Mt. Eden Winery, where she gained a loyal following. In 1996, she purchased the property for her first vineyard, Meredith Estate, and planted it in 1998. In 1997, Merry cofounded Merry Edwards Winery and made the first Merry Edwards Pinot Noir. Merry began making her wines at custom crush facilities in 1997 and moved into her own facility in 2007.

At Mount Eden, supplies are very limited, especially water. Water had to be trucked in and was used for all parts of the operation, from growing, to winemaking, cleaning, and bottling. This encouraged Merry to turn to more sustainable practices that prioritize water conservation.

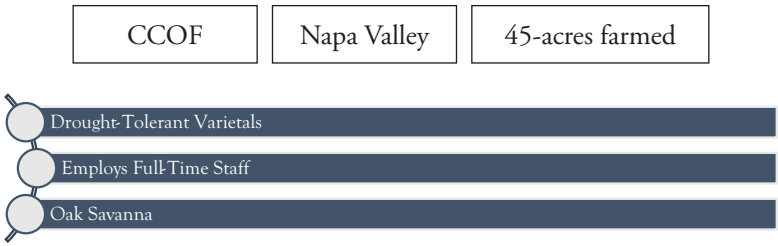
Prior to planting the fields for the Georganne vineyard, she traveled there herself with a tall pole and marked the sun's path across the field, ensuring she planted the vine rows facing the ideal direction.

Merry Edwards makes 9 to 10 vineyard designates of Pinot Noir and Sauvignon Blanc, and a very small batch of Chardonnay each year. In 2017, the vineyard produced ~27,000 cases. Sulfites are used to ensure batch quality.

Merry Edwards continues to explore ways to achieve sustainable goals, including: increase of composting at the winery, reduction in garbage created, and further reduction in water use. Their first step is to improve measurement of their current usage so they have a numerical starting point as they begin implementing changes.

Merry Edwards Winery
2959 Gravenstein Hwy N
Sebastopol, CA 95472

Matthiasson Wines



"*Our wine is all about food!*"

Matthiasson Wines was started by husband and wife duo Steve and Jill Matthiasson in 2003, and they bought their first vineyard three years later. They currently grow grapes for Cabernet Sauvignon, Cabernet Franc, Ribolla Gialla, Refosco, Merlot, Schiopettino, Petit Verdot, Malbec, and Chardonnay. Their vines are California Certified Organic Farmers (CCOF) and Fish Friendly Farming.

Matthiasson makes between 15 and 20 different wines each year, preferring Italian varieties with moderate alcohol content (~12 percent). The goal is to make wines that pair well with food, getting back to the old way of wine.

In 2006 they purchased a property just outside Napa City limits on an agricultural preserve and a new housing development right next door triggered an outbreak of Pierce's Disease. Because of this, they now plant two vines on every stake in case of losses; if one dies, they can train the second onto that line.

In 2017, the couple purchased additional land that had dead vines on it. The dead vines were removed and the land the Matthiassons replanted with Cabernet, using drought tolerant rootstock and planting at a high density to keep yields high and maximize the acreage. Drought-tolerant rootstock is not usually planted in the area, as an experiment to prepare for climate change and plan to use those heat adapted reds for blends. As the region warms, they hope those varietals will be perfectly positioned to thrive in the warmer world.

Matthiasson plans to limit water use once the new vines have established, but the vineyard isn't 100 percent dedicated to dry farming. If a day is particularly hot (95 degrees or higher), a drip irrigation system is in place.

Permanent cover crops are planted between rows of grapes, with local tilling around rootstalk only, allowing them to grow deep and healthy root systems. Native grasses are kept in place and are particularly valuable because they can have an eight-foot root depth. Thanks to these permanent cover crops and native grasses, feet of standing water that used to pool in the fields during the rainy season can now infiltrate the soil. Now, even during the worst of the rainy season, puddles don't form in the fields.

In addition to organic farming practices, like compost, cover crops, and biological control, hedgerows have been planted, bee boxes are maintained, and raptor perches and barn owl boxes are installed to support biodiversity on the property.

They also use recycled glass for their bottles and aim to make the winery carbon neutral.

For labor, Matthiasson employs a full-time staff, pays competitively, and offers paid holidays. To keep year-round employees, they bottle during the off-season so there's always work to do. Matthiasson pays for ESL classes for their employees, and employs approximately 50 percent women, many of whom are mothers. They offer flexible hours to try to accommodate busy families and parental duties.

History of Matthiasson

Steve and Jill have been involved in the organic food and farming world for over 30 years, both boasting impressive resumes even before starting Matthiasson Wines.

Steve Matthiasson is a member of the Farm Worker Foundation and in 1999 he coauthored the California manual on sustainable vineyard practices. In 2002, he started consulting on vineyard practices in Napa before starting winemaking in 2003, and he now travels and speaks at conferences and universities, sharing the successes in California internationally.

Jill Klein Matthiasson studied botany at the University of Pennsylvania, researched ancient farming techniques in Israel, and studied traditional methods for soil health in graduate school at University of California, Davis. She pioneered *farmer to farmer* networking for sustainability in

the early 1990s while working for a family farming nonprofit, and ran programs training farmers on direct sales, such as Community-Supported Agriculture (CSA) and farmers markets, before local food had the momentum that it has now. She runs the business side of the family farming and wine business.

Vision

One of Matthiasson's goals is to create an oak savanna on their property. Oak savanna woodlands cover about 10 percent of California's land, or approximately four million hectares.[8] These kinds of oak woodlands play a critical role in soil health by protecting soils from erosion, preventing mass wasting processes like landslides and soil creep, regulating water flow in watersheds, and maintaining water quality in streams and rivers. Oak woodlands also have higher levels of biodiversity than virtually any other terrestrial ecosystem in California.[9]

By Appointment Only
Matthiasson Winery
3175 Dry Creek Rd.
Napa, CA 94558

[8] Bolsinger, C.L. 1988. "The Hardwoods of California's Timberlands, Woodlands, and Savannas." *Resource Bulletin (RB) PNW-RB-148* https://doi.org/10.2737/pnw-rb-148

[9] Bernhardt, E.A., and T.J. Swiecki. 2001 "Restoring Oak Woodlands in California: Theory and Practice." *phytosphere.com*, http://phytosphere.com/restoringoakwoodlands/oakrestoration.htm

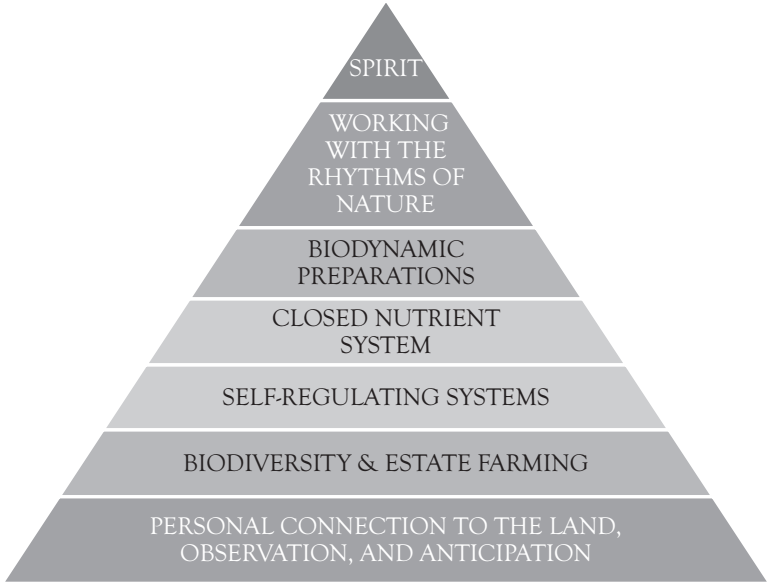
Benziger Winery

Biodynamic®	Sonoma Valley	~85 acres

- Recipient of the "Water Steward of the Year" award
- Community Outreach & Philanthropy
- Wine-Growing Pyramid

"To make and sell the best wine we can for as long as we can, while remaining good stewards of the land so it will continue to produce great grapes long into the future."

Benziger Family Winery, and its sister winery, Imagery Estate Winery, are big names in the region. In 1995 they began transitioning from conventional farming to Biodynamic®, and in 2000, Benziger's Sonoma Mountain Estate was officially certified as a Biodynamic® Farm by Demeter.



[10] Buck, T. 2017. "Imagery Estate Winery—Sonoma Wineries—Wine Tasting." *Sonoma Valley Wine Trolley*, https://sonomavalleywinetrolley.com/imagery-estate-winery/

Benziger Biodynamic® Pyramid

The Benzigers describe their farming practices as a pyramid.

At the base of the pyramid is "*Personal Connection to the Land, Observation, Anticipation*—A deep, personal relationship with the land heightens our ability to anticipate and avoid problems in the vineyard while encouraging conditions that promote quality." This is vigilant, involved farming. It means knowing, for example, where a plant might get mildew in certain conditions and cutting it back before the mildew spreads to the rest of the vines.

The next level is "*Biodiversity and Estate Farming*—Cultivation of a polyculture in and around the vineyards is as important as healthy grapevines. This diversity is reflected in the individuality of the wine." This is really the idea that the terroir of the site will speak in the wine if the farmer doesn't try to completely destroy the natural habitat.

Next on the pyramid is "*Self-Regulating Systems*—A healthy and diverse habitat of plants, animals, and micro-organisms leads to a self-regulating system of predator/prey relationships, honoring the idea of reciprocal maintenance." At most wineries, you might see cover crops between the rows of grapevines or a small garden at the visitor's center; the Benzigers have taken this to the extreme by planting connecting insectaries in pockets of the vineyard to give predatory bugs an incentives to range into all parts of the vineyard, providing extra defense against disease-causing insects.

Next, because the property is certified Biodynamic®, it is a "*Closed Nutrient System*—All organic waste is recycled through composting, encouraging the growth of indigenous yeasts and bacteria that ultimately contribute to farm individuality." This means that the vineyard composts everything, and that no outside compost will be added.

The last two pyramid planks and the pyramid's apex are where Biodynamic® farming really differs from organic farming. "*Biodynamic® Preparations*—The eight preparations regulate and stimulate the life processes in plants and grapevines, connecting them to a site." Biodynamic® Preparations are often what people cite as the only thing they know about Biodynamic® farming. According to Demeter USA, the certifying organization for Biodynamic® farms in the United States, Biodynamic®

preparations made from a variety of herbs, mineral substances, and animal manures are used in field sprays and compost inoculants applied in minute doses, much like homeopathic remedies are for humans.

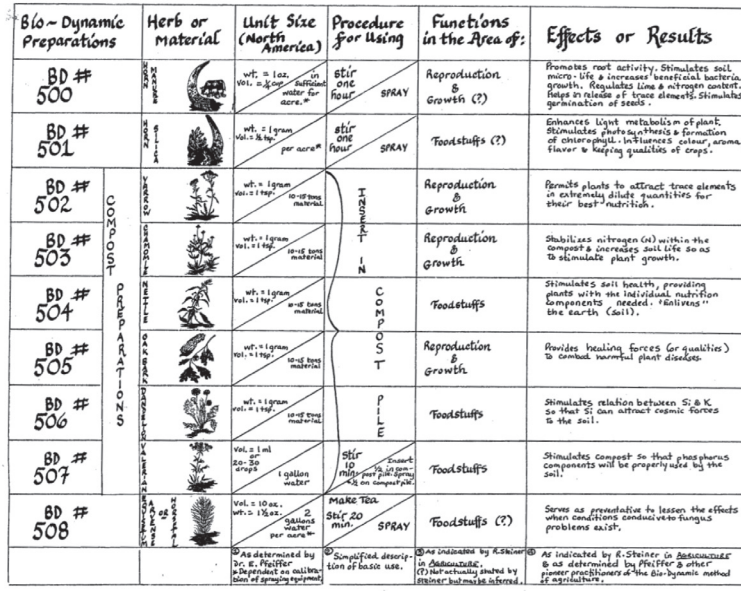


Figure 7.1 Biodynamic® Preparations; Courtesy of the Josephine Porter Institute

"*Working with the Rhythms of Nature*—All plants evolve with an intimate connection to their environment, including the movement of the sun, seasons, and lunar cycles." Practicing biodynamics is all about working *with* nature, not against it. As Mike Benziger told us, "the Biodynamic® Preparations and timing are vitamins and medicines for the vines and soil."

At the tip of the Benzigers' pyramid is "*Spirit*—Through awareness, practice, and intuition we connect with the spirit of a place." Although less tangible, you definitely feel Spirit on the property. The Benziger's stamp is everywhere, in the way they do business with their employees and customers, and in the way they make their wine.

The company also differentiates itself by its level of community activism, which at other wineries ends with donating wine and tasting room visits to auctions. Benziger goes beyond that, with its greatest philanthropic commitment being to Jack London State Park. The winery

donates its tasting room profits to the Park during Earth Day weekend each year, and sends paid vineyard workers to the park for trail restoration and campground clean ups. The winery is also the signature sponsor for the Park's Broadway Under the Stars series.

Benziger is also a leader in the area of water conservation, so much so that in 2010, the National Resources Defense Council named Mike Benziger the "Water Steward of the Year." The Benzigers began to really look at their water use when their wells started to run dry. They did two things to conserve quickly. First, they removed underperforming grapes that need frequent irrigation; second, they built wetlands to recycle water using planted hollow reeds as a filter.

The Benzigers also water differently. Instead of using scheduled drip irrigation to water the grapevines, they watch the weather closely and use drip irrigation a few days before a hot spell to keep the temperature around the vines cool so that the grapes don't overheat.

History of Benziger Winery

The Benzigers began farming operations in the late 1970s and quickly discovered that the wine business is capital intensive. They solved their cash flow problems by starting a high-volume, jug-wine brand called Glen Ellen Winery.

The inspiration for Imagery Estate struck in 1984, when Joe Benziger and Sonoma County artist Bob Nugent met at a wine tasting event. Nugent agreed to design those first labels, and 20 years of collaboration later, Imagery has become home to a unique art collection that fills the tasting room and can be found on the bottles they produce. Nugent still serves as curator of the Imagery art collection, commissioning hundreds of international artists to design one-of-a-kind artwork for Imagery labels. Imagery Winery is dedicated to crafting rare wines from uncommon varietals and character-rich vineyards, focusing on interesting varietals like Malbec, Tempranillo, Barbera, and Lagrein.[10]

In 1989, Benziger, including the Glen Ellen brand, would sell 3.2 million cases for a gross revenue of $90 million. Shortly after reaching this milestone, Mike met a man named Alan York, an expert in Biodynamic® farming, and everything about his winery changed.

Until this point, Mike farmed his winery conventionally. He sprayed grapes according to a calendar, one part of the year spraying pesticides, another, fertilizers. "The earth didn't look as rich as it once had," said Chris Benziger. "Things seemed drier and harder and quieter." Mike and Mary, following Alan York's lead, began to realize that maybe the conventional way wasn't the best way to grow grapes. They stopped spraying their vines, created havens for good insects, and began composting. Slowly their vineyard came back to life.

Although the decision to become a Biodynamic® winery had less to do with green marketing than with keeping the 85-acre property healthy, once Benziger became Biodynamic®, people began asking about the wine they were producing from the purchased grapes. Was that wine Biodynamic® as well? Since the Benziger property was the first in Sonoma County to become certified Biodynamic® by the Demeter Foundation, the answer was "no." In fact, most of the wine the winery produced was still farmed conventionally. In 2001, Mark Burningham, Benziger's VP of winegrowing, created his own certification process for sustainable grape farming called "Farming for Flavors." As of 2007, Benziger would only buy grapes meeting the Farming for Flavors criteria.

Benziger Winery
1883 London Ranch Rd,
Glen Ellen, CA 95442

CHAPTER 8

Boisset Collection: Raymond Vineyards and Deloach Vineyards

"Find the rhythm of nature"

The next two wineries are both part of the Boisset Collection, and to discuss them without talking about the owner, Jean-Charles Boisset would be remiss. Both properties have taken his vision of green viticulture and brought it to life in California.

Jean-Charles Boisset

Jean-Charles Boisset serves as the president of Boisset Family Estates, one of the world's most-known family-owned wine companies, with wineries in Burgundy, Beaujolais, the Rhone Valley, the South of France, and expertise in French sparkling wines. Boisset's August 2009 purchase of Raymond Vineyards expanded the company's footprint in the New World, which already included properties in Canada and California's Russian River Valley, making it one of the top 25 producers in the United States.

Jean-Charles has been vital to the family firm's expansion through organic growth and by building a collection of wineries that fit the family's vision and share its values. He instituted the concept of the "viniculteur," which redefined the company's traditional role to encompass a closer, more active interest in all aspects of winegrowing to ensure sustainable farming practices and premium quality. He also elevated Jean-Claude Boisset, the founding winery bearing his father's name, to new heights of quality, concentrating its activities on the Côte de Nuits and Côte de Beaune, limiting yields and practicing Biodynamic® farming methods.

Integral to Jean-Charles' long-term vision has always been a dedication to innovation and the environment, which is reflected in the organic and Biodynamic® farming techniques that have been implemented at Boisset's wineries, as well as alternative packaging to reduce environmental impact.

A member of various boards of directors in different fields, and active in environmental groups around the world, Jean-Charles is also a member of the Northern California Young Presidents Organization (YPO), the French Club, La Confrèrie des Chevaliers du Tastevin from Burgundy, La Commanderie du Bontemps et du Medoc from Bordeaux, and de L' Ordre du Coteaux from Champagne.

In June 2007, he was named in Decanter magazine's Top 50 Power Brokers in the global wine industry. In March 2008, he received the Meininger International Wine Entrepreneur of the Year Award from the Meininger Group, publishers of Meininger's Wine Business International, and in December 2008, he was named "Innovator of the Year" by Wine Enthusiast Magazine.

Jean-Charles' History

The Boisset family first embraced the world of wine in 1961 in Burgundy, France. Jean-Claude along with his wife, Claudine, began selling wines from neighbors to friends and family. Soon they purchased their first plot for a vineyard. Today, this plot is part of the Boisset family domaine, which is now a leading wine producer with a Franco-American collection of wineries on two continents. The son and daughter of the couple, Jean-Charles and Nathalie have carried their parents' vision forward and continue to evolve the company philosophy. They have united their parents' vineyards into one estate in France and continue to innovate their wine in both the old world and the new.

Jean-Charles grew up in the vineyard, making the natural world a part of his life from the start. His grandparents taught him how to prune & garden and he was able to grow up watching the natural processes and learned the basics of Biodynamic® agriculture from his family: farming in tune with nature, following the natural cycles. Thanks to that upbringing, he was able to personally observe the difference sustainability, organic, and Biodynamic® farming made on the land and fruit. When he was

able, he chose to convert his family's estate in Burgundy to organic and Biodynamic® farming.

As he branched out, his goal was to bring his understanding and connection to the land and to his roots to California. His education-focused, progressive, authentic way of farming was a natural fit for California, and he began creating spectacular wines with personality. That personality comes from the terroir: the climate, soil composition and health, microbiomes, water, minerals available, and so on.

To its credit, California is already interested in change and willing to try new approaches, and it became clear that there was interest in JC's way of wine, his brand of farming. The United States, and California in particular, is different because they are willing to give it a shot, sometimes going all in but usually starting small-scale and after seeing the results, moving to full transition. Raymond's Symphony of Nature was created to show, visually, the difference earth-based viticulture makes. He frequently hosts blind tastings so those interested in conversion can literally taste the difference.

DeLoach Vineyards

Biodynamic®	Russian River Valley	17-acre Vineyard

"In Tune with the Land."

History of Deloach

Deloach Vineyards has been growing Pinot Noir grapes in the Russian River Valley since 1971, with its first vintage debuting in 1975.

Winery founders, Cecil and Christine DeLoach, were drawn to a small area of the Russian River Valley between Sebastopol and Santa Rosa, where agricultural miracles seem to occur regularly. Cecil researched the area and discovered that Italians had selected the particular area because it was possible to "dry farm," that is, to farm without permanent irrigation, due to the rare combination of soils and climate. The semipermeable soils allow good drainage yet retain enough moisture throughout the year to nourish the vines. The climate allows for at least 115 days without rain, which inhibits disease and promotes good grape development.

Long before the DeLoach family moved north from San Francisco, the Russians and Spanish were here planting the first grapes in 1836, followed by Italians who planted the first vitis vinifera vines in the area.

DeLoach Vineyards was purchased by the Boisset family in 2003, with a vision to convert the 17-acre estate vineyard surrounding the winery to organic and Biodynamic® farming. Decades of conventional chemical farming had left the soil tired and drained. The Boisset family knew that the vineyard's prime location on an eastern bench of the Russian River was spectacular, indeed, the estate vines produced Wine Enthusiast magazine's 2004 wine of the year, the DeLoach Vineyards' 30th Anniversary Cuvée

Pinot Noir, so they developed an environmentally sustainable plan to revitalize the soil.

Restoring the Land

The process of restoring the DeLoach estate vineyard was conducted from the perspective of nature. Rather than simply pulling out the old vines and putting in new ones, the DeLoach team began by restoring the health of the land. The vineyard was allowed to recharge itself by growing cover crops that return essential nutrients to the soil. Farmers call this letting the land go fallow; simply put, do nothing but let the land grow something different for a change.

Biodynamic® agriculture takes the restoration process even further. The first cover crop planted was safflower, whose deep roots drew moisture up and out of the sticky clay soil of the Russian River floodplain. Once the soil dried out to a more balanced level of moisture, it was turned over at a depth of several feet. This introduced more space for oxygen and water, which make up nearly half the composition of good winegrowing soil.

The soil was then amended with a combination of rock phosphate (a natural slow-release form of phosphorus), lime (to raise the soil pH and adjust the calcium/magnesium ratio) and a Biodynamic® compost preparation. Production of the compost had begun the winter before and was a mixture of organic barley straw and clean cow manure containing no hormones or other chemicals. DeLoach acquired manure from local dairies, thus recycling the natural nutrients from the manure back into the local ecosystem. A hundred tons of manure and straw were formed into a large windrow, covered with straw to hold in moisture and heat and thereby encouraging metabolic activity. At certain points in the compost's development, the team added Biodynamic® preparations—teas made from beneficial plants. The preparations further stimulate and focus the compost's metabolic growth.

During the first cover crop season, DeLoach applied horn manure to the soil to introduce more beneficial microorganisms. Horn manure is made by filling a cow horn with dried cow manure and burying it in the vineyard where it remains through the winter. The horn shape is one

of nature's inventions, and it serves to focus the decomposition process where the horn is buried underground. When fully broken down, the finished compost is essentially "bugs in a jug," or soil inoculum, because it contains microorganisms that have naturally adapted to the farm's soil conditions. These minute living creatures carry nutrients into the soil and distribute them evenly to encourage the formation of good soil structure. In the second year of vineyard restoration, the vineyard soil was again inoculated with horn manure and its host of beneficial microorganisms.

Then DeLoach planted a winter cover crop of barley, vetch (which fixes nitrogen in the soil), and indicator plants (which are known to either thrive or wither under specific soil conditions). Like a canary in a coalmine, the indicator plants helped DeLoach's vineyard experts understand what was going on in the underlying soil.

After the second cover crop had successfully run its course, the vineyard was ready to plant Pinot Noir and Chardonnay. Planting took place according to the Biodynamic® calendar, which takes account of celestial and terrestrial movements such as the moon and tides. The moon can create the powerful tidal forces that are easily observable at the seashore or in the mouths of rivers as they reach the sea. In fact, the moon creates tidal effects in many other places as well, including lakes, streams, underground reservoirs and river floodplains like the one surrounding DeLoach Vineyards.

Deloach uses an organic filtration system to filter the wine using bentonite clay or egg whites. This provides yet another example of the sustainable practices Deloach employs to create their Estate grown wines.

Even after planting the new grapevines, the vineyard's rebirth was not complete. From a Biodynamic® point of view, everything moves in cycles: instead of endings, nature continually finds new beginnings. DeLoach therefore continues to plant a variety of cover crops alongside the vines to encourage beneficial insects and microbial diversity and enhance soil fertility and structure. The estate vineyard is now a rich ecosystem in which grapevines are able to express the unique combination of soil, climate, air, water, nutrients, and human attention that turn the concept of terroir into a tangible reality.

In July 2008, DeLoach was certified organic by the California Certified Organic Farmers (CCOF), and in December 2009, Demeter

awarded Biodynamic® certification for both the estate vineyards and the 1-acre garden. 2010 marked the first vintage of wines from the estate vineyards at DeLoach Vineyards since their conversion to Biodynamic® farming.

While the estate vineyard was transitioning, the winery partnered with winegrowers equally dedicated to and passionate about eco-friendly farming practices and the production of high-quality wines, and Deloach now works with a large number of small growers and is supporting and incentivizing them to conduct organic and Biodynamic® farming practices. Many farmers are making the transition because consumers pay more for sustainably farmed grapes. These include Maboroshi Vineyard, which is Biodynamic® ally farmed and uses goats to control weeds; Riebli Valley Vineyards, which is organically farmed; and Van Der Kamp Vineyard, which is working toward converting to Biodynamic® farming.

Deloach Vineyards uses a technologically advanced greywater system with an on-site Membrane Bioreactor (MBR). This state-of-the-art machine was designed to convert domestic wastewater on an industrial scale. This system was expensive but has reduced the vineyard's dependence on water for farming by recycling all the water on the property. Since they purchased the most innovative system, the energy usage is low through a combination of periodic back washes and a more advanced control of the operating restrictions.

The energy used to operate the Membrane Bioreactor is from renewable sources. The Deloach estate boasts a large solar array, which is not only used to shade parked cars from the sun, but also powers their entire property and then some!

Their use of renewable resources and an advanced greywater system blends perfectly with their Biodynamic® farming methods to create a vision for their land that is defined by environmental prerogatives. As growers, they see themselves as stewards of the land.

Walking the Vineyard

The tour of the property begins at the entry way, standing in front of an 18-foot bronze sculpture known as the *Earth And Sky Statue*. According to the artist, Peter Schifrin, this statue honors the Deloach

Vineyards' commitment to "Biodynamic® agriculture which embraces a spiritual, organic, and scientific relationship with farming that nourishes and heals the earth."

The statue looks out at the acres of vines, grown to create exquisite Chardonnay and Pinot Noir using Biodynamic® farming. Surrounding the vines are a variety of cover crops, used to encourage beneficial insects and microbial diversity. It's hard to believe, looking out on this flourishing vineyard that when the Boisset family purchased it back in 2003, it was a conventionally farmed vineyard, ripe with pests and disease. Boisset removed the vines and let the land go fallow for two years before replanting. During this time, the land was converted to Biodynamic® farming methods.

As the tour continues, guests happen upon a little stretch of land filled with different plants and placards. This is the Deloach Biodynamic® Knoll and Insectary. Located on the side of their property, adjacent to their vineyards and just outside their tasting room, this thriving ecosystem is accessible to wine tourists. The placards explain the basics of Biodynamic® farming, the importance of cover crops, and provide the names and descriptions of both the plants and insects that are evident in the knoll and the vineyard. Plants such as *pineapple guava, butterfly bush, Jerusalem sage, wild lilac, ghostly manzanita, yarrow, rosemary, tea tree,* and *lambs ear* were chosen because of the beneficial insects and pollinators they attract. Insects such as the *aphid midge, braconid wasp, damsel bug, ground beetles, lacewings, lady beetles, minute pirate bugs, soldier beetles,* and *tachinid flies* work symbiotically with the farmers to promote a healthy ecosystem that is free of pests and disease.

Just beside this educational knoll is the 1-acre garden featuring herbs, fruits, and vegetables, as well as chickens, sheep, and other farm animals.

Everywhere you look while visiting this idyllic vineyard, you find evidence of their commitments to sustainability.

Visit for tastings; experiences by appointment
Deloach Vineyards
1791 Olivet Rd,
Santa Rosa, CA 95401

This chapter was written in part by Heather Duplaisir

Raymond Vineyards

Biodynamic®	St. Helena	62-acre Vineyard

"We're managing an ecosystem, not just growing grapes."

Rooted in the concept of balance, Raymond Vineyard's passion for sustainable viticulture aims to boost environmental health, enhance grape quality, maintain economic viability, and ensure the quality of life for employees and vineyard workers. Farming techniques employed here are cover crops, the application of Biodynamic® specific preparations and composts, and maintenance of biodiversity within the estate vineyard property. The property is also home to sheep, goats, and chickens that provide some of the compost that nourishes the vineyards.

By eliminating the use of synthetic pesticides and fertilizers, organic farming fosters a greater level of awareness while reducing viticultural monocropping's environmental impact. Biodynamic® farming expands on the principles of organic viticulture by embracing a view of the vineyard as single self-regulating, self-sustained entity in harmony with the forces of nature and the celestial rhythms.

Because it is expensive, organic and Biodynamic® farming can be hard to start. Both methods are labor-intensive, requiring manual tilling in place of herbicide usage and compost application instead of fertilizer spray. The benefits of farming without inputs can be challenging to quantify because the benefits become more pronounced in the long run. Early on, it may be difficult to transition, but if the goal is to have healthy vines in five, ten, twenty years, it's worth the effort.

Raymond owns 81-acres in Rutherford and St. Helena, of which 62-acres are dedicated to vineyards and certified organic and Biodynamic®. Their organic wine is sulfite-free, while Biodynamic® wine allows 100 ppm.

Currently, Raymond Vineyards is transitioning 50 recently-acquired acres to Demeter Certified Biodynamic®. Transitioning from land that

was conventionally farmed to a certification like Demeter or Certified Organic is a long process, taking three full years for Demeter, two for Organic. By growing in a closed circuit, without outside inputs, Raymond believes they see a clearer expression of the terroir in their wines while getting the benefit of long-term vine and soil health.

With three different locations in play, the St. Helena Vineyard, the Rutherford Vineyard, and the Jameson Canyon Vineyard, each parcel is matched to varietals that perform well in each particular climate and soil type. Raymond also works with many smaller operations, maintaining long term growing contracts with over 15 Napa Valley growers, allowing the winery to take advantage of the micro-climates and subappellations throughout the Napa Valley.

In addition to California Certified Organic Farmers and Demeter Biodynamic®, the Raymond vineyards are also certified by Napa Green, Fish Friendly Farming, and the California Sustainable Winegrowing Alliance.

Grapes grown at Raymond are Cabernet Sauvignon, Merlot, Sauvignon Blanc, Chardonnay, and Pinot Noir.

Raymond Vineyards continues to enhance the channels and methods by which they promote soil health and biodiversity, educate guests about sustainable efforts, and conserve resources by using solar energy, using less water, and diverting solid waste.

Raymond is proud to be one of the largest Biodynamic® vineyards in Napa County, celebrating 15 years of Biodynamic® certification in 2019.

A Focus on Education

From the start, Raymond Vineyards was planned with education in mind, through its impressive "Theater of Nature", a two-acre educational exhibit on Biodynamic® farming in the Napa Valley. It showcases how all the *actors* in the Theater of Nature play a crucial part in crafting quality wine, from the soil to the vineyardist to larger forces such as the lunar cycle. Like a performance, the Theater of Nature is divided into five acts, with each act devoted to a particular component of nature. As visitors are guided through each *act* they are shown how and why Biodynamic®

farming works, and how they can incorporate Biodynamic® practices into their own gardens through composting.

The Five *Acts* of the Theater of Nature:

- The Soil—How compost is made, distributed, and utilized to keep the soil healthy
- The Plants—Not just the vines; many other plants play a part in the vineyard
- The Animals—Grazers like sheep and goats keep weeds from being a problem and chickens produce eggs and make manure to be used as a component of the fertilizer
- The Vineyardist—Humans farm the land in harmony with the natural processes
- The Act of Wholeness—Biodynamic® farming is a holistic practice, focused on creating a system not at war with itself

Stance on Labor

Keeping in line with their values, Raymond employs a foreman and 11 tractor drivers, full time, along with two crews employed for the entire season, coming to 25 to 30 year-round vineyard employees. The cost of living in Napa County is high, by employing full-time employees and paying them a living wage, vineyard workers are invested in the health of the vineyard and can get to know the vines. When changes occur, workers notice and can deal with it before it becomes an issue.

Raymond, like many Biodynamic® vineyards, is moving away from monocropping by bringing more variety into the fields. Growing more than just grapevines increases beneficial insect activity, soil health, and gives year-round workers work during the grape off-season.

History Raymond Vineyards

Roy Raymond arrived in the Napa Valley in 1933 for the first post-Prohibition harvest and worked in every capacity of Beringer's winemaking team, including winemaker, from 1933 to 1970. In 1970, he founded Raymond Vineyards with his two sons, Roy Jr. and Walter.

They released their first commercial wine under the Raymond Vineyards label in 1974 and never looked back. Nearly 50 years later, Raymond has grown to include 380 acres of vineyards across all their growers in Napa Valley, including prestigious sites in Rutherford, St. Helena and Jameson Canyon in the coolest reaches of southern Napa. Its estate vineyards are certified organic and Biodynamic® by Demeter USA.

Today the Raymond family tree is entwined with Burgundy's esteemed Boisset Collection. In August 2009, the Boisset Collection purchased the winery. Jean-Charles Boisset has a history of elevating wineries to new heights, Raymond Vineyards joining his catalog in August 2009. The winery brought on Napa Valley veteran Winemaker Stephanie Putnam to oversee winemaking, while Vineyard Manager Sophie Drucker has transitioned the estate vineyards to organic and Biodynamic® farming practices, a hallmark of Boisset Collection properties worldwide. The winery has also renovated its tasting room and opened several new visitor offerings with a focus on educating consumers and providing a place for them to nurture a passion for wine.

Walk-ins welcome, specific experiences by appointment
Raymond Vineyards
849 Zinfandel Ln,
St. Helena, CA 94574

A Year at Raymond Vineyards' Acre-and-a-Half

January

The year starts with pruning, the most critical moment in the season that provides the best chance to bring balance to the vines. It is an opportunity to assess the vines' health and vigor from the previous year and decide accordingly how much potential that vine has to grow and ripen fruit for the year to come.

Winter rains feed the biodiversity in the insectaries. Diversity of insect life on the property is crucial to our mission. In all ecosystems, life is balanced by the presence of others whether through competition or predation. Having a robust diversity of insect life helps keep the populations of our pest insects low, avoiding the need for insecticides that can have toxic side effects on our beneficial insects and pollinators.

February

Sheep and goats are extremely adept at accessing the vineyard floor while it's too wet for heavy equipment. Grazing throughout the winter months gives us an advantage in the early spring when we would otherwise be trying to access the vineyard with diesel-dependent equipment. Through grazing, we can lower greenhouse gas emissions and naturally fertilize the land with droppings, adding nitrogen and organic matter to the soil.

March

As the soil warms and dries, tractor work begins. Cover crops are plowed back into the soil, slowly releasing the fixed nitrogen into the soil while building structure and organic matter back into to the freshly worked dirt.

Conservation tillage helps to sequester carbon in vineyard soil. Depending on the site and the age of the vineyard, we may till some of our vine rows. This decision is based on the need for reduced competition for water and mineral nutrients, as well as soil conditioning. We minimize passes through the vineyard, but occasionally disking the soil helps alleviate compaction and allows for improved water infiltration.

April

Once growth is four inches or more, the excess shoots will be removed. Depending on a vine's carbohydrate reserves, nutrient status and available water, the vines may initiate growth from buds other than the primary buds left at pruning. Removing unwanted shoots helps the vine focus its energy on growing the shoots that we want. Shoots that push around the base of the vine are cleaned off as well.

With warming weather, it is also an ideal time to stimulate microbial life in the soil, encourage healthy development of the soil food web, and promote beneficial cosmic forces by spraying Biodynamic® preparation #500. Derived from dairy cow manure buried in fall in a cow horn on a fertile location on the farm, the preparation is dug up in spring and made into a tea by stirring water and the preparation together in a vortex.

May

Around 50 percent bloom we pull a sample of petioles, the tissue that connects leaf to shoot, from each block. These samples are analyzed for their macro and micro nutrient levels, and help us understand whether or not the vine has adequate access to essential macro and micronutrients.

After bloom, removing leaves is a critical practice to create an ideal sun environment for the grapes. This reduces humidity, and therefore, disease pressure as well as allowing for better coverage of fungicides. The dappled light on growing clusters aids in phenolic development.

June

Fungicide sprays are an imperative part of growing healthy grapes. Powdery mildew is our biggest pest and will destroy an entire crop if left uncontrolled. We use organically certified, gentle fungicides that don't harm insects or animals in the vineyard, that is, oils, sulfur, and biologicals (the latter being bacteria that colonize the surface of the berry and make it hard for the fungus to take hold).

Another quick pass through the vineyard helps keep all the shoots tucked into the wires of the trellis and in the ideal position for air flow and even sun exposure on all the leaf area.

July

Balance! An overcropped vine may not be able to adequately ripen fruit, and an undercropped vine may ripen fruit too quickly and not develop the tannins and aromas that make wines complex. Prior to veraison, we pass through the vineyards to target an ideal crop load and open up bunched clusters before they become soft and juicy.

Irrigation enables us to control the level of stress the vines are under. Small amounts of stress, in certain stages of the grapes' development, can improve the quality of the resulting fruit. Using multiple instruments we can measure the amount of water the vines are using, the amount of water available in the soil and the level of stress they are experiencing. These measurements allow us to target our irrigation to the exact desired amounts and levels in the soil. Not only is this good for grape quality, but it also ensures that we are not wasting water by over irrigating beyond what the soil is capable of holding. Grapevines thrive on minimal amounts of irrigation and dialing into their water needs with data allows us to maximize the use efficiency of this precious resource.

August

Veraison is the moment in the development of the grape berry when it begins the ripening process; berries soften, change color, and accumulate sucrose.

Ongoing vigilance in the vineyard remains critical to maintain a healthy crop. As berries ripen, the spraying has stopped, but botrytis, sun burn, and bird damage are all late season risks.

Made from ground quartz, Biodynamic® preparation #501 is packed in a cow horn and buried in a fertile sunny location for the summer months. After it is dug up and dynamized, it is sprayed above the vines to enhance the light metabolism of the plant and encourage ripening. The silica spray on the foliage of the plant act like tiny prisms, reflecting and intensifying the light.

Once veraison is complete, it is time to start pulling maturity samples of grapes to send to the lab for analysis of sugar and acids.

September

When chemistry and flavors are just right, our winemakers call the pick. Grapes are harvested by hand at night so the fruit comes into the winery cold and intact.

October

Virus expression in vines is most apparent in the fall. The team scouts for viruses present in any vines, and if found those vines are marked for treatment or removal, to keep the vineyard virus free.

When we harvest grapes from a vineyard, we are taking many tons per acre of nutrients away from the vines. Planting cover crops, applying compost, and organically derived fertilizers are methods to return those nutrients back to the vines. Fall applications of compost return organic matter to the soil. The timing allows it to incorporate over winter, so some of its nutrients will be available to the vines in the spring.

The finished Biodynamic® preparations are added to a mature compost pile, ensuring a complete and healthy decomposition that will allow a diverse set of nutrients to be available to the soil and plants. All of the herbs have benefits to the farm ecosystem, whether they attract beneficial insects, accumulate nutrients deep in the soil or provide herbal medicine for humans and animals.

November/December

Postharvest, we focus on measures that protect our soil's integrity and health. Establishing a cover crop, laying down straw, use of wattles, and water bars help prevent erosion from winter rains that will minimize loss of topsoil and prevent soil from polluting our watershed.

This timeline was written by Joe Papendick and Sophie Drucker of Raymond Vineyards.

CHAPTER 9

An Interview With Sam and Phil Coturri; Organic Leaders

In an interview with father and son duo Phil and Sam Coturri, we discussed their family's history, the origins of their operations, and their own unique style of organic viticulture. Phil now runs Enterprise Vineyards, while Sam has taken over as the principal winemaker and manager of Winery Sixteen 600.

The Coturri family has been in California wine country for four generations. A great-great grandmother came to the Italian Swiss Colony in Napa. Both great-grandfathers were coopers (barrel makers), and for their home wines, they got grapes from Cloverdale and proceeded to craft their own vintages.

The current Coturri label began its life in the 1960s with the purchase of the Glen Ellen vineyard. Phil and his brother Tony harvested the first vintage from that vineyard when Phil was about 15 or 16 years old. Coturri became an officially bonded wine label in 1979, and that same year Enterprise Vineyards was also founded. 2005 to 2007 saw rapid growth, prompting Phil to take on Enterprise Vineyards full-time, stepping back from the wine-making side of things. In 2007, Winery Sixteen 600 was founded and spearheaded by the current generation of Sam Coturri, his brother, and his cousin.

The Coturri-Style

"You can't make great wine out of bad grapes."

The Coturri's operate two separate businesses, Enterprise Vineyards on the farming side run by Phil, and Winery Sixteen 600 on the wine-making side, which is mainly run by the newer generation of Coturris.

At Enterprise Vineyards, all vines are CCOF certified. Planting-wise, Zins are a favorite, but notably, they've also planted Rhône varietals. Reds include Grenache, Syrah, Mourvèdre, while whites include Grenache-Blanc, Roussanne, Marsanne, and Viognier. They have chosen to focus on Rhône varietals because it's becoming too hot for the varietals traditionally grown in the Napa and Sonoma region.

Wines from Sixteen 600 are single-vineyard sourced, which they do, so you can really compare and contrast the flavor, terroir, and so on. It also creates a conversation—about taste and then about method—giving them the opportunity to discuss organic farming and why they consider it so important.

Sam and Phil note that luxury brands have begun to realize that the only way to get a product that can justify the high cost they want to charge is to make the wine with organic grapes.

We discussed the challenges and positives of the slope farming that they do.

> Honestly? It takes a lot of money to grow grapes in the places we're growing. Growing grapes in the mountains here isn't like growing them elsewhere—the marine influence stabilizes the climate—keeps it from getting mega hot or mega cold. It wouldn't be possible without that.

We also asked where they see the future of viticulture in the region going. "What we're doing is inherently a multi-generational pursuit. The understanding of a place—of a land—that you get from 20 generations on a plot of land in, say, Burgundy… that can't be replicated. Wine—growing it, making it, aging it—the process is multi-tiered and all decisions affect the final outcome."

Phil Coturri on "Sustainable"

"Sustainable wines, natural wines, and the like… they can use Roundup®! A vineyard has to be certified organic or Biodynamic® to be certain that glyphosate stays away from the grapes and out of the wine." We asked him what he thought about natural wines and that movement, and he answered, "Natural may be the new fad. Certain big wine corporations are starting to look at natural wines as the next hot ticket item."

CHAPTER 10

Making Wine at Home

When making wine on the small scale as a home winemaker, there are a few essential ingredients and tools that make the process easier. The necessities? Grapes, a crushing tool, something to hold the crushed grapes, and a fermentation starter. Early in winemaking's long history, which goes back some 5,000 years, the crushing tool was likely the feet or hands of the winemaker or workers, the receptacle may have been as simple as a hollowed-out log, and fermentation was usually started by the native yeast carried on the berry. Pressing came later in the form of woven "mats" that pressed more juice from the pomace. Presses were found in Greek and Roman ruins dating to first century AD. Wine at that time was stored in animal skins or clay amphora until glass bottles became widely available.

Making Wine at Home

The first essential ingredient is the grapes, which can either be bought or grown. If grown, keep vines free of mildew or botrytis, or if buying grapes, inspect the vineyard if possible before purchasing grapes, or buy from a known grower.

Tasting the grapes is also essential for winemakers who aim to make wine every year. By tasting the harvest for several years, winemakers develop an extra sense of how the juice relates to the wine and learn how to recognize flavor markers present in the grape that can be brought out in the wine.

Sugar content: Learning how to measure the sugar content is a necessity for the home winemaker, more accurately, the percent soluble sugar, which most measuring tools will measure. Commercial wineries send samples of the grape juice to wine labs for a very detailed report regarding what the juice contains. Most small lot wine makers rely

on the "Brix" measurement to determine when to pick. A Brix value, expressed as degrees Brix (°Bx), is the number of grams of sucrose present per 100 grams of liquid. The value is measured on a scale of one to 100 and is used to calculate an approximate potential alcohol content by multiplying by 0.59. So, if a prefermented liquid measures 23 °Bx, its potential alcohol content will be approximately 13.6 percent alcohol by volume (ABV). While Brix is not the option for measuring sugar content, it remains the most affordable and readily available for home winemakers.

Those able to make a number of sample tests in the vineyard over a period of 4 or 5 weeks, will begin to notice that the grape "Brix" goes up about 1 percent in 7 days. This is true for most of the cooler, coastal grape regions. In the warmer interior regions, the same grapes will increase almost 2 percent in 7 days. Knowing how the Brix increase for grapes grown in a specific growing region can help forecast a harvest date. From the start of veraison, grapes will usually reach optimal conditions in 6 to 8 weeks, but by knowing the rate at which the grapes sweeten, a more precise picking time can be established.

There are other factors that influence when to harvest. A heavy rain in the forecast may cause the onset of bunch rot so picking before the rain may be prudent, even if the target Brix value hasn't been reached. In particularly dry years, the vine risks running out of water, causing the leaves to yellow and drop and the grapes to raisin.

Knowing how quickly the sugar will likely increase, along with the time of veraison, gives a clear window to prepare for harvest. Being able to factor in the expected harvest volume enables winemakers to determine how large of a tank will be needed to hold the wine created. A ton of crushed grapes fills a 32 cubic foot container right up to the top, which will produce 62 cases of wine. Most grape yields produce 1 gallon of wine per 15 pounds of grapes; on the other hand, most home wine makers can plan on growing or buying approximately 20 pounds of grapes for each desired gallon of wine.

Fermentation containers vary in size from 5 gallons, to 10, to 20, to 30, to 50 or 60 gallons while multilevel variable top containers can hold

approximately 125 gallons. Containers can be made of glass, ceramic, plastic, wood, or stainless steel.

Red Wine

Red wines are produced by fermenting the grapes in a container with either the natural yeast that is present on the grape skin or by adding a yeast that is purchased from a winery supply or home wine making supplies store. The clusters are usually dumped onto a table for a visual inspection before being put into a crusher. The process of destemming and crushing red grapes can be a formidable task. Hand stripping the berries off the stems is an option, but most buy or rent a crusher/destemmer, which can be manually cranked or motorized. The grapes could also be placed in small, food grade plastic bags, with the tops tied closed, and the bags are put in a watertight container to be stomped. It is recommended that the bags are stomped in a new clean vessel.

The grapes, with or without stems, go into a fermenting container, though it should be noted that the container cannot be completely filled as the fermentation process will generate carbon dioxide (CO2). This gas will *lift* some of the grape mass, mostly skins, up to the top of the liquid level forming the famous *cap*. Usually, the fermenter is filled to about 75 percent of its height.

The process of *punching down* the cap during fermentation is very important in order to extract both color and flavor components from the grape skin. This process is often done 2 or 3 times a day during fermentation and can be managed in small containers with a pair of hands, or in larger containers using some form of punch down tool, which can be purchased from wine supply stores. The cap becomes thicker and raises higher in the container as the fermentation becomes more active. It is essential that the cap be managed so it is pushed down into the fermenting liquid, preferably broken up as it is punched down. Some wine makers extend the punch down tool to try to punch the cap down all the way to the bottom of the container, then lift the material collecting on

the bottom of the container upward with the punch down tool allowing some oxygen exposure.

Some winemakers allow the grapes to sit in the fermenter for a few days before actually beginning fermentation to help extract color without extracting tannin. A yeast is purchased and added to the container to aid fermentation, which is monitored using a hydrometer. Some juice from the fermenter is poured into the hydrometer container and an approximate measure of the remaining sugar in the juice is recorded.

When the hydrometer reads 3 or 4 Brix, or when the hydrometer indicates no remaining sugar, the fermentation process can be concluded at the winemaker's discretion. The alcohol present in the liquid will is responsible for extracting tannin from the seeds and skin.

Most commercial fermentation tanks have a drain port on the side of the tank a few inches from the bottom to drain off the wine. Through fermentation, the bottom of the tank becomes covered with dead yeast, seeds, and sediment that came off the grapes called "lees." The drained off wine is called "free run." To remove the free run, the liquid is pumped from the tank with a screen to keep seeds and sediment out of the free run wine.

Getting the remaining must, that is, wine plus lees, to a press can be done in a few ways. Home winemakers usually scoop it from the fermenter using a plastic scoop or shovel. If the container is small enough it can be picked up and poured directly into a press basket. Wineries usually have a *manhole* door at the bottom of the fermentation tank, which can be opened slowly, draining the must into another tank connected to a pump hose. The pump then moves the must to a press that can separate the liquid from the solids.

The simplest press for home winemakers is a bag made of several layers of cheese cloth. The must is poured into the bag and squeezed over an open top container. The wine is either pumped directly into a container with a closed top or into an open top container and then poured into a closed top container. If a press is used, the drain on the press pan is either set over a container or is connected to a pump hose and pumped directly into a closed top container to settle.

A secondary fermentation may be needed with just the pressed juice, now called wine. Removing the liquid from the skins adds lots of oxygen to the wine and can reactivate the yeast to help finish off any remaining

sugars. In addition, a secondary fermentation process may be desired to convert the malic acid in the wine to lactic acid, called *malolactic fermentation*. Malic acid is an acid found in apples that has a sharp acid taste, which, through the conversion to lactic acid, provides a softer acid taste. This fermentation can occur naturally or it can be encouraged by adding a malolactic bacteria, which can be purchased from a wine supply store. Wine makers have a wide variety of malolactic bacteria sources to choose from, which are chosen based on the wine they are to convert or to better match the goal wine product.

During this time, a natural settling of the wine in the closed container will occur causing very small particulate to settle via gravity once all the active fermentations stop or slow down. A lees layer will often form at the bottom of the container after 3 or 4 weeks. It is best seen if some of the pressed wine is put into a clear glass container. This so called *gross lees* layer settles to the bottom of the container and is distinguished by its difference in color from the rest of the wine. After settling, the wine may be transferred to another vessel, leaving the gross lees to be discarded, in a process called *racking*. The process of moving the wine off the settled lees is called *racking*. This is done to reduce the chances of any off odors developing in the gross lees. Once racked, further settling is done, along with a slow aging of the wine in the container. If done in a wood barrel the term *barrel aging* is used.

A second racking may or may not be deemed necessary by the winemaker. If so, it is done several months after the first racking. This can help the aging process and further clarify the wine. Some wine makers do a natural clarification, and some add *fining agents* to enhance the process. The goal at the end of it is to have a translucent wine product, with the targeted flavors present and the tannins softened, making it ready to bottle.

Bottling

Gravity flow is used to move the wine to bottles. Either the wine container can be lifted onto a rack that is high enough so the wine will flow down into a bottling filler by gravity or the wine could be pumped up into a container that is high enough to allow the wine to flow into a bottling

filler. In either case, a small plastic tube is used to move the wine from the container to the bottle filler. The simplest filling device is a long plastic tube that has a *filling wand* attached to the end with a spring-loaded valve that is inserted into the bottle. The bottle filler has a small tank with a float valve and a filling spout.

Once filled, a corker or corking machine can be used to insert a cork into the bottle to finish the process.

Contribution by Carmine Indindoli

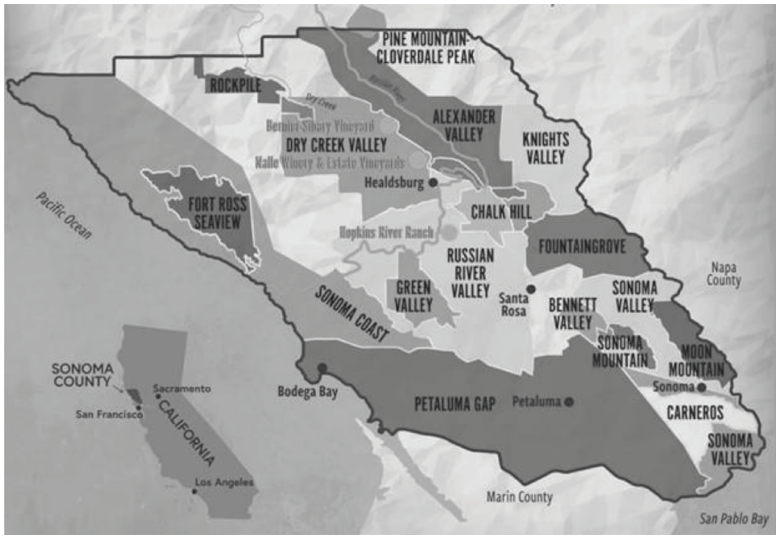
CHAPTER 11

Petaluma Gap AVA: Establishing a New American Viticultural Area

The Petaluma Gap AVA is a winegrowing area that covers northern Marin County and southern Sonoma County from Bodega Bay to San Pablo Bay. For travelers from the greater Bay Area, it is the gateway to Northern California's wine country. Wind and fog are Petaluma Gap's trademark; its name hails from the coastal mountain gap that allows the wind to flow through the town of Petaluma, roaring south to San Pablo Bay.

The Petaluma Gap is a grower-focused region with a rich history of agriculture dating back nearly 200 years. It began in the 1830s when General Mariano Vallejo, the military governor of Mexican California, began planting grapevines at The Petaluma Adobe, the rancho headquarters that is now known as Petaluma Adobe State Historic Park. The area's vineyards are shaped by this agricultural beginning.

Vineyards are often nestled in with cattle, sheep, chickens, and fruit trees. Crest a hill, round a curve, look into the little nooks and crannies that make up the Lakeville, Adobe Road, or West County landscape and you will notice pockets of green, with rows upon rows of grapevines. The vines bring brilliant patches of color to the golden grasses that support the neighboring pastures of cows and sheep. Petaluma Gap grape growers are stewards of the land and are dedicated to farming sustainably, with many growers subscribed to organic or Biodynamic® viticultural practices.



The Petaluma Gap Winegrowers Alliance, the organization that drove approval of the Petaluma Gap AVA, was founded in 2005. The founding members were largely grape growers who wanted to share stories about the growing conditions in the Petaluma Gap. The wind and fog that define the region bring advantages but also create challenges that these growers wanted to discuss in a collegial setting. Many of the early meetings took place at Ernie's Tin Bar on Lakeville Highway, a very popular hangout for farmers and winemakers.

By 2015 local winemakers had also joined the Alliance. They began discussing the distinctive flavor profiles of the wines being made from grapes grown in the Petaluma Gap and felt that because of the unique growing conditions and terroir, the Petaluma Gap should have its own AVA. And thus, it began.

Before the application was submitted, Alliance leaders engaged in a lengthy study of wind patterns which would yield critical data for defining the AVA boundaries. Previous studies have shown that sustained winds of 8+ mph during the growing season have a profound effect on grapevines, resulting in significant changes to their physiology.

Once the wind exceeds 8 miles per hour, the stomata (the pore-like openings on the underside of the grape leaves) begin to close as a protective measure against the effects of the wind. This happens because the "guard cells" surrounding each stoma regulate the rate of transpiration by opening and closing, to preserve moisture. The closing of the stomata slows the rate of photosynthesis, thus allowing the grapes to stay on the vine longer resulting in the development of deeper flavor profiles.

Certainly, there are other windy wine-growing regions. But the afternoon wind speed within the Petaluma Gap is unique in its consistency and intensity. This is due to the low coastal terrain bordered by higher hillsides perpendicular to the coast, creating a funnel for the cool Pacific air to rush through the Petaluma Gap and out through San Pablo Bay. To illustrate this, wind speed data from several weather stations within the Petaluma Gap area were analyzed and compared with wind speed data from weather stations adjacent to, but outside, the Petaluma Gap. This analysis was focused on the wine grape growing season (April 1 through October 31) and for the afternoon hours of 12 noon through 6:00 PM, Pacific Standard Time. Five years of data from existing meteorological stations throughout the area were gathered and analyzed. These wind data helped to define the AVA boundaries where the wind regularly exceeded 8 miles per hour.

The consistent winds also result in smaller berries with thicker skins, yielding a high skin to juice ratio. This in turn results in more intense color and varietal characteristics in the finished wines.

The process of applying for AVA status includes multiple phases and is not an easy task. In the case of the Petaluma Gap, it involved submitting an application, sitting out a review period and requests for additional information, another review period with public comment, and then a long wait until the AVA was finally approved. During that time, a new administration was elected at the federal level and established a moratorium on new rulemaking. This moratorium directly impacted all

AVA applicants waiting for federal government approval, including the Petaluma Gap application. Additionally, after the Alcohol Tobacco Tax and Trade Bureau (TTB) approves an AVA application, the approval must be countersigned by the Treasury Department, which has the ultimate authority. Unfortunately, the position designated with responsibility for the approval went unfilled, causing delays as the Petaluma Gap AVA application languished for months without the necessary signatures required for final approval.

Fast forward to the fall of 2017, when Sonoma County experienced heavy fire damage during wildfires that were fueled by years of drought and heavy brush that hadn't been cleared from hillsides overlooking the valley. The vineyards of the Petaluma Gap didn't burn, but with heavy smoke in the air, tourism and wine sales took a hit.

By this time, the Alliance had reached out to Congressmen Jared Huffman and Mike Thompson, to see if they could assist with the AVA approval process. As a result of the fires, the Congressmen were eager to help members of the area's marquis wine industry and this was a meaningful way for them to make a difference. Within weeks of the fires, the AVA was officially approved; it was published in the Federal Register on December 7, 2017. After the final 30-day waiting period, on January 8, 2018, the TTB began accepting wine label submissions from winemakers who wanted to put the Petaluma Gap AVA on the front label as the source of the grapes for the wines they produced and bottled. Today, hundreds of bottles labeled with Petaluma Gap as the AVA are members of what the Alliance calls its 90+ Point Club, garnering reviews and awards of 90 points or above from well-respected wine writers and judges.

The Petaluma Gap has long been committed to sustainability and respectful farming practices. As of 2020, 99 percent of Sonoma County's vineyards are "Certified Sustainable." It is important to note that half of the just over one million acres in the county are still in a natural state of woodlands and forests. Six percent of the Sonoma County's total acres are production vineyards and for every acre of vineyards its growers farm, there are an additional two acres of diversified agriculture, including dairy, poultry, fruit and hay. The most prominent grape variety grown in the Petaluma Gap is Pinot Noir at 75 percent, followed by Chardonnay and Syrah plus a few acres of other cool climate grape varieties.

Leaders in Sustainability in the Petaluma Gap AVA

In 2019, the Petaluma Gap Winegrowers Alliance held its first seminar on sustainable, organic, and Biodynamic® farming practices. Several vineyard owners and vintners attended. Here are some vintners who have taken on AVA leadership roles in the commitment to be 100 percent sustainable. This information is summarized from their respective websites and provided by the owners.

Cline Family Cellars is committed to stewardship of the land, through its natural and sustainable farming methods and by bringing interconnected systems into harmony. Fred Cline and Bobby Cannard developed the Green String farming method, a system that promotes and enhances biodiversity, biological cycles and soil biological activity and is used at Cline's vineyard properties. These methods minimize pollution and optimize the health and productivity of soil, plants, animals, and people. Instead of herbicides, sheep and goats roam the vineyards, tasked with removing invasive weeds. Cover crops feed the soil; a wide mix of plant types are chosen specifically to produce soil-enhancing organic material. Instead of harmful pesticides, owl boxes and raptor perches in the vineyard are used to keep pests under control. In 2005, Cline was one of the first wineries to fully adopt solar energy, and in 2018, they upgraded the original array with the latest technology, designed to offset 100 percent of its electrical consumption. Adapted from Cline Cellar's website, https://clinecellars.com/about-us/farming-practices.

Keller Estate farms its 92 acres of Chardonnay, Pinot Noir, Pinot Gris, Syrah, and Viognier grapevines sustainably and organically. As part of the inclusive practices, they incorporate methods such as bee-keeping, maintaining owl and bat boxes, and a flock of over 200 sheep that graze and fertilize their land. They carefully manage the pond system that ensures their water supply as well as providing a safe haven for wildlife. In 2015, they began transitioning to organic farming, with three areas of focus: soil nutrition, under the vine management, and organic pesticide and fungicide approaches.

McEvoy Ranch strives to create a self-sufficient and balanced agricultural ecosystem, embracing diverse plant and animal populations. On the Ranch, they practice the sustainable use of resources while tending the soil, supporting the flora and fauna dependent on its health, and tapping the solar energy that powers the growth cycle. McEvoy's orchards and gardens are maintained in accordance with organic standards and are certified by the California Certified Organic Farmers (CCOF.) Active fertile soil is the foundation of their approach to farming. To enrich soils, eliminate off-ranch waste, and reduce water consumption, they produce their own organic compost from the by-products of olive oil and wine production, farming, and maintenance of the Ranch landscape and gardens. The olive paste that remains after oil extraction and the wine lees are mixed with livestock manure and plant materials for effective composting. The liquid waste, or olive fruit water, is used to maintain compost moisture. Compost helps develop the organic matter content of their soils, enhancing the quality and productivity of their plantings. Adapted from McEvoy Ranch's website, www.mcevoyranch.com/about/farming-practices

Sangiacomo Family Vineyards has employed many sustainable methods of farming since they began cultivating their land in 1927, gradually increasing these practices over the years. In 2015, they attained 100 percent sustainable certification for all their vineyards, from the California Sustainable Winegrowing Alliance (CSWA). As sustainable farmers, they have committed to being environmentally conscientious with farming practices, economically viable as a business and socially responsible in how they treat employees and their surrounding community. Of prime importance is irrigation; small drip irrigation blocks

are used to conserve and control water usage. Other methods are used to assess grapevine nutrition during the growing season while planting cover crops, adding organic matter to the soil and fertilizing through drip irrigation as needed. Infrared mapping is employed to evaluate the long-term health of their vineyards, while also regularly walking, row-by-row, to visually monitor the grapevines. Adapted from Sangiacomo Vineyards' website, https://www.sangiacomo-vineyards.com/sustainability.

For other outstanding wines and vineyards operating in this unique, wind-driven terroir, visit https://petalumagap.com
Contribution by Cheryl Quist

Glossary & Terms

American Viticultural Area (AVA)—a federally-recognized winegrape-growing region.

Appellation d'Origine Contrôlée (AOC)—sets of standards for wines made in France. 363 AOCs exist for wine and spirits in France, providing direction for everything from how grapes are to be grown to what wine varieties are or can be in the bottle.

Cuvée—a batch of wine distinguished by a particular blend or fermentation. Much like how each paint mix differs a bit from others of the same color, each batch of wine is distinct from others, even of the same year or mix ratio.

Estate Wine—some wines may be "estate-bottled" or an "estate wine." This designation refers to wine made entirely from grapes owned by the winery, and the wine is made entirely on the winery's property.

MLF Fermentation—Malolactic fermentation is the process by which bacteria convert tart malic acid into smooth, even creamy, lactic acid and carbon dioxide. Lactic acid is the same acid found in milk.

Sur Lie—French for "on the lees", wines aged sur lie are kept in contact with the dead yeast cells and are not racked or otherwise filtered. This is mainly done for whites, to enrich them. It is a normal part of fermenting red wine, and so is not usually noted.

Terroir—a wine's sense of place, expressed in the wine. This may include macroclimate and microclimate, soil type, geomorphology, topography, other organisms growing in, on, and around the vine plots, and the general environment in which the grape is grown.

Veraison—the onset of the ripening of the grapes. This is when red grapes change color from green to pink for reds or when grapes change from a bright green to a softer yellow green for whites.

Further Exploration and Learning

Amigo Bob's Book Recommendation List:

- *Farmers of Forty Centuries; Or, Permanent Agriculture in China, Korea and Japan* by Franklin Hiram King
- *The Soil and Health: A Study of Organic Agriculture* by Albert Howard
- *Five Acres and Independence: A Practical Guide to the Selection and Management of the Small Farm* by Maurice G. Kains
- *Soils & Men: a Yearbook of Agriculture 1938* by U.S. Department of Agriculture
- *Organic Principles and Practices: Green Manuring* by Adrian Pieters
- *The Albrecht Papers: Vol. 1—Foundation Concepts & The Albrecht Papers, Vol. 2: Soil Fertility and Animal Health* by William A. Albrecht, Charles Walters
- *Silent Spring* by Rachel Carson
- *Eco-Farm, An Acres U.S.A. Primer* by Charles Walters Jr
- *Plowman's folly* by Edward H. Faulkner
- *Common Sense Pest Control* by William Olkowski
- *Organic method primer update: A practical explanation* by Bargyla Rateaver
- *Mycelium Running: How Mushrooms Can Help Save the World* by Paul Stamets
- *The Nature and Practice of Biological Control of Plant Pathogens* by R. James Cook, Kenneth Frank Baker
- *The New Organic Grower: A Master's Manual of Tools and Techniques for the Home and Market Gardener* by Eliot Coleman
- *The Encyclopedia of Organic Gardening* by J. I. Rodale

Other Resources:

- *The One-Straw Revolution: An Introduction to Natural Farming* by Masanobu Fukuoka
- The Josephine Porter Institute for Applied Biodynamics—https://jpibiodynamics.org
- John Kempf, the founder of Advancing Eco Agriculture, Crop Health Labs, Ozadia, and the Regenerative Agriculture Academy. Hosts the Regenerative Agriculture Podcast, where he interviews top growers and scientists about the principles and practice of implementing regenerative agriculture on a large scale.—https://johnkempf.com

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About the Authors

Pamela Lanier

In 2017, Pamela and her team established a United Nations World Tourism Organization affiliate, the Sonoma Sustainable Tourism Observatory, which shifted her focus from international sustainable tourism to local. Noticing the vast impact wine tourism has in this region on all pillars of sustainability, she was inspired to create a guide to the many modalities of sustainable viticulture in the San Francisco North Bay, specifically, Sonoma and Napa Valleys.

Pamela Lanier is the author of 20 titles in 120 editions, and her latest titles include *Sustainable Tourism: a Small Business Handbook for Success*, *The Good Company: Sustainability in Hospitality, Tourism, and Wine*, and *Marketing Essentials for Independent Lodgings*.

Working in the fields of conservation and ecotourism has been her exclusive focus for the last ten years, participating in and speaking at international conferences. She has addressed organizations such as IUCN at the World Conservation Congresses and the World Parks Congress, and UNWTO at the yearly meetings for the International Network of Sustainable Tourism Observatories.

As a student, Pamela was a youth delegate to the first United Nations Environmental Congress in Stockholm.

Jessica N. Hughes

Jessica Nicole Hughes is a San Francisco Bay Area native and lover of the natural world. Following graduation with her Bachelor's degree from Sonoma State University in Earth Sciences, she turned her attention to sustainable tourism in the SF North Bay, helping to establish the Sonoma Sustainable Tourism Observatory in 2017. She has continued her work with the Observatory as Project Coordinator and expects to see it grow in the next decade.

After years of working behind the scenes on presentations and speaking proposals for others, she will attend the next World Conservation Congress as a member of the Young Leaders & Youth Delegation. She is a member of the IUCN's Commission on Education and Communication, and a member of the following subgroups: IUCN CEC Young Professional Group, IUCN CEC NatureForAll, CEPA, Social and Behaviour Change Communications, IUCN CEC Community Management, Traditional Knowledge, Empowerment.

This is her first publication.

About the Contributors

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After her career as a marketer for the professional and trade division of John Wiley & Sons, Lora is now a writer and marketing consultant for academic publications and newsletters. She is currently the social media editor for Women in Higher Education, a monthly newsletter for university professionals. A lifelong advocate of sustainable and accessible agriculture for communities, she worked closely with neighbors to revitalize the Lanham Village Community Garden in 2008 and continues to volunteer in the Garden each year. She lives in Marin County California with her bees and chickens.

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Pamela Busch

Pamela Busch is a 30-year wine industry veteran, writer, entrepreneur, educator, organizer, and activist based in the Bay Area. After two years of sommelier and consulting work in San Francisco, they opened Hayes & Vine in 1994, and in 1998, Pamela started The Grapes of Path wine school. In 2005, they found a way to incorporate their work as a buyer, educator, and writer into CAV Wine Bar & Kitchen, one of the first Bay Area venues to carry natural wines.

In 2013, Pamela started *The Vinguard*, a blog focusing on natural wine as well as inequalities in the wine industry and has continued to be a powerful voice for the women's movement as it relates to discrimination in the wine industry. As of 2020, *The Vinguard* is now a 501c3 organization whose mission is to build a collaborative community in the natural wine space centered around its RENEW (regenerative, environmental,

natural, equitable, women) wine program that uplifts and is driven by a diverse representation of women and nonbinary genders. Pamela founded WINeFare in 2018 to give women who work with natural wine a platform for their work.

Pamela lives in the Mission District of San Francisco with their partner and cat.
www.thevinguard.com

Cheryl Quist

Cheryl Quist is the Executive Director for the Petaluma Gap Winegrowers Alliance. She has worked in the wine industry for 20 years, having also held positions with Duckhorn Wine Company, the Anderson Valley Winegrowers and the Rhone Rangers. She is also a SuperHost for AirBnB and enjoys hosting guests from around the world. Ms. Quist earned a Bachelor of Arts degree from Wheaton College (Norton, MA) and a Master of Business Administration from Babson College (Wellesley, MA) and began her career in Sales and Marketing in the technology sector.

She resides in Santa Rosa, CA with her husband and beloved Romeo, the cat.

Carmine Indindoli

Celebrating in 2020 his 50th grape harvest year, Carmine is a dedicated winegrape grower. His education began in 1970 with classes at Napa College, UC Davis and Santa Rosa JC in Viticulture and Enology. Carmine started with a very small planting of 28 vines and continued through the years to establish 135 vineyards while managing as many as 200 viticultural sites, with experience covering most

California wine grape varieties. A believer in educating others, he teaches two classes, "*How to establish a vineyard*"; and "*How to manage an existing vineyard.*" He's visited many European and New Zealand grape growing areas to gain a more international perspective. He's known as a hands-on grape grower with the motto "From vine to wine."

Carmine is also a board member of the Sonoma County Vineyard Technical Group, and named by the Sonoma County Winegrape Commission as the recipient in 2012 of the Spirit of Sonoma Award to a grapegrower.

Still going strong at age 79.

Heather Duplaisir

Heather Duplaisir is a professor at San Jose State University in the Department of Public Health and Recreation. She has a Master of Science in Recreation from San Francisco State University where her focus was on sustainable tourism. Her publications include the textbook: Girling, R., Gordy, H. & Lanier, P. (2016) *The Good Company: Sustainability in Hospitality, Tourism and Wine*, as well as the article: Duplaisir, H., Látková, P., Wilson, J., & Everette, M. (2019). *Impacts of Participation in Socially Responsible Tourism on Tourist's Attitudes and Future Behavior: Amazon Watch Journey to Ecuador* in the Journal of Tourism and Leisure Studies.

She was the winner of the International Award for Excellence in May 2019. She also has an Outdoor Educator Certification awarded by the National Outdoor Leadership School in August 2012. She has spoken at tourism conferences both globally and locally on sustainable tourism.

"Amigo Bob" Cantisano

June 25, 1951—December 26, 2020

"Amigo Bob" Cantisano is perhaps best known as the founding organizer of the annual Ecological Farming Conference, which celebrated its 40th anniversary in January 2020 and is the largest sustainable agriculture gathering in the Western United States. Recognized among conference-goers for his adept leadership of Eco-Farm's popular bus tour of Central Coast organic farms—and for sporting trademark shorts and sandals no matter what the weather—Amigo has been involved with diverse aspects of organic foods and farming since the late 1960s. He was involved in early efforts to certify organic farms and products, helping to found California

Certified Organic Farmers (CCOF), and he collaborated in the production of an early organic-products trade journal.

Cantisano has also worked as an organic farmer, growing a variety of crops over the years in a succession of California locations. His search for a reliable source of organic inputs led him to found a farm supply company, Peaceful Valley, which grew at an astonishing pace and currently operates under different owners in Grass Valley, California. His desire for better communication among organic growers in California prompted him to organize a 1981 gathering that evolved into EcoFarm (whose organizers have recently dropped the hyphen in their moniker). Cantisano established the first organic agriculture advising business in the country, and served for many years as the only independent organic farming adviser on the West Coast. Operating for more than two decades now as Organic Ag Advisors, he has consulted with hundreds of small and large growers of fruits, vegetables, wine grapes, grains, and other crops—advising both organic farmers and those making the transition from conventional farming.

Amigo's most recent venture, the Felix Gillet Institute (the FGI), aims to assess and document the impact Felix Gillet's actions had on the growth and presence of agriculture in the United States today. To do this, they educate farmers and gardeners about the many tree and plant species he introduced, which provides valuable genetic material for propagation of excellent food, fiber, and ornamental crops with great hardiness, resistance to disease and insects, excellent culinary qualities, and longevity. FGI identifies the sites of historic Gillet-introduced perennial plants, evaluates the crops that are found, propagates the cream of these varieties and species, and reintroduces these plants into modern agriculture.

To purchase heritage varietals from the Felix Gillet Institute, visit their site at felixgillet.org. Please note that not all plants can be shipped.

Amigo passed away during the production of this book, but his legacy lives on at events like EcoFarm and through the organic movement he helped build.

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Healthy Vines, Pure Wines

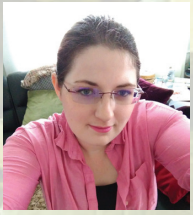
Methods in Organic, Biodynamic®, Natural, and Sustainable Viticulture

Pamela Lanier and J.N. Hughes

Healthy Vines, Pure Wines serves as a guide which derives its information from real-world sources to share green practices in sustainable viticulture in a practical way. Including a how-to on treating vineyard issues organically, a look at how climate change is affecting viticulture, and a special focus on women in the field, this handbook maintains a forward focus.

Also included are sixteen case studies on successful organic, biodynamic®, and sustainable wineries from the San Francisco North Bay Region, focusing on how what each has done can be replicated.

For over a decade, **Pamela Lanier** has focused her work and advocacy on international issues in conservation and ecotourism. In 2017, Pamela and her team established a United Nations World Tourism Organization affiliate, the Sonoma Sustainable Tourism Observatory. Noting wine tourism's impact on all pillars of sustainability in the region, Pamela was inspired to create a guide to the many modalities of sustainable viticulture in Sonoma and Napa Valleys. Pamela is the author of 20 titles in 120 editions, including *Sustainable Tourism: A Small Business Handbook for Success and Marketing Essentials for Independent Lodgings.*



Jessica Nicole Hughes is a San Francisco Bay Area native and lover of the natural world. Following graduation with her bachelor's degree from Sonoma State University in earth sciences, she helped establish the Sonoma Sustainable Tourism Observatory in 2017 and now serves as project coordinator. She is a member of the IUCN's Commission on Education and Communication, and a member of the following subgroups: IUCN CEC Young Professional Group, IUCN CEC Community Management, and Communication, Education and Public Awareness. This is her first publication.

Tourism and Hospitality Management Collection
Betsy Bender Stringam, *Editor*

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