FARMING FOR QUALITY
Growing Great Pinot Noir

This workshop is an in-the-vineyard experience of Oregon’s progressive cool-climate viticulture practices. You will see first hand the innovative techniques and technologies, as well as the rediscovered farming wisdom of the past, which we are exploring in our attempt to farm for both quality and sustainability. Discuss clones, rootstocks, vine spacing, trellis systems, crop yields, biodynamics and biodiversity with some of Oregon’s best grape growers. Presented at Domaine Drouhin Oregon.

Topics to Investigate:

Long-term vineyard decisions
- Site selection for wine quality
- Selection of clones and rootstocks for Oregon conditions
- Vine density adaptations to our cool climate

Viticultural practices for optimal fruit quality
- Crop management
- Canopy management
- Water management
- Conserving soil stability and structure

Maintaining vine health
- Function of biodiversity in the vineyard ecosystem
- Managing natural processes for vine nutrition
- Managing pests and diseases with natural, biological, and physical controls

Moderator:
Mimi Casteel, Bethel Heights Vineyards

Presenters:
Leigh Bartholomew, Archery Summit
Jason Tosch, Anne Amie Vineyards
Jason Lett, Eyrie Vineyard
Joey Myers, Vinetenders
Tim Scott, Domaine Drouhin Oregon
Rebecca Sweet, Van Duzer Vineyards
Part 1: Long-Term Vineyard Decisions

Site Selection
Much is said about how and why the Willamette Valley is the perfect place to grow Pinot noir. But once that most fundamental “long-term vineyard decision” has been made, it must be said that not every acre in the Willamette Valley is created equal. Indeed, most of the acres of the Willamette Valley are deep, rich valley-floor soils brought to us all the way from Montana by the Missoula Floods at the end of the last ice age. These valley floor soils are paradise for a great diversity of crops, but the prevailing belief for many years was that these soils were not ideal for growing Pinot noir. However, recent economic pressure and the ever-present desire to push the envelope has meant that several growers have started planting on and near the valley floor. These soils are undeniably richer than the hillsides, and are therefore capable of carrying a heavier cropload, which can, in the end, make a less expensive bottle of wine. It remains true that Pinot noir at low elevations is subject to frost damage in the spring, and in such deep soils it can become overly vigorous, and therefore requires careful management.

For now, the majority of Willamette Valley Pinot noir grows on rocky hillsides facing south or southeast, at least 200 feet above sea level. This is a common factor amongst the six AVAs within the Willamette Valley, regardless of soil types and weather patterns.

Elevation
One of the lessons from the first 30 years of grape growing in Oregon had already been learned in cooler parts of Europe; that is, higher elevation plantings are slower to ripen. Grapes grown at higher elevations have a balance ideally suited for sparkling wine. Champagne is cooler than Burgundy, and high elevation Oregon is cooler than low elevation Oregon.

There is also a difference between what can be called the mid-panel of elevation (500–700') and the low-panel of elevation (300–500'). Low-elevation wines generally get riper, and often are more powerful and more forward. When the mid-elevation grapes get ripe, which may not be every vintage without considerable intervention, they produce wines with more finesse and restraint. In the recent hot vintages in Oregon, the high elevation sites have had a chance to prove their value.

Clone Selection  (see Chart of Red and White Clones in Oregon, Reference Section)
Pinot noir is known for its great genetic variability; so is Chardonnay, to a lesser extent. Over the centuries, growers observed individual vines that performed differently from the neighboring vines over a period of years. Quite often those differences were expressed in growth characteristics, cluster shape and size, and, most importantly, ripening date. When growers decided they wanted a whole new field grown from cuttings from a single plant, these selections came to be known as clones.

Although the pioneers of the Oregon wine industry were led to the Willamette Valley by the radical notion of matching variety to climate, the notion of matching clone to climate was not in the equation before 1974.
Originally all our plant material came to Oregon via California. In California, with abundant heat and light, variations in clones did not draw much notice. In Oregon, they began to loom large, especially in cool, rainy vintages. We were very lucky that the two clones of Pinot noir available in the beginning, Pommard and Wädenswil, actually performed quite well here in most vintages. With Chardonnay we were not so fortunate. The ubiquitous “Davis super-clone” (a.k.a. clone 108) was very productive and very high in acid, often failing to ripen in vineyards in the Willamette Valley.

Beginning in 1974, David Adelsheim led an initiative to import new clones from Europe. Many of the new clones came from France via Dijon—hence the name “Dijon clones”—for a collection of Pinot noir and Chardonnay clones that finally became widely available to growers in Oregon after 1988, following years of quarantine and testing at Oregon State University.

When the Dijon clones were first released, their acceptance was not universal. Now, after years of comparisons, one major difference has emerged. The old Pinot noir clones of Pommard and Wädenswil tend to be larger-clustered, and often have wings and shoulders. It’s true that these shoulders can be thinned off, but that is another chore. Even more importantly, these clones produce wines with slightly different flavor profiles, giving winemakers more tools in blending.

The impact of clonal differences was even more pronounced in Chardonnay. Often the final cluster weight of the Dijon clones is half that of the original California clone, which is a big factor in cool climates.

**Rootstock Selection**
Early Oregon vineyards were planted on their own roots, before the arrival of Phylloxera. This contrasts with European vineyards, where all winegrapes have been necessarily grafted onto Phylloxera-resistant rootstocks since the nineteenth century.

Since phylloxera was discovered in Oregon in 1990, most new vineyards have been planted on phylloxera-resistant rootstocks. A secondary effect of this practice derives from the fact that many commonly used rootstocks are devigorating. This has proved to be an advantage in our moist climate, since the grower’s job is to get the vines to stop growing at a certain point and put their energies toward the fruiting process. Another factor often attributed to clone, but certainly greatly affected by rootstock, is that of early ripening. Even when bloom is relatively uniform across clones, devigorating rootstocks will almost always have accelerated brix accumulation.

**Vine Density**
Although many of the founders of the Oregon wine industry came to the Willamette Valley by way of California, they soon realized that Northern Europe was a more appropriate viticultural model than Napa, since our latitude and climate more closely approximate that of Alsace, Burgundy, Champagne, and Switzerland.

Early connections with the Swiss, especially Dr. Werner Koblet of the Wädenswil Viticulture Experiment Station, had a major impact on the development of Oregon viticulture. The Swiss had a strong, practical approach to growing grapes in a cool, moist, disease-prone climate. From them we learned viticultural techniques that were not in the California curriculum but which are
critical to successful viticulture in Oregon’s climate, such as vertical training and trellising, leaf pulling, and intermediate vine spacing (around 800 vines per acre).

In 1989, with the arrival of the Drouhin Family, Burgundian style, high-density plantings (3000 or more vines per acre) began to appear in Oregon, along with a new generation of tractors and other specialty vineyard equipment. Since wine growing is basically the capture of light by leaves, the most important idea behind higher density planting is to have more rows and more leaves as receptors. Any light hitting bare ground is wasted. Once the light is captured, the grower nurses the process of the leaves, converting that light into fruit.

The theory of high-density vineyards is that having fewer clusters per vine allows the fruit to ripen more easily. Also, higher density plantings tend to dry out the soil sooner in the season, and the resulting stress sends a message to the vines to put their energies into the ripening process sooner. Since higher density planting began in the late 1980s, many variations have been tried and debated. In warm years, the benefit of dense spacing seems to be less than in cool years. In the end, the argument comes down to wider-spaced old vines (20 years plus) on their own roots vs. young vines at higher density on early rootstocks—one of those apples vs. oranges questions. Great wines are made from both, with conscientious vineyard management.

For a summary of the relationship between vine density and yield per vine, refer to the Farming for Quality FAQs chart on the last page of this section.

**Part 2: Viticultural Practices For Optimal Fruit Quality**

**Vine Balance**

*Expressive wines come from healthy, balanced vines that are able to take advantage of everything a specific site offers.*

Winegrowers agree that vines need adequate—but not excessive—heat, light, and moisture to produce a successful vintage. Yet what constitutes too much or too little of each variable is the subject of considerable debate. These, and other, variables interact with the unique characteristics of each vineyard site to determine vine balance. While vine balance is difficult to state succinctly, it involves the relationships between vigor and stress, reflected in the vine by such measurable elements as the size of individual leaves, the size and average diameter of canes, and the quantity of fruit produced. When vines are out of balance, ripening can be delayed, and wine quality may be affected negatively.

Vine balance is greatly influenced by the amount of water and nutrients in the soil. Too much water and nutrition can produce excessive vigor, vegetative growth, delayed ripening, and undesirable flavors in the resulting wine. Inadequate water and nutrients compromise the vine’s ability to produce sugar and flavor precursors so vital for high-quality Pinot noir.

Ultimately, winegrowers must monitor their vineyards and understand the impact of specific meso-climates, soil types, and viticulture choices on vine balance and wine quality through experience and observation.
Irrigation
One of the ongoing debates among Oregon winegrowers concerns irrigation. Like a marathon runner who runs out of energy before the finish line, vineyards (and therefore fruit quality) can sometimes suffer from the long, dry, and hot summers that occur in Oregon more often than people from outside the region may realize. Burgundy and other cool-climate winegrowing regions of Europe, where irrigation is generally banned, often receive late-summer rains, which are not usual in Oregon.

Removing weeds that compete for water is essential in these conditions, and sometimes cover crop is also removed in summer to reduce competition. On the other hand, research has indicated that some drought stress is beneficial for wine quality. Those who choose to irrigate generally do so only after careful observation of vineyard conditions or only for establishment purposes. Moisture-holding capacity of different soil types is one of the critical factors determining these choices. Vine density in well-drained, droughty soils is another factor that will influence water demands. The higher the density, the more competition for water.

Crop Management
One issue where there is wide agreement among growers concerns the effect of crop level on wine quality. Willamette Valley Pinot noir is typically produced at a finished yield of 2 to 2.5 tons per acre. With denser plantings growers look more to pounds per vine than tons per acre for targeting yields. In large crop years such as 2003, 2006, and 2009, average yields were closer to 2.5+ tons per acre. In 2004, a notoriously small crop year, the yield in many Willamette Valley vineyards was considerably less than 2 tons per acre.

Flowering, or bloom, is the key event that influences crop levels. Because grapevines are programmed by evolution to maximize self-preservation, they are inclined—given optimal conditions—to produce more berries than winemakers would like to see. Alternatively, when conditions are bad, vines tend to abort many of the flowers and wait for a better day to produce offspring. The average weight per cluster thus varies significantly from year to year, but on average Pinot noir clusters weigh about 0.2 pounds each.

Sometime after flowering, the grower needs to determine—usually within 5–10%—what the final production will be. If the crop level is considered too high for the purposes of winemaking, a portion of the crop is thinned. It takes a good deal of courage to trust hypothetical calculations and then go out to cut off clusters. You can see how this is done in the vineyards in July.

Canopy Management
Winegrowing is basically the capture of light by leaves. In a cool climate where the grapes ripen at the very end of the season, every bit of sunshine counts. The goals of canopy management are to expose every leaf to the sun for maximum photosynthesis, to keep the fruit clusters exposed to air circulation to minimize disease pressure, and to maximize the effectiveness of sprays.

Canopy management involves several different operations during the growing season, including shoot thinning, shoot positioning, leaf pulling, and hedging. Many of these operations (as well as crop thinning) are done by hand. Canopy management is time consuming, labor intensive, and expensive, but it is essential for wine quality.
Part 3: Maintaining Vine Health

The Soil Food Web

*Healthy living soil, rich in microorganisms, is essential for growing healthy vines capable of resisting disease and expressing the full range of qualities inherent in any vineyard site.*

Soil is more than just weathered rock. Whether you are looking at basaltic or marine sedimentary soils, when you get to the “A” and “O” horizons, soil is a living system. The soil food web is the community of organisms living all or part of their lives in the soil. All food webs are fueled by the primary producers that use the sun’s energy to fix carbon dioxide from the atmosphere. Most other organisms get energy and carbon by consuming the organic compounds found in plants, other organisms, and waste by-products. As organisms decompose complex materials, or consume other organisms, nutrients are converted from one form to another, and are made available to plants and to other soil organisms. All plants and animals ultimately depend on the food web for their nutrition. (Ref: www.soilfoodweb.com)

In vineyards without a healthy population of soil microorganisms (especially mycorrhizal fungi, whose unique importance for grapevines is just beginning to be understood) many of the nutrients in the soil are unavailable to the vines; vines become dependent on synthetic nutrients applied through unnatural life support systems. Disease resistance is impaired. Nuances of flavor and aroma are lost.

Tools we use to enhance soil biology in the vineyard

- Compost, compost tea, and biodynamic preparations
- Incorporating green manure
- Avoiding use of pesticides and herbicides
Biodiversity and Integrated Pest Management

Biodiversity above ground is just as important as biodiversity in the soil for growing healthy vines that are capable of resisting pests and diseases with little or no chemical intervention. In Oregon, we are fortunate to have very few serious insect pests in vineyards, and we are able to rely to a large extent on predator insects to keep them under control. Tools we use to encourage a healthy population of beneficial insects include:

- Maintaining a diverse cover crop of flowering plants
- Alternate row mowing to maximize pollen availability
- Avoiding the use of pesticides and herbicides.
- Maintaining uncultivated compensation areas around the vineyard to increase biodiversity
Cultural practices for disease prevention
Powdery mildew is historically the only serious vineyard pest in Oregon (other than phylloxera). Vinifera has no natural resistance to powdery mildew, and a serious infestation can completely defoliate a vineyard and destroy the fruit.

- Best defense is physical: prevent infestation by promoting air circulation and exposure to sunlight by leaf pulling and shoot positioning

- Fungicides are still necessary but must be used very sparingly. All have some negative side effects, even when organic, such as collateral damage to beneficial insects, antibiotic resistance, respiratory irritation to vineyard workers, and negative impact on wine fermentation

- New research supported by the Oregon wine industry is focused on finding predictive tools for mildew pressure, to help reduce frequency of fungicide sprays

Farming for Quality is Expensive
Great Oregon wines come from vineyards that are managed intensively and where crop yields are kept very low. These facts go a long way toward explaining why Oregon wines are relatively expensive. One way to look at this is to ask how many times in a year each vine is addressed by a skilled worker, and how many bottles of wine each vine produces. The following chart of Farming for Quality FAQs summarizes the answers to these questions at four different vine spacing levels typically found in Oregon vineyards, all cropped at two tons per acre, which is the actual average crop level in the Willamette Valley from 2000 through 2006.
### Farming for Quality FAQs

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<th>Wide</th>
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**How many times is each vine addressed by hand?**

1. winter pruning - cut
2. winter pruning - pull brush
3. winter pruning - tie canes
4. disbud/sucker/thin shoots
5. shoot position #1
6. shoot position #2
7. shoot position #3
8. pull leaves
9. thin clusters #1
10. thin clusters #2 (if needed)
11. harvest
FARMING FOR QUALITY
Growing Great Pinot Noir

MODERATOR

Mimi Casteel
Mimi is the daughter of Ted Casteel and Pat Dudley, co-founders of Bethel Heights. Growing up working in the vineyard and winery, Mimi gained such an appreciation for the industry that she promptly left home after high school. Armed with a BA in History and Classics from Tulane University, Mimi spent the next year working in various National Forests across the west. Always fascinated with the natural world, Mimi decided to change disciplines and enter the sciences. After completing the required post-baccalaureate work, Mimi went into a Masters Program in Forestry, and earned her MS in Forest Ecology and Biology from Oregon State University. Working as a botanist and ecologist for the Forest Service allowed Mimi to spend the next several years in the backcountry. During this period of adventuring she met her husband Nick Gunn, whom she knew she liked when he agreed to go touring in Mexico with her for their two months off after only knowing her for a few hours. She also began to realize she had a nagging desire to return to the vineyard, and work with the vines. Mimi returned to the bosom of her family business in 2005, along with her cousin and childhood best friend Ben. Taking her passion for ecology and biology, Mimi embarked on becoming the queen of vineyard experimental design, focusing on innovations in sustainable farming, compost and vermiculture, and various quality experiments. These days she holds court as General Manager of Bethel Heights, making wine with Ben, building a new vineyard with her father Ted, and teaching her darling daughter, Stella, about all the wonders of the natural world. So far her attempts to teach macro-economics to vitis vinifera have all failed, largely due to her own disdain for the topic.

PRESENTERS

Leigh Bartholomew
Leigh is the vineyard manager at Archery Summit where she farms 120 acres of Pinot noir. Leigh has been with Archery Summit since 2000 and together with a talented vineyard crew tends vineyard sites in the Dundee Hills and on Ribbon Ridge. Leigh graduated from UC Davis with a Master’s degree in viticulture and has worked harvests around the world including Washington, California, Chile, New Zealand, and Burgundy.

Jason Lett
Jason Lett is the second-generation president, winemaker, vineyard manager, (and self-proclaimed curator) of The Eyrie Vineyards. As the son of vanguard producers David and Diana Lett, Jason has had 40 years of experience with Oregon vineyards and winemaking, and has worked in Europe and New Zealand as well. He combines hands-on experience with a scientific background in research ecology. When he’s not making wine, Jason and his wife tend a small farm of their own with livestock, including goats, sheep, chickens, and two young children.
Joey Myers
Joey is a vineyard manager at Vinetenders, LLC, a company established by his father, Joel, in 1988. Vinetenders manages over 500 acres of Oregon's renowned vineyards for several clients in the North Willamette Valley. Joey began working with his family at an early age, and in time has been involved in all aspects of vineyard establishment and management. He holds a Bachelor's Degree from Southern Oregon University in Geography, where he studied under climatologist Dr. Greg Jones. Further education led him to complete a professional certificate in Viticulture through Washington State University. After graduation, travels brought him two seasons in Carneros, where he gained valuable insight into the world of California Pinot noir. Later work experience in New Zealand, Switzerland, Germany, and France opened his eyes to just how 'different' Pinot noir growers are across the globe. He returned to work with Vinetenders for harvest 2008, and has since become an integral part of the team. Vinetenders strives to produce premium quality fruit, adapting its methods according to site and season, and considering equally current research as well as age-old winegrower's tradition. "The potential for Oregon wine is unbound; I am eager to engage the questions that will drive our industry into a bright future."

Tim Scott
Tim is Vineyard Manager for Domaine Drouhin Oregon. He joined the winery in 1999, after more than 15 years with Rex Hill, where he managed their vineyards and established Oregon Grape Management Company. He helped DDO achieve LIVE certification for its vineyards, and is involved in furthering the winery’s sustainable farming efforts. Tim holds a business administration degree from Oregon State University.

Rebecca Sweet
Rebecca has been the Vineyard Manager at Van Duzer Vineyards since 2009. There, she continues to reduce the unit of management from “block” to “sub-block”, with the goal of bringing blocks into balance and increasing overall quality. Previous to that, she co-managed organic blueberries in the Willamette Valley, although she knew that her higher calling was wine grapes. From 2004-2006, she spent countless hours pondering the subtleties of various cover crops as they affected Pinot Noir vines for her Master’s Thesis at OSU. Since 2008, Rebecca has served as a third-party inspector for the LIVE (Low Input Viticulture and Enology) program, and is a participant in their Technical Committee. Rebecca hails as a fifth generation Northern Californian.

Jason Tosch
Jason is the vineyard manager for Anne Amie Vineyards in Carlton, Oregon in the Yamhill-Carlton AVA. A native to Oregon's Tualatin Valley, Jason earned his degree in horticulture from Oregon State focusing on small fruits and berries. He has found his passion in growing winegrapes, having spent earlier years growing florist-grade cut flowers. Jason is currently the Chair of the Technical Committee for the Oregon Wine Research Institute. He has been serving as a board member for the Northwest’s LIVE, Inc. sustainable certification program since 2006. Jason acknowledges the highest quality wines are created from the highest quality fruit and believes sustainable farming practices achieve this.