

# Back to the future: dry farming.

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Publication: [Wines & Vines](#)

Date: [Monday, February 1 2010](#)

California is in some respects reaching the limits of its water resources. The various stakeholders that need water are now starting to actively compete for this important "public trust resource." Essentially, the state of California owns and controls the use of all surface water--and, in some instances, groundwater as well. Because there are fish in the streams and rivers--including endangered species of salmon and their threatened cousin, the steelhead trout--California Fish and Game and the National Marine Fisheries Service also have something to say about how and when water is diverted to ensure the health of fisheries.

Ongoing issues in the Sacramento River Delta and the Russian River are really beginning to cause significant impacts on irrigation practices in regions using those rivers and their tributaries as water sources. Increasingly, farmers will have to show that the water they procure has "beneficial use" and doesn't interfere with other environmental needs, such as fisheries and wildlife habitat. At the same time, their farming operations can't impair [water quality](#).

Against this backdrop, some agriculturists are thinking that irrigation may not be sustainable in the long-term in a state that seems to have an insatiable demand for urban water and, increasingly, environmental mitigation. So what kind of future would the winegrowing industry have without irrigation?

Look to the past

If we look at the history of winegrowing in many parts of the state, we can find dry-farmed (un-irrigated, dependent on natural rainfall) "heritage vineyards" filled with very old head-pruned vines. They range from the North Coast in high rainfall areas such as the DuPratt Vineyard in Mendocino (average annual rainfall around 70 inches) to Rancho Cucamonga in Riverside County (average rainfall 8 inches). Irrigation wasn't common in many places until the advent of drip systems in the 1970s.

Iconoclastic winemaker John Munch at Le Cuvier Winery, the unofficial dean of the Far Out [Wineries](#) (west side) of Paso Robles, Calif. made some cogent observations in a recent conversation. "Dry-farmed land vines are very self-regulating, and the fruit is often superior from these vineyards because natural water availability frequently causes a good balance: If the grower overcrops, the vines will shut down and turn to raisins. If the vine is under-cropped, you get a lot of suckering.

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"By paying close attention and pruning right, the vine will set the right amount of fruit. Some of the best grapes that I purchase come from dry-land vineyards. While the yields are low, the price I pay per ton is among the highest, because they make some of the best wine. I am convinced that it is the balance of resources available to the plant relative to the yield that makes the difference."

Managing the soil becomes a key factor in dry-land winegrowing. John Chiarito of Chiarito Vineyard in Ukiah dry farms [Zinfandel](#), Petite Sirah and, most interestingly, the southern Italian varieties Nero D'Avola (the first winery in the United States to offer this wonderful Sicilian variety) and Negroamaro. Chiarito farms on the Talmage Bench on the eastern side of the Ukiah

Valley, on an alluvial fan that drains from the Mayacama Mountains. He moved to the area more than 30 years ago and learned the ways of farming from the old Italian-American farmers in the neighborhood.

Chiarito does not irrigate his 4 acres of head-pruned vines, planted 8-feet by 8-feet, and he farms everything with organic techniques. Most years Chiarito plants a cover crop in his vineyard consisting of bell beans, vetch and oats. He begins the year by mowing the cover crop down to help it decompose quickly in the soil. He does this just ahead of bud break as part of his frost protection practices: He has no frost protection system. Normally the varieties he grows bud after the danger of frost has passed, and the elevation of his site above the Ukiah Valley makes freezing less likely. Tilling begins when the soil reaches the right moisture content; Chiarito admits that the entire 4-acre vineyard is rarely exactly right everywhere.

Moldboard plows are his primary tillage equipment. Rarely seen in modern vineyards, they were the implement of choice 100 years ago, when most work was done with horses. It was the old way, before vines went on wire. Chiarito's equipment was made in the 1930s, and he routinely visited scrap piles around the neighborhood to find spare parts for the two old Moline plows that he uses.

The equipment has a sturdy frame with two plows on the right, two on the left, and a breaker chisel in the middle. One plow throws the soil up into a berm near the vines, which smothers the weeds. After waiting three weeks, Chiarito makes a pass with the other plow, which pulls the soil back. He then makes a pass across the rows with a chisel implement and hand shovels around the vines.

Finally, he makes two passes with a disk, leaving a perfectly clean vineyard floor free of weeds, with a crumbly "dust mulch" of loose soil that seals in the moisture below 8 inches. He also uses a subsoiler plow every four years or so--a heavy old implement with a single shank that goes about 16 inches into the soil. It is raised and lowered with a rope and a series of cogs--an ingenious design from an era before hydraulics were common on tractors. He does this in the fall, when the soil is more likely to break up and less likely to smear. He may also apply [lime](#) or gypsum if needed at this time.

"In the early '90s, I had planted my vineyard and just started using the plows. One Sunday, I was on my tractor, going down the row plowing. I see Larry Pacini (original owner of Pacini Vineyard) go by in his truck, turn around, and then he drives into my driveway. He gets out, waves his arms, swearing in Italian, and yells 'Stop. Get off the tractor, the ground is too wet.'

"I told him that this was the only time I could plow, because I was going to be busy during the week, and he told me I would ruin my soil if I continued. 'You always wait until you think it is ready, then wait,' he explained. The soil needs to crumble, and not slick or smear when the plow cuts. The year after he died, I hit it just perfect, the crumbling, the smell, the sound, so I jumped up off the tractor, and yelled, 'I got it, Larry!' I try every year to wait a little longer."

Chiarito also has started vines without irrigation. Typically, he will plant rootstock in February and chip bud the following year. "The key is to keep the vineyard floor clean. After tillage, we hand hoe and use a Bezzarides weeder. Around every vine, we dig any weeds out with a shovel. It stays very clean, once it has been plowed, looks great and also conserves moisture for the young vines."

Chiarito notes differences between grapevine varieties and their ability to produce under dry-farmed conditions. "Our Nero d'Avola produces well and is quite vigorous. Zinfandel loses leaves as we get close to harvest. I only have a small amount at Negroamaro, but it also does OK. Our target is 2 tons of fruit per acre per year. The wines have amazing concentration and beauty."

"I do some crop load management. All of these varieties tend to have large clusters. If needed, I will cut shoulders off. I also look at the cane size and drop some fruit if the canes aren't at least 3 feet long. I will make another pass to drop second crop and [green fruit](#) at veraison. When I do this, the concentration and evenness of ripening are much improved."

### Steele Wines' experience

The downside of all of this tillage is the potential for erosion. Steve Tylicki, general manager at Steele Wines in Kelseyville, Calif., has a long history managing dryland vineyards including the DuPratt Vineyard on Greenwood Ridge above Anderson Valley and Pacini Vineyards in Talmage, Calif.

Tylicki believes strongly that managing the soil with cover crops, lime and compost improves the quality of the soil and the ability of the vines to tolerate long periods of dryness. "When I first started working with the DuPratt Vineyard, the soil was quite depleted. It took awhile before the soil-building program that I developed for the vineyard starting having noticeable effects. I call this putting life back into the soil. Wine quality improved as the soil improved. Yields also went up after a remedial pruning program. The vines were nearly 80 years old at the time, but they still responded to good practices. It is not unusual to get yields between 3 and 4 tons per acre at this site."

At Pacini Vineyards, Tylicki finds dry farming a bit more of a struggle. "We don't have the deep timber soils and the high rainfall that are found at DuPratt. The vines are on St. George rootstock, and it is hotter and drier in the Ukiah Valley. Some years, the vines get pretty tired looking as we get near harvest." Regardless, Pacini Vineyard Zinfandel is one of the top Zins that Jed Steele makes, and it is much enjoyed by many of his customers.

Tylicki also notes that you have to protect the soil when you till everything in a dry-farmed vineyard. "We sometimes plant cover crops, and other years, we let the naturalized vegetation grow. There are many good plants that come up, like filaree, mustard, bur clovers and subterranean clovers. We do put down mulch and annual ryegrass in strategic locations to prevent rill erosion from happening." The vineyard floor is managed both with tillage and herbicides beneath the vines in some locations where the vines are planted on gentle terraces.

## Leap to dry farming

In the Napa Valley, Frog's Leap Winery is a showplace for dry-farmed vineyards. Vineyard manager Frank Leeds also adopted techniques from the old days involving tillage, and modernized it with more cover cropping and use of compost. The vineyard and wine are organically certified, and iconoclastic winemaker John Williams is personally very passionate about the case for dry-land farming.

"Three decades ago there was very little irrigation going on in Napa Valley," he explains. "There really wasn't enough water to sprinkle irrigate. Drip irrigation changed the picture, and not necessarily for the better. Grapegrowing started to become like growing hydroponic tomatoes-- bigger yields of crops with less flavor, because growers were putting more fertilizer on, increasing canopy size, delaying maturity, making the vines more tasty for leaf hoppers, and fruit that needs more hang time.

"Suddenly fruit was not mature at 23.5[degrees] Brix, because of the unbalanced growing conditions. The fruit needed more hang time because of the green tannins from over-stimulated canopies. We don't have those problems in our dry-farmed vineyards, because our vines are in balance with the water supply. We can harvest at lower sugars and still have good tannin maturity and flavor concentration without high alcohol. It changes the whole paradigm of winemaking."

Williams also makes an excellent point, "Dry farming is only a little about not irrigating. It is much more about learning how to farm if you aren't going to irrigate--it is actually easy to do. We disk the vineyards initially in the spring, and then follow with a cultivator. We may run the cultivator as often as every 10 days. This helps to loosen the soil to allow moisture to wick up. Since the ground is mostly firm and dry near the surface, it causes very little compaction. The other really important thing is that we cover crop and add compost every year. This helps to create sponge-like conditions and improve water penetration and retention. These practices also provide nutrients for the vines without over stimulating growth."

Williams finally remarks, "I am not a zealot, and I don't promote what we do for everyone. But think about the best wines from around the world: How many come from irrigated vineyards? Dry-land farming works for us."

## Not ready to go dry

For those not quite ready to go to dry-land farming, there is what I call "irrigation-assisted" winegrowing. This is actually widely practiced as deficit irrigation, but in some locations, growers are learning to use far less water than in the past.

Bob Gibson of Roederer Estate, in Mendocino County, relies on pressure bomb data to help make irrigation decisions. Former winemaker and vice president Dr. Michel Salgues always encouraged the vineyard managers to irrigate less as a way to induce finesse and complexity in their excellent sparkling wines. When current winemaker and vice president Arnaud Weyrich

took over, he began a research program with French student interns and concluded that Roederer Estate could grow its vines with far less water.

Gibson notes, "There are some blocks we haven't needed to irrigate for over six years that we used to irrigate in the past. For our Pinot Noir and Chardonnay vines, we use minus-11 bars as our irrigation threshold. Some blocks never reach that threshold. We are finding that in our newer blocks with closer spacing and cane pruning on VSP systems, the vines hold up pretty well with less water. We still are averaging about 3.5 to 4 tons per acre, which is ideal for the quality that we want from our hillside blocks. Overall, we probably use around 2 or 3 acre-inches a year for irrigation. Before we started doing pressure bombs, we were using twice that amount."

Gibson makes another point: "We are starting to look at more vigorous root-stocks as we replant. Right now, most of our vineyard is planted to 101-14 and SO4. But we are also working with 1103P, which we like, as well as 110R. 110R seems to take more time to get going, but eventually makes a fairly drought-tolerant vine for us."

Conclusions?

I wouldn't give up on irrigation just yet. The people having success dry farming are working in very specific situations and have spent time learning how to develop systems that fit their particular needs. Often they are in higher rainfall areas (more than 20 inches per year), and have soils with good water-holding capacities. Dry-farmed vineyard yields tend to be low, but the wines from them are often complex and concentrated.

Certainly, vineyards of the near future will mostly be planted on more drought-tolerant rootstocks; growers likely will use more regulated deficit irrigation, drip systems and any other techniques that conserve water. Regardless, it is good for all of us to consider conservation as a way of extending resources, a key strategy in developing successful sustainable farming systems. Meanwhile, we will continue to enjoy some very outstanding wines produced from dry-farmed vineyards.

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John Chiarito adheres to traditional ways, living in a house that he built himself, styled after an old Italian farm house with a winery in the basement, where he makes his own prosciutto and other delicacies that he serves to customers who taste wine by appointment. His wines are all handcrafted and mostly estate grown. His terraced garden and pergola overlook a sea of vines across the Ukiah Valley; it is both charming and a tribute to his love of the Italian heritage of this special region in Mendocino. He bakes pizza, bread and whole deboned suckling pigs (porchetta) in an outside wood-fired oven that he built himself (his [wine club](#) parties are legendary). You think that you are in Italy with all the special foods he prepares with his chef friend Ari Rosen of Scopa Restaurant in Healdsburg.

G.M.

## RELATED ARTICLE: Rootstock for dry farming

Where might the future lead us? Dr. Andy Walker, noted professor and rootstock breeder at the University of California, Davis, says, "We need to think about more appropriate vigor for our vineyards. We may not have as much irrigation water available in the future for a variety of reasons. There are two strategies that you could use to deal with this problem. The first is typical of rootstocks with *Vitis riparia* parentage. You have a short cycle of growth, the crop ripens and you are done as the water supply in the soil is used up. The second approach is a deep root system that can more effectively find moisture deeper in the soil profile. These vines are usually more vigorous and grow later into the growing season, resulting in later ripening."

When asked about whether he is currently breeding for drought tolerance, Dr. Walker responded, "Drought tolerance as a specific genetic trait may not exist. What we know is that some rootstocks have more acute rooting angles, larger root systems and a longer vegetative cycle. Our breeding program is at present focused on nematode resistance. The crosses made from *Vitis berlandieri* and *Vitis champignii* tend to be vigorous and certainly have good nematode resistance. We don't really have much data on their performance yet as it affects scion growth and vine balance."

G.M.

### Highlights

- \* The centuries-old practice of dry farming vineyards may present an advanced solution to California's current water concerns.
- \* Some viticulturists say that dry-farmed winegrapes are more flavorful, though yields tend to be smaller.
- \* The thoughtful use of cover crops may be more important in dry-farmed vineyards, because they are erosion-prone.

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