

*This working prototype tractor has seven hydraulic rods that can be adjusted as the tractor goes down the rows.*

## Vineyard Retrofitting: Mondavi Moves to High Density



**By Melinda Warner**  
*Assistant Editor*

**H**igh density vineyards make tremendous sense to the people at Robert Mondavi Winery. In the coastal counties where Mondavi has vineyards, the conversion is ongoing.

Within 10 years the plan is to re-develop all Mondavi vineyards, said Neil Roberts, Mondavi field technical manager and viticulturist.

New plantings all go in at closer spacings, as do replants. What company viticulturists and farm managers in three counties are looking at is just how dense the vines should be planted.

There are no quick and easy answers. It all depends on the site and its particular quirks, Roberts said. Each site has its challenges and its own unique attributes.

"In all cases, we want the best possible expression for each site," Roberts said.

Out of the six coastal vineyards Mondavi owns, three are in Santa Maria in Santa Barbara County, two are located in Monterey County and one is near Paso Robles.

Whether refurbishing an existing vineyard or planting on bare ground, spacing is just one of the improvements being made. Replanting is seen as an opportunity to look at all aspects of the vineyard, said Bob Thomas, who manages Mondavi's three Santa Maria vineyards over 1,400 acres.

"It is so costly to develop a vineyard that it is imperative to thoroughly evaluate the site first. We're starting from the ground up and making a better vineyard - and high density

definitely helps," Thomas said. "When we replant, we're also reorienting the rows. It used to be that everything was east/west, but now we take into account the slope and the aspect and the wind direction."

In Santa Maria, there are different aspects, elevations and microclimates between and within the three vineyards. Breezes and coastal fog are funneled west to east from the Pacific Ocean into the Santa Maria Valley. A vineyard five miles east of the ocean has very distinct differences in temperature than one quite near.

"I'm amazed at how high tech the industry has become in maximizing site potential in ultra premium wine growing. And Mondavi has learned a lot about getting the best expression out of each site," Thomas said.

No longer are own-rooted grapevines planted. Mondavi's direction is to better match the rootstock to the soil type and to use different clones that are more suited to their wine program. The new trellis systems are also different from the old.

"All Mondavi vineyards on the Central Coast are going the route of vertical shoot positioning. It opens up the canopy, provides good fruit exposure and is good for mechanization including machine pruning and harvesting," Thomas said.

Opening up the canopy also helps with disease control by enhancing spray penetration.

Drainage is looked at and in some places drain tiles are installed. For locations that have a high salt content, subsurface drainage is a big deal, Thomas noted.

"You need to drain that salt out and keep the soil more workable. And I have some areas that have low spots with a clay layer that need drainage," he said.

While different sites may call for different strategies, the future quality winegrape vineyard on California's Central Coast is definitely tighter and cozier, Roberts said.

"The trend over the next 10 years is high density. We feel that close spacing is our vineyards' future. It's proven itself as far as the wines. We're really seeing a difference - the wine



*Mondavi's Neil Roberts (left) and Bob Thomas look at some meter-by-meter plantings at Byron Estates in Santa Maria.*



is more intense and has better flavors. We can get higher yields and better quality and we get better use of our land. It's a win-win situation for the winery," Roberts said.

Monterey County Farm Advisor Larry Bettiga says that more and more growers are indeed tightening up their rows. While 8-foot spacings are now taking the place of 12, a fair number of vineyards are being planted with rows 6 feet apart.

Certain factors about the Central Coast, Bettiga says, make the area well-suited to high density plantings. The shallow, low fertility soils, and an average rainfall of about 10 inches a year mean that the grower is not constantly struggling to control excessive shoot and canopy growth.

"The soils themselves control the canopy size. Under our situation, I think that closer row spacing is ideal. You can get a better balance between shoot growth and crop levels. You don't have excessive growth for the crop level and you don't have a very small canopy that you're over cropping," Bettiga said.

The biggest challenges of planting more rows to the acre, he says, are time and equipment.

"Equipment becomes a big issue with the meter by meter [and other closer spacings]. Multi-row systems are important, because of time to cover a field," Bettiga said.

Thomas was on the look out for a machine that could meet the variable needs of his vineyards. Row spacing is not the same throughout the vineyards, so a flexible machine was imperative.

Several vineyard tractors especially designed for such small spaces are made in Europe, where high density planting was first pioneered. But, because of difficulties getting parts, Thomas also sought to move away from European-made machines.

"European equipment has all different threading - bolt threading patterns are different, even the hydraulic hoses have different threads on the fittings. You have three weeks downtime just for a simple hose," he said.

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*- Larry Bettiga, Monterey County Farm Advisor*

While growers can buy adapters to change the threading from the European way to the American way, by going with an American-made machine, Roberts said, everything is simplified.

While attending the California Farm Equipment Show in Tulare, Thomas was inspired by a machine made by Staben Equipment in Oxnard that had the potential to meet the

demands of traversing slopes and adjusting to row spacings from one meter in width up to an 8-foot width.

His new over-the-row piece of equipment was built and modified by Staben to meet Mondavi specifications. The starting point of the "working prototype" is an H-frame Hyster tractor. But the similarity to a "regular" Hyster tractor became slight after its transformation. The new machine has seven hydraulic rams which help the operator adjust the machine in practically any direction - all while sitting in the driver's seat.

For going up and down hills, the weight can be transferred forward or backward as needed. Side to side adjustments help the operator perform work on slopes where one row is higher than the other.

Two separate hydraulic motors - one has a capacity of 30 gallons a minute and the other 15 gallons per minute - mean that the operator can run several small hydraulic motors simultaneously.

"This way we can do a lot more rows at the same time," Thomas said. "The machine is versatile and saves labor and time."

Mondavi's custom-made machine can be mounted with a wire lifter, a cane cutter/berm sweeper, two mowers for mowing two rows at once and a pre-pruner which cuts canes before the hand pruners begin working.

"It cuts all the brush off so that the people don't have to fight the foliage when they prune," Thomas said.

With the aid of hydraulics, the machine can be made wider, extremely useful when one has varying row widths.

"For example you might want to straddle four meter-by-meter rows, or three 4-foot rows or two 6-foot," Thomas said. "Plus, we can keep the tracs right down the middle of the row and away from the root zone."

The Positrac Snowcat treads - used to groom ski slopes - help the machine handle hillsides and wet grounds.

A machine harvester and a spray rig that can be mounted on are still in development.

The innovative over-the-row machine is particular to Mondavi's Santa Maria operations. Innovations, observations and ideas are shared throughout the Mondavi team - the two winemakers, four farm managers and Roberts, the liaison.

"Each management company has its own different style.



*Mondavi takes into consideration several factors when replanting; a closely spaced, high density vineyard is the definite trend.*



“We know that 6 is better than 12. But we don’t know if 6-foot row spacing is better than 8 feet or 4 feet,” Thomas said.

While some vines have been planted for a number of years with favorable results on different in-row and between row spacings, it is still too soon for conclusions on some of the trials.

“The meter-by-meter Burgundy vines have only been in the ground for six years. The

winemaker feels that Burgundy doesn’t really achieve proper maturity until the vines are six to seven years old. They haven’t stabilized and become consistent with yields,” Roberts said. “We want to make sure that we’re making the right decisions. We don’t want to plant 40 acres of 4 feet by 4 feet rows without thoroughly evaluating both the vineyard and the winemaking sides of the equation. So, we are easing into the smaller rows.”

According to Bettiga, closer spacing stresses the plants so that they produce smaller berries with more concentrated flavor.

“Most growers space the vines down the row depending on what vigor they anticipate. The other thing that’s been talked about with high vigor vines is to have less space between the rows but more space down the row,” Bettiga said.

In the case of Cabernet Sauvignon on high or excessive vigor sites, the concept is to have a larger vine. Instead of an 8-foot spacing, 10 feet or 12 feet within-row spacing will be looked at in some upcoming Lodi-area trials. These trials will look at using a single vertical shoot position and a 12-foot long vine. The hope is that by letting an innately vigorous vine develop a larger structure, the overall shoot vigor and berry shading will be reduced, Bettiga said.

For the deep clay loam soils on the North Coast where there is substantial rainfall, it is more of a management challenge to stress those vines, Bettiga said.

“A split canopy or the lyre system is a method some employ to let the vine get bigger, but what people don’t like about those is they are more difficult to mechanically harvest.”

At Mondavi’s Santa Maria vineyards, mechanical performance of many tasks is becoming a reality. And so is the modern, well-engineered vineyard. □

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– Neil Roberts, Robert Mondavi Winery



*Neil Roberts (left) is the field technical manager and PCA for Robert Mondavi Winery. He visits Mondavi’s six different vineyards including three in Santa Maria run by Bob Thomas (right) of Mesa Vineyard Management Inc.*

The advantage of these difference is that diverse innovations are shared among Mondavi’s growers,” says Roberts.

A similar over-the-row tractor may make it to Monterey County. The Enviroscan system used in Monterey County vineyards to continuously read soil moisture with electronic probes might eventually be used in other Mondavi vineyards.

Ongoing evaluations of various row spacings and rootstock/clonal combinations at Mondavi’s Byron Estates property are also scrutinized.

“It’s an incredible experimental program. In one of the blocks we have at Byron, 15 acres of dozens of rootstock combinations were planted,” Thomas said.

Each of 50 different combinations are made into a separate wine.

According to Bettiga, larger wineries perform most of the research on the effect of spacing on wine quality.

“Older work [by the university] looked at vine growth and production, particularly for the San Joaquin Valley. What the wineries are looking at right now is wine quality,” he said.