GOOD FRUIT GROWER

New research has the potential to save wine grape growers millions in labor costs.

Hansen: Vineyard mechanization – Is grape quality impacted?

Melissa Hansen // Dec 14, 2016 // Grapes // Labor // Legal & Regulatory // New Developments // Research // Technology and equipment

Vineyard managers are looking to reduce hand labor and increase mechanization in their fields. Some very specific tasks, like how Ignacio Silva is pruning Cabernet Sauvignon back to eight spurs per cordon, may be more difficult to mechanize.

(TJ Mullinax/Good Fruit Grower)

Technology exists for an almost completely mechanized vineyard, but there's often hesitation by growers and winemakers concerned about the potential impact on wine quality.

The Washington State Wine Commission is supporting new research to address these concerns, comparing wine quality in hand-pruned, mechanically pruned and mechanically thinned grapes.

This has the potential to save the Washington wine industry millions in labor costs and also help address labor

shortages.

Preliminary results are encouraging, says Jim Harbertson, Washington State University associate professor of enology, who is leading the research. “It appears that the outcome is not how you get there (in terms of yield), but that you get there.”

The Washington wine industry is focused on the premium wine market. Because changes made in the vineyard can positively — or negatively — impact wine quality, the state’s wine industry is mindful of potential wine quality effects when new viticulture practices and technology are considered.

Vineyard mechanization, while not new, is becoming increasingly relevant with today’s tightened supply of skilled labor.

It may be romantic to think that each vine is carefully tended by human hands, but for many farmers it’s just not realistic.

More than 55,000 acres of wine grapes in Washington need to be pruned, thinned and picked each year at the same time horticultural tasks must be done in other labor-intensive crops like cherries, apples and hops.

Potential savings

Mechanical harvesters, introduced in the 1960s, now pick more than 80 percent of Washington’s wine grapes and save the wine industry nearly $20 million each year in labor costs.

Hand harvesting can cost $500 to $1,000 per acre compared with $200 to $400 per acre for mechanical harvesting. Hand labor is still important in vineyards not conducive to machines or where winemakers prefer the human touch.

Many growers have added mechanization to their pruning by using tools like pneumatic pruners and hedging implements that work like pre-pruners but still require some hand labor as a follow-up.

Hand pruning costs range from 18 to 25 cents per vine or $150 to $200 per acre, based on 807 vines per acre; hand thinning costs depend on crop load and variety, but range from $20 to $200 per acre.

If the 80 percent of the acreage (44,000 acres) currently picked by mechanical harvesters were mechanically pruned and thinned, around $10 million could be saved annually in labor costs.

Mechanization study

Previous studies on mechanical pruning have looked at the impact on yield and fruit quality and measured basic fruit ripening parameters, like total soluble solids, pH, and titratable acidity, but few have looked at the impacts on wine, according to Harbertson, research enologist based at WSU’s Ste. Michelle Wine Estates Wine Science Center in Richland, Washington.

> *“There is much interest in mechanization and mechanical pruning of vineyards, however, there’s*

> *some reluctance because of questions about the impact of mechanization on vineyard performance and grape and wine composition," he said. "If growers are to adopt machine pruning on a large scale, we have to show that they can do so without adversely impacting wine quality."*

The project takes place in a commercial Syrah vineyard block near Paterson, Washington, in cooperation with Ste. Michelle Wine Estates. WSU viticulturist Markus Keller, project collaborator, is collecting vine performance data from mechanically pruned and manual spur-pruned wine grapes.

The vineyard, with vines trained to a bilateral cordon, is drip irrigated and was converted to mechanical pruning in 2013.

When the project began in 2014, four blocks of three adjacent rows were converted back to manual spur pruning to serve as the control, with mechanical pruning conducted in the same number of rows.

The grapes are made into wine, with samples collected each year at pressing and throughout the winemaking process. The research wine is bottled for later evaluation.

The mechanically pruned vines have basically no hand follow-up or bud adjustment, explained Keller. "They look like they've had a short, messy haircut with a lot of spurs left."

In the first year of the study, because there was no bud count adjustment, the mechanically pruned vines had more than double the number of clusters per vine than the hand-pruned treatment (98 clusters per vine compared to 41).

Yield was also higher at 6.8 versus 4.2 tons per acre.

Not surprisingly, considering that all treatments were harvested the same day, the hand-pruned grapes were riper at harvest than the mechanically pruned treatment.

Also, wines from the lower yielding hand-pruned vines were more concentrated in most of the important wine characteristics, including alcohol and phenolics.

To ensure the project compares apples to apples and that yields from the machine-pruned vines match those of the hand-pruned vines, Keller said they decided to make two adjustments, if necessary, to the mechanically pruned vines:

—Mechanically thin the crop with a mechanical harvester.
—Harvest later than, and at the same Brix level, as the hand-pruned vines to compensate for the delay in ripening.

Preliminary results

In the second year of the study in 2015, yield in the hand-pruned vines was much higher than the desired target and reached 7.7 tons per acre, compared to the mechanically pruned vines of 6.8 tons per acre, which

was consistent for both seasons.

The mechanically pruned fruit had much greater soluble solids, berry weight, anthocyanins and pH than the hand-pruned fruit.

Wines made from the mechanically pruned vines had greater amounts of phenolics than the hand-pruned wines. The adjustments were not applied because they were not needed.

During 2016, Keller used the mechanical harvester to remove some of the crop. The harvester ran at a high speed with only a little beating action. The mechanical thinning took place around the lag phase stage of growth. He estimated that about 15 percent of the crop was removed. A late harvest treatment was also applied.

Thus far, Harbertson has not observed significant differences between the mechanically pruned, plus mechanically thinned fruit and the fruit that was only mechanically pruned. In 2016, measurements of cluster temperatures and tannin extractability were also collected.

At press time for *Good Fruit Grower*, wines from the treatment vines were in secondary fermentation. The WSU researchers hope to extend the trial for at least another year to confirm results and assess vineyard productivity. Once the project is finished, details will be reported to the industry.

Serendipity

"It's obvious that the results of this experiment were skewed in the second year by high yields in the hand-pruned treatment — yields that were twofold greater than we targeted," Harbertson said.

But the mishap provided interesting results. The serendipitous higher yields seem to suggest that wine quality is not impacted by mechanical pruning per se.

"The results suggest that as long as the mechanical pruning does not lead to overcropped vines, the wines produced will have high concentrations of phenolics," he said. Preliminary data indicate that for certain tiers of wine styles, mechanical pruning and thinning are not detrimental.

With a looming shortage of skilled workers and continued growth in the industry, data from this trial will be welcome science to the state's wine industry.

The ability to more fully mechanize vineyard tasks like pruning and thinning could help the Washington wine industry continue its rapid growth despite labor shortages and help growers stay competitive in the premium wine market. •

– by Melissa Hansen, research program manager for the Washington State Wine Commission.

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ABOUT THE AUTHOR: MELISSA HANSEN

Melissa Hansen is the research program manager for the Washington Wine Commission. Hansen previously was an Good Fruit Grower associate editor from 1996 through 2015. **Read her stories:** Author Index

3 COMMENTS

Jeff Hinchliffe December 14, 2016 at 8:08 pm - Reply

"Labor shortage" is the accepted half truth that many of us in the Agriculture accept and promulgate. Closer to the whole truth is that current wages and hours worked are neither equitable or sustainable. Paying an equitable living wage would do much to solve the so called labor shortage in the short run. Free market forces and mandated programs make this impossible for all but a handful of high end growers. This is the reality.
The Irony of a growing ; most likely unemployable population not withstanding , the juggernaut that is precision mechanization coupled with information technology will continue to roll.

Thomas Kruse December 15, 2016 at 9:16 am - Reply

Why don't they put all their time into coming up with a synthetic wine. I'm pretty sure that most wine consumers couldn't tell the difference. Aqueous solution with some alcohol, acid, color flavoring and a tiny amount of soluble organic matter.
The advantages are in the saving or water and land and the fact that it could be made anytime of the year. "Oh want some wine? Just a minute. I'll get you a bottle." Then you press a button and all the ingredients mix together like with a soda dispenser.
Why all the big fuss about the stuff – grapes, crush, barrels, cellars and so on?

Paul Vandenberg December 17, 2016 at 9:16 am - Reply

Melissa,
I always read what has your byline.
I think using acreage as a metric is obsolete and inaccurate. Not many vineyards have 807 vines per acre, I have 1,100.
I do all metrics by the meter, the perfect length when working vines. In vineyards it's how many meters per hour we prune.
I don't have .9 acres of Riesling, I have 3 kilometers.
Researchers, typically are looking at a few rows or parts of rows and the data starts as Kg/M then is translated to an archaic, mathematical problem.
Please join me in advocating shoots, spurs, kilos per meter. Let the Luddite's do the math!

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