At High-Tech Wineries, Robots Prune Vines and Precision Sensors Analyze Disease

BY JACOPO MAZZEO

Slopehelper Autonomous vehicle, Vipara Valley, Slovenia / Courtesy Pek Automotive

Technology has long been applied to grape growing and winemaking. Recent advancements, however, have shown how automation can help growers to ensure the quality and integrity of their wines. These innovations enable growers across the globe to make more calculated and better-timed decisions, and also reduce the labor needed to carry out vineyard and winery operations.

Smart Vineyards

Smart management systems optimize vineyard work through data and reports collected from devices deployed across the fields. These can monitor anything from weather to the amount of water in the soil.

SmartVineyard can predict grape disease by analyzing the vineyard's microclimates through precision sensors. This can decrease yield loss, pesticide use and vineyard work.

Terraview provides wineries with real-time data intelligence to tackle challenges like frost and drought. It can also estimate yields and keep track of carbon emissions.

"With Terraview, we can now monitor ripening analysis, have better precision in data acquisition, and cost reduction in sample collection," says Lluís Coll, technical director of viticulture at Catalonia-based Vallformosa Winery.

In Napa, Robert Mondavi Winery took vineyard monitoring to the next level through a partnership with NASA. With remote-sensing technology that scans vineyards from airplanes and satellites, NASA can help Mondavi measure ripening rate, disease incidence, soil drainage and fruit quality.

Sophisticated Robots

Once associated with cheaper products, robots and machines now aid in the production of quality wines.

First trialed in 2017, Ted is a robot designed to remove weeds with precision, which can reduce the need for chemical weed killers. It's relatively lightweight, so it avoids compacting the soil.

Slopehelper, an autonomous electric vehicle, goes a few steps further. It can perform a range of vineyard operations like mowing, mulching, spraying and side-trimming. Slopehelper can also be integrated with the TeroAir system, which can communicate with the vehicle remotely, stream video from the front camera and monitor weather conditions through an on-board weather station.

R2T2 is developing, by motion tracking and data analysis specialist ORME in partnership with Vinovalie Co-op Winery, a pruning robot that can tackle vine-training systems previously only workable by humans.

According to Pauline Laborde-Lacapelle, Vinovalie's head of research and development, R2T2 "works as well as people" on bush vines.

Terraview platform / Photo courtesy Terraview

Symington Family Estates teamed with Germany's University of Geisenheim to develop a mechanical harvester suited to Portugal's Douro slopes, where gradients can reach up to 70%, which is twice as much as the gradient of Los Angeles' Angels Flight funicular.

Production Matters

Technology can also ensure a wine's integrity throughout the production process, from vinification through shipping.

Cooperage Tonnellerie Baron's OXOline racking system places each barrel on a set of rollers. This allows the containers to be rinsed, filled, racked, cleaned, sampled, rotated and removed while not touching neighboring barrels. Not only does it save hours of work in the cellar and reduces risks of waste, it also avoids oxidation caused by excessive movements.

"The purpose of using this technique is to have a soft tannin extraction: smooth, dense tannins in the wine, and greater length," says enologist Giulio Carmassi, who uses the system at Tuscany's Gagliole Winery.

Packaging and shipping innovations include Stelvin Inside, a closure system that allows for different oxygen transmission rates. With it, winemakers can control the speed of maturation inside the bottle and eliminate the risk of cork taint.

Florent-Pierre Merlier, winemaker at Oregon's Van Duzer Vineyards, also believes it provides quality consistency.

Once bottles leave the winery's premises, Italian platform Wenda's live tracking system monitors shipping conditions like temperature and humidity. Producers can solve issues in real time to ensure that wine's integrity is retained up to the final stages of the supply chain.