


The next wave of automation



Oregon nurseries embracing new technology to save labor, increase efficiencies

After talking to nurseries and getting feedback, Burro developed Burro Grande, with a longer range and greater towing capacity than its first product. PHOTO COURTESY BURRO

BY MITCH LIES

JONATHAN BUSWELL IS LOOKING to incorporate an autonomous vehicle to move products from the canning shed to the field at **Monrovia Nursery** in Dayton, Oregon. Trent Morrison is looking to use robots to gather inventory at **John Holmlund Nursery** in Boring, Oregon. Other Oregon nurseries could soon be looking to the sky to count inventory.

As labor costs soar and the need for efficiencies increases, Oregon nurseries are embracing technology like never before.

Just in the past year, Burro, a farm-equipment manufacturing company based out Philadelphia, Pennsylvania, with a West Coast office in Visalia, California, has introduced an autonomous towing vehicle to meet the needs of nurseries. Moss robotics, a company based in Pittsburgh, Pennsylvania, has introduced a robot that can compile inventory in nurseries more accurately and more efficiently than humans. And HarvestWise Drone Solutions out of Oregon City, Oregon, has

implemented agricultural software in its drones and is looking to work with nurseries on counting inventory from the sky.

This technology renaissance is coming at a time when labor costs are skyrocketing with the rollout of Oregon's agricultural overtime law. The law requires farms to pay agricultural workers time-and-a-half after 55 hours in a workweek this year. The threshold goes down to 48 hours in 2025 and 2026 before settling out at 40 hours in 2027 and beyond. And it comes at a time when adding efficiencies to operations is critical to the long-term health of the industry.

Autonomous vehicles

Buswell, director of automation for Monrovia, is among those looking at utilizing autonomous vehicles in their operations. He and others have been working with Burro to revise its initial autonomous vehicle to better meet the needs of nurseries, and Burro has developed a new iteration of its vehicle. Called the Burro

Grande, the new vehicle comes with increased towing capacity and the option of an advance navigation system, which replaces the need to manually instruct a vehicle's path to train it where to go.

"With the addition of the Atlas Navigation System on the Burro, we are able to utilize our drone mapping and our RTK (Real Time Kinematics) systems and get very accurate mapping of the nursery and implement that into the Burro's brain essentially," Buswell said. "And then we can draw the paths on a tablet in a matter of seconds as opposed to have it follow a human or a pickup around to train its pathway."

The tow capacity of the autonomous vehicle, meanwhile, was increased from 2,500 pounds to 5,000 pounds, a feature Buswell saw on display in December.

"The Burro Grande prototype was out here just before Christmas, and we were able to pull three fully loaded trailers with 15-gallon pots up our steepest grade. It was pretty impressive," Buswell said. "It just pulled the trailers right up without any issues."

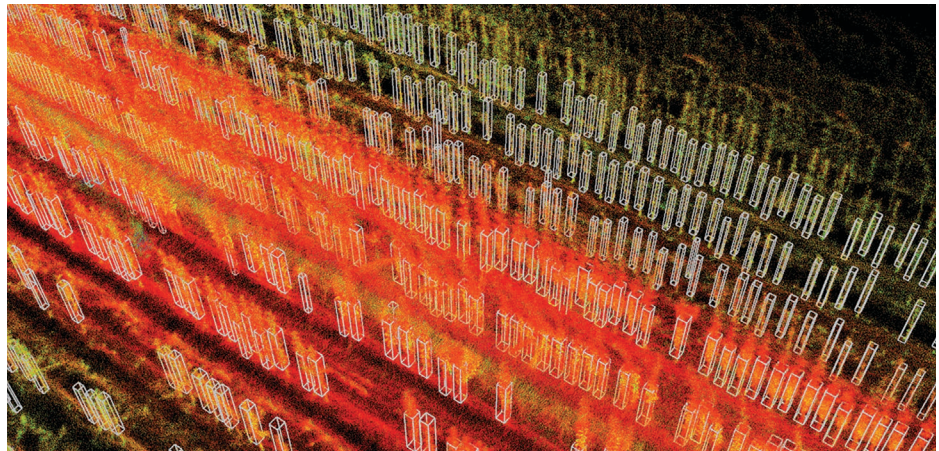
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moss, a new robotics company, is developing an autonomous robot that can count plant inventory (above) and because it scans the entire plant in three dimensions, it can also extract the height of the trees and potentially the caliper as well (below). PHOTO COURTESY MOSS

Mitchell Jacobson, engineer at **Gold Family Farms** (Hillsboro, Oregon), who also has seen the Burro Grande at work, said he too was impressed with the new tow weight. “We have some pretty good hills here and tons of gravel, and one of our biggest worries was stopping it, because it’s towing 3,000, 4,000, 5,000 pounds coming down a hill and this thing is only 4-foot-by-5-foot and probably 3 feet tall, but it stopped no problem,” Jacobson said. “I was impressed.”

Gold Family Farms was looking at the Burro Grande as part of a comprehensive plan to get more out of its skilled labor force. “We were looking for things that could be easily done by machines that don’t really need a person’s touch,” Jacobson said, “and it seems like transportation, just driving back and forth is kind of a waste of human capital. Instead of having a highly skilled person driving back and forth from the potting shed to the field, we figure we could utilize their time more efficiently.”



Harvest aid

Chris Thiesen, head of California sales and services for Burro, said the company initially designed Burro as a harvest aid for grapes and blueberries, where harvest crews would transport blueberries or grapes on the Burro platforms from the field to drop-off points. In blueberries, Thiesen said farms were able to see a 15–20% bump in productivity when using the machines.

Burro started designing the machines for nurseries in 2020, starting with a citrus nursery. Here again, the Burro worked as hoped, providing a 28% increase in throughput for the nursery by replacing a conveyor-belt system to move plants and reducing the operation’s manpower from four to two.

Then last year, after talking to additional nurseries and getting feedback, the company began working on a bigger tow-

ing capacity. “We found pretty quickly that we needed to be able to offer the market something more substantial than our base Burro,” Thiesen said. That led to the development of the Burro Grande, which has a 15 mile range per charge and a charge time of around 10 hours for its 11.4 horsepower engine. “You can plug it into a normal 120-volt circuit, and it charges overnight,” Thiesen said.

Burro, which has more than 350 systems in operation around the world, makes the machines available for purchase or lease, and Thiesen said the company can turn over an order in a matter of weeks.

Robotic counters

While some nurseries are looking to move plants with autonomous vehicles, others like John Holmlund Nursery are looking at automation for compiling inventory, in part to improve product forecasting.

“We’ve always had good guesstimates on what we’re going to have available to sell, but anytime you can have more accurate data and the sooner we can have that data, the better off our sales team will be,” said Morrison, program manager at Holmlund.

Better inventory data also can improve the nursery’s understanding of how to maximize throughput, Morrison said. “Having this kind of data, we can start analyzing the metrics of what works where, and if I can start gathering data on weather and water and count for this variety in this field, that can be extremely helpful.

“A lot of our farm managers know intuitively how this works, and that’s great,” Morrison added, “but it is also quite a risk for farms to rely on single individuals to have that kind of institutional knowledge.”

A robot also tends to be more accurate than a human when it comes to conducting inventory, Morrison said. “If you put me out in that field to do inventory, I’m going to be bored out of my mind in about two minutes,” he said. “I’m probably going to get sloppy. So, this is just ripe for automation.”

Also, Morrison said, with a robot, the nursery can count inventory several times a year, versus once a year when using

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manual labor. “If we can get more information and better information more often, we just think that is something we need to be taking a look at.”

One company offering a service that has piqued Morrison’s interest is moss, a robotics operation started by recent graduates of Carnegie Mellon University’s Robotics Institute.

CEO Di Hu said that they started looking into robots to count inventory after realizing that the precision-agriculture technology being used in herbicide applications could also be used for counting plants. And to date, it appears they are correct. Initial tests show the robots can scan and count trees quicker and more accurately than a human. “And because we scan all the 3D information about it, we can extract not just that the tree is there, but also the height of the tree and also potentially, the caliper of the tree,” Hu said.

The company has modified a sensor kit that guides the autonomous robot with a backpack setup, and it has a vehicle-mounting setup so a nursery can mount it on an ATV or tractor, providing it the kind of flexibility that Hu hopes will attract widespread attention from nurseries.

Another method for counting inventory that nurseries may be using in the future involves the use of drones. Asa DeForest, of HarvestWise Drone Solutions, said he has implemented existing software into drones for providing inventory and crown potential in a



HarvestWise Drone Solutions has implemented software into drones for providing inventory and crown potential in a Christmas tree operation and hopes to apply the technology to nurseries. PHOTO BY VIC PANICHKUL (ABOVE) PHOTO COURTESY HARVESTWISE DRONE SOLUTIONS (BELOW)



Christmas tree operation, and he believes the method has a tremendous upside in nurseries, as well.

DeForest said he was able to fly a 62-acre Christmas tree field in about 35 to 40 minutes, and that it takes 24 to 48 hours to have the data analyzed. “It’s

pretty slick,” DeForest said. “Now that I know I can do it in Christmas trees, I’m confident I can do it for nurseries, too.”

In addition, HarvestWise is working on a functionality that will provide information on the height of the trees in a stand and a height distribution of the counted trees, a functionality expected to be available in January of 2025.

He is now looking for nurseries interested in trying the system.

Oregon nurseries have long utilized cutting edge technology in their adoption of automated greenhouse systems and other leading edge technology in agriculture. Today, with their eyes on robots, drones and autonomous vehicles, nurseries are leaning even further into the future. ☺

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