

The Sydney Morning Herald

WORLD NORTH AMERICA **FARMING**

Harv the robot vs pickers in fight for the future of soft fruit farms

By Danielle Paquette

February 21, 2019 – 5.32pm

Duette, Florida: Human and machine have 10 seconds per plant. They must find the ripe strawberries in the leaves, gently twist them off the stems and tuck them into a plastic clamshell. Repeat, repeat, repeat, before the fruit spoils.

One February afternoon, they work about an acre apart on a farm the size of 454 football fields: dozens of pickers collecting produce the way people have for centuries - and a robot that engineers say could replace most of them as soon as next year.



"Harv", the Berry-4 automated strawberry harvesting robot, at the demonstration in Florida earlier this month.

ZACK WITTMAN FOR THE WASHINGTON POST

The future of agricultural work has arrived here in Florida, promising to ease labour shortages and reduce the cost of food, or so says the team behind "Harv", a nickname for the latest model from automation company Harvest CROO Robotics.

Harv is on the cutting edge of a push to automate the way US farms gather goods that bruise and squish, a challenge that has long flummoxed engineers.

Designing a robot with a gentle touch is among the biggest technical obstacles to automating the American farm. Reasonably priced fruits and vegetables are at risk without it, growers say, because of a dwindling pool of workers.

"The labour force keeps shrinking," said Gary Wishnatzki, a third-generation strawberry farmer. "If we don't solve this with automation, fresh fruits and veggies won't be affordable or even available to the average person."



The fruit pickers currently working the strawberry fields of G&D Farms in Duette, Florida. ZACK WITTMAN FOR THE WASHINGTON POST

The problem is so pressing that competitors are banding together to fund Harv, which has raised about \$US9 million from corporate behemoths like Driscoll's and Naturipe Farms, as well as from local farmers.

Wishnatzki, who created Harv with former Intel engineer Bob Pitzer, one of the minds behind the television hit *BattleBots*, has invested \$3 million of his own money.

The electronic picker is still pretty clumsy.

During a test run last year, Harv gathered 20 per cent of strawberries on every plant without mishap. This year's goal: Harvest half of the fruit without crushing or dropping any. The human success rate is closer to 80 per cent, making Harv the underdog in this competition.



Harv's robotic claws need to pick soft fruit without squashing or bruising them. ZACK WITTMAN FOR THE WASHINGTON POST

But Harv doesn't need a visa or sleep or sick days. The machine looks like a horizontally rolling semi truck.

Peek underneath and see 16 smaller steel robots scooping up strawberries with spinning, claw-like fingers, guided by camera eyes and flashing lights.

Growers say it is getting harder to hire enough people to harvest crops before they rot. Fewer seasonal labourers are coming from Mexico, the biggest supplier of US farmworkers. Fewer Americans want to bend over all day in a field, farmers say, even when offered higher wages, free housing and recruitment bonuses.

The number of agricultural employees in the United States is expected to stay flat over the next seven years, according to the latest projections from the Bureau of Labour Statistics. As "productivity-enhancing technologies" mature in the realm of mechanisation, farms will

require fewer people, even as demand for crops grow, the government researchers wrote.

Manufacturing underwent a similar evolution. US factories have increased output over the past two decades with a smaller workforce, thanks to machines that improve efficiency.

One Harv is programmed to do the work of 30 people. The machine hovers over a dozen rows of plants at the same time, picking five strawberries every second and covering 8 acres (nearly 3¼ hectares) a day.

That potential is increasingly attractive to growers, who say the Trump administration's tighter immigration policies are squeezing off the supply of seasonal workers, as well as undocumented labour.

About half of the country's 850,000 farmworkers are not in the US legally, according to 2016 data from the Department of Labour, the most recent available.



The BT-3 harvester at work in a lettuce field in Salinas, California. The machine uses high-pressure jets of water to cut off lettuce heads. NEW YORK TIMES

Agricultural analysts say the labour shortage is already forcing up wages.

From 2014 to 2018, the average pay for farmworkers rose faster than employees in the broader economy, jumping from \$US11.29 to \$US13.25, according to numbers from the Department of Agriculture.

Agriculture economists at Arizona State University last year estimated that if farmers lost their undocumented workforce entirely, wages would have to rise by 50 per cent to replace them -

and that would crank up produce prices by another 40 per cent.

Then there are other rising costs.

Starting in 2025, all farms in California - the nation's largest fresh-food producer - must pay their employees overtime after eight hours a day instead of 10.

"Automation is the long-term solution, given the reluctance of domestic workers to do these jobs," said Tim Richards, the Morrison chair of agribusiness in the W.P. Carey School of Business at ASU.

Wishnatzki said he lost about \$US1 million due to spoilage last year. He said he pays experienced pickers about \$US25 an hour.

Harv would diminish the need for field labour, Wishnatzki said, but it would create new jobs, too. Wish Farms, his family business, would train pickers to become technicians.



Antonio Vengas, a field worker, says: "I see the robot and think, 'Maybe we're not going to have jobs anymore.'"

ZACK WITTMAN FOR THE WASHINGTON POST

"We need people to clean, sanitise and repair the machines," he said.

Some workers view that plan with anxiety and scepticism.

"I see the robot and think, 'Maybe we're not going to have jobs anymore'," said Antonio Vengas, 48, one of the about 600 employees on the farm with Harv.

Vengas moved to Florida 15 years ago from the Mexican state of Oaxaca and makes about \$US25 an hour. About 75 per cent of his co-workers are Mexicans on seasonal work visas.

They all make good money, he said. They're motivated.

"People can pick strawberries without hurting them," he said. "They know which ones are too little or rotten. Machines can't do that."

Labour groups also doubt that robots are prepared for the job.

"A machine cannot harvest delicate table grapes, strawberries or tree fruit without destroying the perfect presentation demanded by consumers and the retail food industry," said Giev Kashkooli, political and legislative director for the United Farm Workers of America, which represents about 20,000 farmworkers across the country.

Unions don't oppose technological advances, though, Kashkooli added.



Bob Pitzer of Harvest CROO Robotics holds a freshly picked strawberry. ZACK WITTMAN FOR THE WASHINGTON POST

"Robotics can play a role in making the job less backbreaking and play a role in helping people

earn more money," he said.

Out West, engineers at Washington State University are working with local farmers to test an apple-picking machine that has 12 mechanical arms.

It drives down orchard rows, snapping pictures of trees. A computer brain scans the images and finds the fruit. The arms grab and lower apples onto a conveyor belt.

Expect to see this technology on the market in the next three years, said Manoj Karkee, associate professor at the school's Centre for Precision & Automated Agricultural Systems.

Farmers who struggle to hire workers wanted it "yesterday", he said.

"We all know we need to go in this direction," Karkee said. "The last advancement in apple picking was the invention of the ladder."

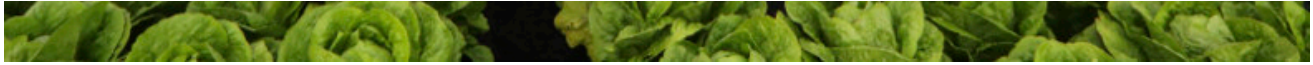
The robot rarely hurts the produce. But as of today, one robotic apple-picker costs at least \$US300,000 - too much for most budgets.

On the day Harv is put to the test, farmers and researchers arrive in three buses to Wishnatzki's farm. They've come from Canada, Australia, Germany, Switzerland and across the United States. Curiosity hangs in the air like the hawks circling overhead.

Blaine Staples, a strawberry grower from Alberta, steps through the dirt toward the machine, which hisses as it claws up fruit. Dozens of people around him crouch to the ground. The machine's arms go to work amid exclamations of awe and disbelief from onlookers.

"This is pretty much the new industrial revolution," Staples said.





A conventional crew harvesting lettuce in California. Labour for this kind of work is drying up. NEW YORK TIMES

His Canadian farm is tiny compared with Wishnatzki's 600 acres. But he could see himself renting Harv for a season - as long as it's comparable to his current labour costs.

Under Harv's proposed business model, farmers would pay only for the fruit the machine picks at the same rate they pay seasonal work crews.

A few strawberry rows over, Doug Carrigan, a North Carolina farmer, stands in the group with his eyes locked on Harv.

"It doesn't care if it's a Sunday or a holiday," Carrigan said. "The machine will work regardless."

He pays his workers between \$US10 and \$US14 hourly. They're mostly locals.

"A lot of Americans have become lazy," Carrigan said. "They want a paycheque. They don't want a job."

Any time you can automate work without sacrificing quality, "that's a win", he said.

Behind the crowd of farmers, a team of engineers watch the spectacle on a flat-screen TV in a white trailer, their makeshift command centre. Cameras in Harv give them a close-up.

Lights flash. The 16 smaller robots spin, clawing up strawberries. Engineers compare them to duck feet, paddling furiously.

"The best view in the house," said Alex Figueroa, 24, director of machine vision.

Everything looks to be running smoothly. Nobody's stress-eating the oatmeal raisin cookies they ordered.

"No errors!" Figueroa pleads aloud.

"Knock on wood," another engineer replies.

In another section of the field, far from the commotion, the pickers work like they have always worked.

It's 80 degrees outside, but they wear long sleeves, pants and scarves below their eyes to block the sun. They bend over, pluck the strawberries and slip them into plastic cases.

Then, they sprint through the plant rows to a supervisor, who scans in each package. They are paid by the package. Slowing down means losing money.

Parked nearby is an old school bus, which shuttles them free to work. Most of the pickers live in housing Wishnatzki provides.

Santiago Velasco, 65, has worked here for 35 years and has done practically every job: picking, digging, irrigating.

Harv is a newcomer that doesn't concern him.

"I don't think it'll work, because the people know how to pick," he said, "and they go faster."

His prediction held up on demo day.

The robot found more than half the strawberries on each plant, but the fruit this season was bigger than anticipated. A bunch tumbled from Harv's claws - red and juicy and now gone.

Engineers aren't sure how many - they've got to review hours of video. They can't be sure Harv hit this year's target. But they're confident the machine can get it right next year.

The Washington Post
