Agrobot machine from Spain uses cameras to identify ripe fruit.

Strawberry Picking Goes Mechanical

The always-tedious and time-consuming job of picking strawberries by hand may soon be mechanized. Robotics companies in Spain and Belgium have introduced machines to pluck ripe berries, sort them by size, and gently place them into trays.

The Spanish-designed Agrobot SW6010 is a 4-wheel-drive unit powered by a Lombardini diesel 28.5 hp engine. The SW6010 manages a set of "robotic manipulators" able to locate, identify, select, and pick strawberries one-by-one based on size and degree of ripeness. Workers sit at two stations aboard the machine where they monitor fruit that's moving on a conveyor and pack it into containers.

Agrobot says the machine's ability to select berries based on ripeness is controlled by AGvision® cameras that identify ripe fruit.

A fully-automated strawberry picking robot developed by Octinion, of Belgium, is expected to reach the market by 2018. The company says the machine is designed for greenhouse harvesting and is capable of damage-free picking of 70 percent of ripe strawberries.

The machine's 3D vision detects ripe berries which are picked by patented soft-touch gripper cups. The robotic arm only selects and picks berries if it's possible to pick the berry without bruising. A company spokesperson says the machine is as gentle as human pickers and can pick one strawberry every 3 seconds.

Octinion pickers are soft as human fingers.

The robot can be programmed to sort berries by size and quality, and will place berries in their final packaging. The company says its machine delivers picking quality, speed, and sorting comparable to the ideal human picker, but with advanced monitoring.

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Asparagus picker has electronic eyes and mechanical arms with cutting blades. It senses spears that are tall enough to harvest, then grips, slices and conveys them into a box.

Mechanical Asparagus Picker Ready For Market

As an energetic young man in 1974, Bill Lund asked his dad what he could invent to make some money. "He told me that asparagus growers could sure use a mechanical harvester, so that's what got me started on the idea," says Lund, who's still energized but is now a 65-year-old inventor whose idea is finally gaining traction.

"Early on I teamed up with Geiger Manufacturing in Stockton, Calif. and we built about a half-dozen prototypes until 1984. They worked okay, but they couldn't quite compete with the plentiful and cheap hand labor, so we stopped working on it," continues Lund. "Over the years we'd make some improvements and try it out, but it still wasn't quite right. A few years back we made some dramatic changes and teamed up with Washington State University to prove the economics."

Lund says WSU researchers compared the quality of hand-harvested product with that from his machine and found there was virtually no difference between the two. "There wasn't any weight loss, spear tips weren't feathering, and after two weeks of cold storage, asparagus from both picking methods hadn't deterioriated. WSU also told us the machine would be a viable economic alternative if it selectively harvested 70 percent or more of what a manual crew could. At the time it was harvesting about 50 to 60 percent of the hand crew harvest," says Lund.

"Each machine has electronic eyes and mechanical arms with cutting blades to harvest spears the same way humans do," Lund says. "The machine senses the spears that are tall enough to harvest, then grips, slices and conveys them into a lug box all facing the same direction, all without laborers on the machine."

Another big benefit of Lund's machine is its simplicity. "When you're harvesting you don't want to break down because asparagus can grow up to 7 in. a day. If our machine does break down it can be fixed in minutes, not hours," Lund says. The picker runs with tractor electrical and hydraulic power that operates the on-board computer and drives the fingers and conveyor. A gas-powered air compressor drives the cutting knives.

Efficient and tireless, the picker can operate 24 hrs. a day, allowing a 4-row machine to harvest more than 100 acres in that span with only tractor drivers as labor. Lund says it would take a crew of 40 to 50 people to harvest that same amount. "A grower with less than 40 acres can probably replace his field crew with a single, one-row machine," Lund adds.

The cost of a single-row machine is $75,000 and about $250,000 for a 4-row model.

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"Underground" Irrigation Test Shows Promising Yield Boost

Minnesota farmer Brian Velde is testing an innovative irrigation system on his farm to prove his corn can produce far more than 200 bushels an acre when it receives abundant water and extra doses of nutrients. Velde installed test strips of plastic drip tape 14 to 16 in. deep and 5 ft. apart on a 58-acre test plot. He used a special tillage implement pulled by his tractor equipped with a GPS guidance system. Velde received a permit from the Minnesota DNR to pump water from the Yellow Medicine River for his test project rather than dig a special well.

"With the tape strips placed at 5-ft. intervals, in the middle of every other 30-in. row, corn plants are never more than 15 in. from the moisture," Velde says. The tape strip supplies water through pressure-compensated emitters spaced 27 in. apart along the tape. Water is released with 8 lbs. of pressue and percolates through the soil so corn roots can tap into it. Velde applied 5 in. of water during July, 2017 and says a yield check in mid-August showed that the irrigated strips should produce 77 bu. per acre more than the non-irrigated strips.

The system can also supply liquid nutrients to the plants, with analysis and amounts guided by tissue-testing during the growing season. "We can spoon-feed the plants exactly what they need, when they need it, rather than randomly applying fertilizer across a whole field." In 2017 Velde applied 30 lbs. of 28 percent nitrogen with the July waterings.

Velde received a grant from the Minnesota Corn Growers Association to test the system on his farm. The University of Minnesota is collecting data on the project to learn how the system works in Velde's different soil types, which range from sugar-like sand to heavy clay loam.

"We think that abundant moisture and spoon-fed nutrients can really bump the yields, reducing the stress that corn normally endures during the hot and dry weather in a typical growing season," Velde says. He says tests with this type of system in other areas have increased yields as much as 84 bu. per acre, an increase that could pay for installation costs in 6 to 7 years.

Equipment for Velde's test is manufactured by Netafim, a California company that's installed more than 30 billion feet of dripline irrigation in the U.S. since 1995. The company says farmers who've used the system to replace conventional above-ground pivot or flood irrigation systems are using 30 percent less water and 20 to 30 percent less fertilizer to produce 20 to 30 percent higher corn, soybean, wheat and vegetable crop yields.

Drip tape was installed by a special machine using RTK guidance on the tractor.

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By late last July there was a significant height difference between the irrigated and non-irrigated plants.