INNOVATION

■ **LABOUR EFFICIENCY**

Automated mini cuke loader now on the market

Projects at Vineland Research and Innovation Centre reduce labour costs through automation

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A robotic loader that can take the manual labour out of placing greenhouse mini cucumbers onto trays is now available on the market.

Developed by researchers at the Vineland Research and Innovation Centre (Vineland) in partnership with CMP Automation of Ayr, the technology is part of ongoing efforts to reduce labour costs for farmers through automation.

▶ **WHY IT MATTERS**
Labour is one of the biggest costs for many fruit and vegetable farmers because produce-growing still requires a lot of manual labour.

"Mini cucumbers are placed by hand onto six-pack trays. It's a repetitive process that lends itself well to automation," says Darren Ward, manager of business planning and commercialization at Vineland.

After cucumbers have been sorted according to specifications like weight, diameter and length, the system uses machine vision to identify the curvature of each cucumber and places them all in the same direction so they are nestled evenly onto the tray. It can also see length and size, giving it grading capabilities.

"The perfect cuke is straight, that's a grade A, but most have a bit of a curve and if we don't know where the curve is, they don't load properly," says CMP partner and business development manager Rob Shwery.

"We also do another check on diameter and length as sorters aren't 100 per cent reliable and if a cucumber comes that was missed by the sorting machine vision system, it can lead to jam ups."

Packing line rates can vary due to the speed and abilities of each worker, requiring addition or removal of staff to ensure production targets are met. The robot gives growers that stability and consistency, as well as bringing high efficiency and reliability.

Shwery estimates one machine could replace two operators for a year, resulting in a payback of three to four years for growers. The system can handle 300 trays per hour, is scalable to increase capacity, and can be integrated into a packing station with an existing mini cucumber grader. A stand-alone unit with a hopper is in development.

Vineland's technology researchers are also working on a smart irrigation system for potted greenhouse plants.

Sensors inside the pot and in the greenhouse gather data that is fed to the system, which uses artificial intelligence to determine when to irrigate. The grower trains the system over the course of one crop growing cycle, so it learns from the skill and expertise of the grower and can then mimic that behaviour.

"I think this is one of the first of its kind. A lot of automated systems out

A smart irrigation system for potted plants is in development that will learn from a grower over a production cycle. PHOTO: VINELAND RESEARCH AND INNOVATION

there make hard decisions based on thresholds like climate conditions, but this uses an artificial intelligence that has learned from the grower and the data that is coming in," Ward says.

Most potted crops are currently watered by hand or through use of drip irrigation or flooded tables. The smart system will ensure plants consistently get the amount of water and fertilizer they need, resulting in a higher quality product as well as labour, water and fertilizer savings for growers.

Vineland has partnered with Lets-Grow.com in the Netherlands, which plans to commercialize the technology. Testing is underway, according to Ward, and if all goes well, the technology could be available by this autumn.

Agriculture and Agri-Food Canada has provided funding for a new national research cluster focused on automation that is being led by Vineland. The cluster's initial focus is on automation for the horticulture sector, and Vineland researchers are leading three projects.

One is focused on automating greenhouse cucumber harvesting, a system that would include a vision component to identify the cucumbers, artificial intelligence to decide whether or not to harvest, and a robot arm to grip and pick the cucumber.

"We chose cucumbers because it is a popular crop and there are a lot of acres in Ontario especially," says Ward, adding that there are other projects already on the go for peppers and tomatoes, Ontario's two other big greenhouse vegetable crops.

Another cluster project will focus on improving and simplifying the sensor network behind the smart irrigation system for potted plants, and the third will focus on developing a robotic solution for mushroom harvesting.

A robotic cucumber loader could replace two people. PHOTO: VINELAND RESEARCH AND INNOVATION