Horticulture and space-based technologies

Space-based technologies offer multiple benefits to horticulture operations today, and they will be a key enabler for the development of new technologies and applications in the future.

Satellite technologies can reduce farm labour and waste, and improve profit margins. Satellite technologies fall into three main categories:

- **Remote sensing:** Uses sensors and cameras to monitor an area from a distance
- **Connectivity:** Allows sensors, devices and computers to communicate with each other
- **Geolocation:** Provides information on positioning and navigation, for example GPS

There are several startups in Australia that make satellite technology more accessible for producers, making data interpretation and enhanced connectivity quicker and easier. As a result, many producers will access space-based technologies indirectly through products delivered by service providers or through farm advisors and consultants.

**Autonomous agriculture**

SwarmFarm has developed a diesel-powered autonomous platform with a variety of attachments that perform different tasks. The mower/slasher attachment can be used in orchards to manage grass between rows. The SwarmFarm platforms use real-time kinematic (RTK) positioning for geolocation, which allows the equipment to operate autonomously in the field without a driver.

Emerging technologies like autonomous harvesters with sensors to detect the ripeness of produce have the potential to reduce labour costs and optimise product quality. New Zealand company RoboticsPlus has developed a robotic kiwi fruit harvester that uses an autonomous platform. These technologies rely on satellite-based geolocation to navigate through fields.

In 2025, a new Australian Satellite-based Augmentation System (SBAS) for geolocation that will go live will improve position accuracy from 1 m to about 10 cm across the country. This enhanced positioning technology will improve the accuracy of on-farm applications without the need for internet-enabled real-time kinematic (RTK) positioning.

**Peanut predictions**

Satellite technology can give peanut growers accurate yield predictions and spot disease outbreaks, according to a trial by the University of New England. The technology generates interactive yield maps using satellite images to show high and low-growth areas.

By quickly identifying low-growth areas, farmers can investigate whether soil issues, pests or diseases are affecting the area and act to remedy the issue. The imagery used in the maps also detailed crop maturity underground, which could allow farmers to selectively harvest areas at optimal maturity and leave other areas until they have matured.
DataFarming uses Sentinel satellite remote sensing to assess crops. The organisation provides free satellite images of farms with a 10 m x 10 m resolution that show normalised difference vegetation index (NDVI), which can be used to monitor crop and pasture health. NDVI measures the difference between the near-infrared light reflected by green vegetation and the red light absorbed by green vegetation. A higher NDVI value indicates more green, healthy plants.

The technology can be used in vineyards to identify underperforming areas, and compost can be applied in areas where it is needed most. This is an example of satellites supporting precision agriculture – methods of making farming techniques more accurate through technology.

Avocado yield forecasting

Accurate yield forecasting is important for avocado growers so they can estimate harvesting labour requirements and cost, packing costs, and the ability to fulfill contracts. The University of New England, in collaboration Circul8 and Hort Innovation, has developed an avocado yield forecasting application called CropCount.

CropCount combines satellite images with on-the-ground sampling to produce avocado yield forecasts. In trials, CropCount has reduced the time required for yield assessment on a 10,000-tree farm from 500 hours to just nine hours. The technology was also associated with a significant improvement in forecast accuracy compared with visual assessment alone, with remote sensing having an average yield estimate accuracy of more than 98% across five blocks.

Water management

Goanna Ag creates sensors for use across farms. Their GoRain and GoTank offerings allow producers to manage water without needing to visit water storages frequently. For farms where connectivity through 3G or local networks is difficult, the company provides satellite connectivity through a partnership with Myriota.

Myriota owns a constellation of small satellites that send packets of data between devices, which is ideally suited to sensor monitoring systems. Paired with satellite remote sensing, these technologies can inform precision irrigation practices on-farm to maximise yield and water-use efficiency.

Reference

1. SwarmFarm, https://www.swarmfarm.com/applications/
3. Geoimage, Peanut growers gain accurate yield predictions, Geoimage.