MENDELU
Faculty
of Horticulture

Institute of Horticultural Technology

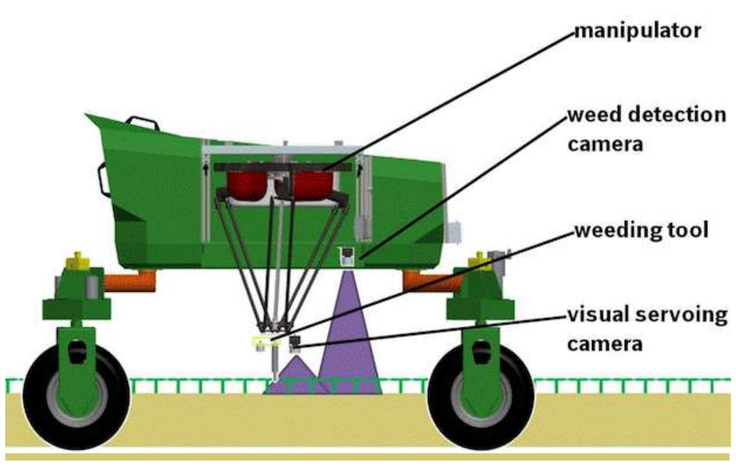
Autonomous Systems in Horticulture

Horticultural production, including all of its specializations, is seeing an Agriculture 4.0 transformation aimed at increasing its efficiency. The worldwide trend is to move towards precision agriculture, supported by advanced technologies including robotics and efforts to eliminate time-intensive and physically demanding work. However, their onset is gradual, and while any systems are already being fully used across a wide range of users, from home gardens to large-scale production growers, some remaining in the process of developing and verifying or amending implementing legislation.

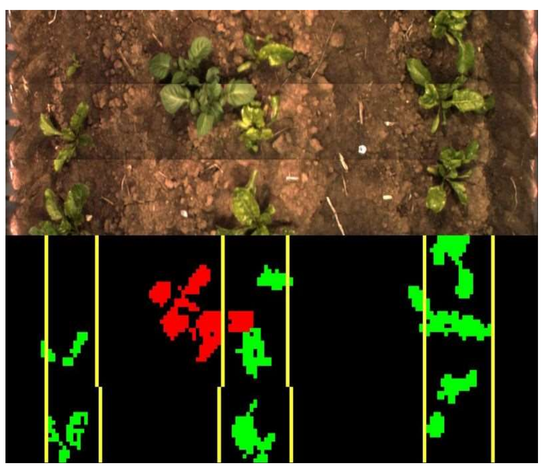
Transport systems

In production horticulture, autonomous systems ensuring the transport of seedlings between individual sections of work operations, from the transport of substrates and cups to the actual expedition of seedlings, are an increasingly used variant.

Herbicide systems

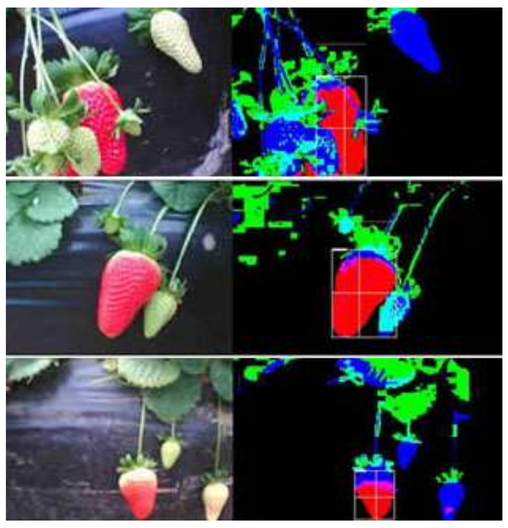


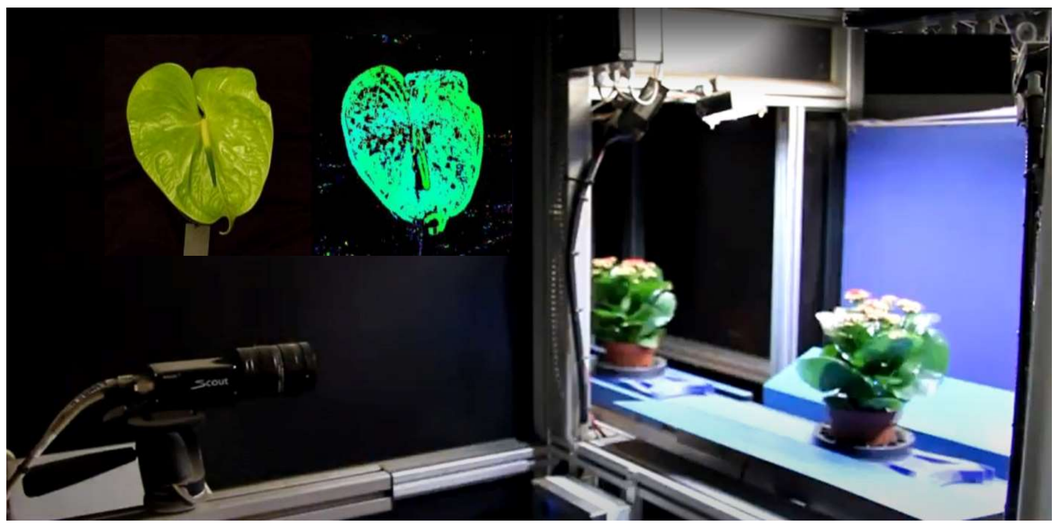
Due to the trend of reducing and eliminating herbicide sprays, the development in the robotics also focuses on the issue of elimination of weeds. When the autonomous system decides on the basis of defined features whether it is a cultivated or weed plant and, if necessary, its mechanical removal.



Opto-electronic systems

Opto-electronic systems are also increasingly used in harvesting operations. These systems have found application especially in those horticultural commodities where a very time-consuming test harvest is required. These are mainly fruit vegetables or small fruits, where the harvest can be complicated by uneven fruit ripening. In the production of cut flowers, these systems, in combination with X-ray systems, are used for control plant quality.





Automated harvesting

The whole harvesting process then consists of scanning the plant, identifying the fruits and their degree of ripeness. Subsequently, the system decides about the next step. If the fruit meets the specified quality requirements, a series of operations follows, in which the fruit is gently separated from the plant and stored in a container or on a transport device, where sorting by size, ripeness, weight and selection of damaged fruits can be performed.