
And now machines do the selecting

Selecting the best specimens in agriculture and horticulture has traditionally been labour-intensive manual work. With increasing success, machines are being developed to do the assessing, the selecting and the sorting.

TEXT YVONNE DE HILSTER PHOTOS BUREAU VOOR BEELD AND GREENVISION

At Australian Palm, a palm tree cultivation business in Naaldwijk, the selection of saleable palm trees has recently been fully automated. Formerly the owner would pick out the suitable specimens himself, trudging through the greenhouse with three plants in each hand. Wageningen researchers and logistics systems manufacturer Logiqs Agro BV have developed a machine to do this. The remarkable thing about the machine is that the expert selector's knowledge is programmed into it and made usable. This is one of the latest examples of the new applications in this field on the market.

The automatic detection of saleable plants followed by the automatic grouping of these small palm trees enables the company to deliver homogenous batches, says Rick van de Zedde of GreenVision, the expertise centre of Wageningen UR for image processing in the agro- and food industry. 'What is more, plants can be sorted non-stop, and larger and smaller specimens can be easily grouped. In this way each plant is constantly given the optimum growth conditions.'

When you develop a system to replace the product expert, you must understand how someone sorts: what does he mean when he labels a plant as 'saleable' or 'frail'; and what is his assessment based on? Once you know exactly what the important features and

the underlying decision-making model are, then it's a question of choosing sensors that can pick out the information you need. For example, if a feature can be seen with the eyes then a standard camera can be used. But there are lots of possibilities for using cameras that use black-and-white, red-green-blue, ultraviolet, infrared, fluorescence, or combinations of light waves from the spectrum. 'If you use near-infrared spectroscopy you can see moisture build-up, for instance', says Van de Zedde. 'In cucumbers that would indicate internal rot.' Finally, a calculation model for the deciding factors in sorting decisions is developed, based on the photographic image(s) taken. In the case of palm trees things that are looked at include fullness at the top, height and width. 'You can make a specific decision-making model for every enterprise: plant growers don't necessarily always agree about these things.'

For automatic quality selection, this deciding factor is always crucial: it's a matter of black or white, explains Van de Zedde. 'But when people do the selecting there are no absolutes.' There is always the chance that people select plants from a bad batch as 'good', which in different circumstances might have been judged as mediocre. 'Computers enable you to standardize assessment, and there's a demand for that.'

Glasshouse horticulture in the Netherlands already



1933

Manual selection of tulips in the greenhouse of the Laboratory for Plant Physiology at the Schip van Blaauw in Wageningen.

‘The system only sees what you teach it to see’

makes full use of colour cameras and two dimensional imaging. New possibilities are emerging all the time. Techniques used in the medical sciences – MRI and CT scanners, X-ray apparatus – will be introduced in the agrifood sector too, Van de Zedde expects. ‘X-rays can already show us how many buds there are under the foliage of alstroemerias, or where the buds of tulips are positioned, making it possible to bunch flowers that will be of equal height in a vase.’

An upcoming trend is the robot-harvesting of fruit. ‘We have started an initiative together with the Dutch Fruit Producers Organization to make it possible to harvest apples and pears automatically; and a project has been started with Jentjens Machinetechniek to develop a robot harvester for products like sweet peppers.’

‘We are mainly working on problems for which there is no system on the market yet. It is challenging, risky research with specific objectives coming from the industry. Our advantage is that we work with lots of different products and properties and this often allows us to combine experiences’, adds Van de Zedde.

The use of automatic systems can take away people’s jobs, he admits. But labour is not just expensive; there could also be a shortage of it in future, partly because of the ageing population. ‘Already last year we had apples and pears left on the trees. By using these systems we can safeguard the Netherlands as a production location.’

Another advantage of the new development is that the experts’ knowledge gets analyzed and can thereby be passed on to others. It also makes it possible to adjust the production process in the light of the automatic assessment. And yet a horticultural producer will never blindly trust the selection system. ‘After all, it only sees what you have taught it to see.’

www.fbr.wur.nl ■



2010

Automatized selection and grouping of plants that meet previously established criteria.