Irrigation

Technology is providing cheaper and more efficient ways to water precisely, says **Sally Drury**

If you are overwatering you are wasting money. But apart from puddles on pathways, droplets drifting in a breeze or water seeping from containers, how can you tell whether you really are wasting water?

Using water efficiently means providing the plant with what it needs, when it needs it. The water must also be of the right quality. Producing a top-quality crop would be simple if the plants could tell us what they want and when they want it, but we have to rely on the condition of the plant and measurements of soil moisture. Sophisticated equipment is available to help, but once you add in variables such as radiation, temperature, humidity and wind speed, applying water to match the demand of the crop becomes tricky.

HDC

Irrigation system: new technology can determine and automate accurate watering and fertiliser application at relatively low cost

Key role played by control systems

Control systems, linked to weather stations for improved accuracy, play a key role in ensuring that crops receive water at the right times. But there is a new system that does away with the need for a weather station and provides water in relation to the rate at which it is lost from the plant.

An addition to the Electronic & Technical Services (ETS) range of irrigation control equipment, the Evapo-irrigation interface (Eii) offers growers the ability to automatically adjust irrigation frequency according to weather conditions. The device is based on the Evaposensor misting controller that won the Best Technical Product award at Four Oaks Trade Show in 2010 and Best Overall Product at GAN this year.

"Fitting an Eii to a simple irrigation timer transforms it into an intelligent controller that will cut back on water wastage, improve crop quality and ultimately boost the bottom line," explains ETS director John Walker. "It is compatible with any existing timer/controller that can accept a remote start signal. But the key feature is its ability to integrate the signal from an Evaposensor. It then triggers irrigation when accumulated evaporation reaches a user-adjustable target value."

The Evaposensor measures evaporative demand on the crop—also known as potential evapotranspiration. The device replaces the costly weather station and computer used to estimate evapotranspiration in high-end irrigation control systems. Like plant leaves, the Evaposensor responds to humidity, temperature, radiation and wind speed and is easily mounted where it will be exposed to the same environment as the crop.

> **"The Evaposensor saves water, time and money and cuts out guess work, too"**
> **Bill Godfrey, nursery director**

"A single Evaposensor could be used to control irrigation on a whole nursery. Equally, the cost is low enough to make separate sensors for different areas a cost-effective option," says Walker.

Doing away with the guess work

Bill Godfrey, managing director of W Godfrey & Sons in Lightwater, Surrey, was one of the first growers to invest in evapo-irrigation. He says: "Evaposensor is brilliant—the 'guesstimation' in irrigation is done away with and it has made an enormous improvement in our use of water. It saves water, time, effort and money, and cuts out over-watering, too. Matching irrigation to the water lost by the plant has been a goal for us for 20 years. Now we can do it."

Other equipment from ETS that uses the Evaposensor includes multistation irrigation controllers and the ECI, a flexible multipurpose interface for misting and irrigation.

Growers looking to reduce water consumption are also trying capillary matting. Flowering Plants, based in Buckingham, claims growers using its Florimats have seen water consumption fall by an average of 59 per cent—figures since confirmed by trials in France and Germany.

Each Florimat has a specific capillary action such that it not only delivers water evenly, but also pulls water from plants that are not using it and redistributes it to those that are. "In effect, plants on any one area of Florimat should all get the same breakfast when they are watered and all grow the same muscles as they dry," says Flowering Plants director Francis Richardson.

The evenness of watering has benefits in other ways, but particularly when using liquid fertiliser.

> **"Copper-dosed water benefits the root systems of most plants"**
> Max Manning, Hortisystems

Richardson explains: "When plants all take up the same amount of water, and when that water contains liquid fertiliser, every plant receives the same amount of fertiliser. Most of the fertiliser is taken up quickly, either by the plants or by adsorption on the growing medium, and so generally remains with the individual plants."

Flowering Plants supplies acid-dosage systems that provide a precise control of alkalinity in a water supply. "Where appropriate fertilisers are used, Florimats have been shown to provide conditions that encourage large and diverse populations of microflora such as *Bacillus subtilis* and *Trichoderma Harzianum*, which help plants to take up fertilisers.

"Reduced leaching increased use of liquid fertilisers in place of controlled-release ones and improved-response fertilisers have generally resulted in a reduction of fertiliser costs of more than 60 per cent, while also improving growers' control of crop quality," says Richardson.

Microflora help reduce pesticide use

Further savings can be made on pesticide usage as the Florimats provide conditions to encourage beneficial microflora that predate on many plant pathogens. Richardson confirms that most of his customers rarely use fungicides. Looking ahead he says: "Customers have found that they can apply overseas research and development work about how specific fertilisers block the paths through which many air-borne pathogens enter plants.

HDC

Hardy nursery stock: automated sprays

"Growers concerned about mildews, *Phytophthora ramorum*, *Botrytis* and black spot, have found this useful. We are preparing a technical note about how to test the active ingredients and their synergists in small, systematic trials."

Florimat systems have been made as easy to operate and maintain as possible. According to Richardson, "topping up" by hosepipe should be unnecessary. The growth of mosses, lichens, liverworts and weed seeds is prevented, and rooting through has only been reported after 138mm of rain fell on a nursery in 18 hours.

Using clean irrigation water is important in the battle to reduce chemicals. Some growers will use bio-filters, chlorine injection or ultraviolet light. Another option to consider is copper dosing.

The Aquahort copper fertiliser system from Hortisystems has well-proven credentials from many trials, including a Horticultural Development Company (HDC) nursery trial in 2009. "The copper-dosed water has a beneficial effect on the root system of most plants and has a significant controlling effect on fungal attacks, where the zoospores are killed by the exposure to the free copper in irrigation water," says director Max Manning. "Bacteria such as *xanthomonas*, *agrobacter*, *raistonia*, *erwinia* and *clavibacter* are also killed with exposure of two to four hours."

The Aquahort doses copper using electrolysis of copper rods to introduce free copper ions into irrigation water. The fact that the ions are free differentiates the Aquahort system from chemical copper fertilisers.

"One advantage of the system is that the copper can remain active from the point of dosing right to the plants and, depending on the water quality, can remain active for several hours," says Manning. "This means there can be some suppression of fungal spores at the plant, which would not occur with, for instance, ultraviolet light-treated water."

Originally developed for use on pot plants in Denmark, the Aquahort now has a range of applications in all types of nursery- grown plants.

Reel irrigation

Growers who want an efficient and durable reel irrigator now have a new option. The ProRain irrigator from Bauer UK comes in two sizes covering many of the popular hose configurations and can be adapted to cover a wide range of water flow rates and rain-gun sizes.

Key features include a self-loading rain-gun trolley for rapid moves, hydraulic stabiliser leg operation, optional hydraulic turntable rotation and a fully-galvanised finish.

The design is based on retraction forces that are a little lower than those of Bauer's high-end Rainstar, though higher than competitor machines. The drive unit provides sufficient power to cover all the standard application rates. It has also been made easy to change injection cones for a range of water flows.

BAUER

ProRain irrigator: incorporates a self-loading rain-gun trolley and is fully-galvanised

Have you got the capacity?

Irrigation systems should be continuously assessed to see whether they are meeting the needs of the growing crops. Any shortfall in delivered irrigation volume will result in the plants being affected either in growing vigour and/or fruit yield and quality.

An example of this re-assessment work was carried out by soft fruit grower of the year 2011 Wallings Nurseries. The nursery is currently operating the MultiMa computer system with Synopta 2, supplied by HortiMax growing solutions of east Yorkshire.

The re-assessment led to an increase in the number of irrigation units being used on the nursery and the MultiMa system was updated to give this extra functionality. Each unit now has spare capacity that enables any changes in irrigation plant requirements – volume of water per plant per irrigation cycle – to be dealt with easily.

HORTIMAX

Irrigation: assessment is vital to success