



Protected and non-protected horticulture: improving water use efficiency in soil and soilless cultivation

3 december 2009

Erik van Os, Jos Balendonck, Ellen Beerling

Expertise

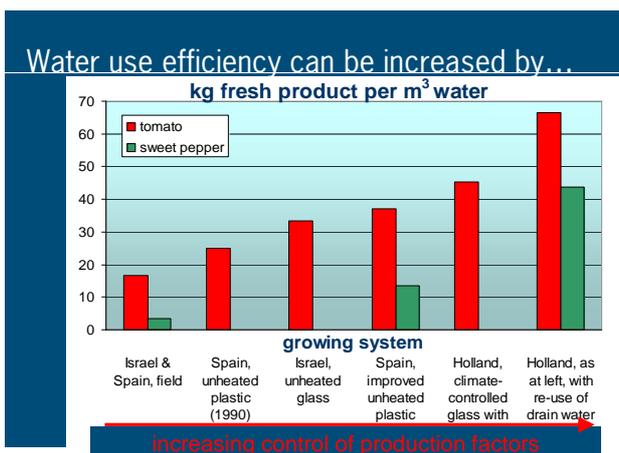
Wageningen UR Greenhouse Horticulture is the leading research institute in the international greenhouse horticulture. Experience in both greenhouse horticulture and research allows Wageningen UR Greenhouse Horticulture to develop and implement innovations for and in partnership with the horticultural industry. Wageningen UR Greenhouse Horticulture develops new sustainable concepts for cultivation, production systems and horticultural companies for or together with the sector and governmental bodies. As examples can be mentioned the development of the energy producing greenhouse, climatized cultivation or fully automated production systems. Sustainable production (people, planet, profit) is the leading motivation. Having roots in greenhouse horticulture and in research, Wageningen UR knows how to innovate and to stimulate application and implementation. Expertise needed to increase the water use efficiency (knowledge about water, nutrients, sensors, emission, water flows) can be used in either protected or non-protected cultivation and in soil and soilless culture systems.

Background Soilless cultivation

EU Water Framework Directive demands a good ecological and chemical quality of ground and surface water. The sweet water stock to supply men and plant is limited and decreases by the climate change. As water in agriculture demands about 80% of the sweet water stock, an increase of the water use efficiency is needed. An excellent water quality is essential for control of the growth and the development of the crop to achieve the best quality. Water is the carrier of nutrients and crop protection chemicals. Due to excessive discharge surface and ground water might be polluted with these substances. Wageningen UR Greenhouse Horticulture delivers the knowledge and the methods to control these water flows and to reduce the discharge of these flows.

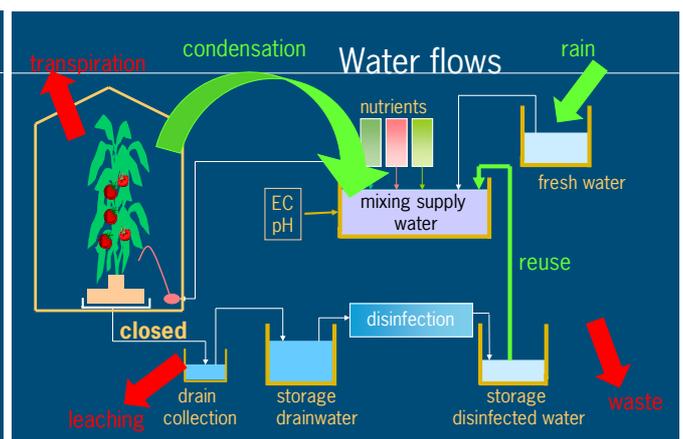
Goal

- Soilless cultivation: development of methods to increase the water use efficiency with the goal to achieve an almost zero emission of nutrients and crop protection chemicals.
- Water quality: To find the adequate equipment to purify the various water flows, as well as methods to optimize crop yield while using marginal water resources (saline or treated waste water).



Cecilia Stanghellini

Increasing water use efficiency by more technology



Zero emission, EU-Water Frame Work Directive

Water flows in a greenhouse with soilless culture



New partners and projects in soilless cultivation

We seek partners to close the water cycles in soilless cultivation to achieve an almost zero emission in both the Netherlands and in Spain and to build a broader consortium to do research and to demonstrate equipment to growers and suppliers. Companies and knowledge institutes collaborate to achieve best options for growers.

Background Soil cultivation

Water shortage forces growers to adopt deficit irrigation practices. They tend to irrigate with less water at a lower quality. To avoid crop damages and income losses, they need to manage their water and nutrients more precisely. New technology based tools might help them by making the most optimal operational decisions. The extra income, due to slightly higher yields and use of fewer fertilizers, might help to invest in these new technologies. Due to environmental legislation, in the near future, under rain-fed as well as in semi-arid climatic conditions, many horticultural soil-grown crops will be grown detached from the sub-soil. New automated irrigation systems were demonstrated that give good quality products, and as well save the environment by reducing the fertilizer leaching to ground waters and reduce the water use with large amounts up to 50% compared to standard growers practise. Farmers are still hesitating to use these automated irrigation system because of the costs. However, the FLOW-AID project demonstrated that these systems have the potential to raise crop yield with 10%, which might compensate the higher costs for equipment. Wageningen-UR Greenhouse Horticulture is co-ordinator of the European FLOW-AID project and has a large network of Mediterranean partners, like universities and SME's.

Goal

- Sustainable irrigated horticulture for low water availability and quality.
- Use of precision monitoring technologies, Decision Support Tools and models to optimize water and fertilizer use.
- Development of cropping systems which are less susceptible to climatic constraints (detached from soil)



Examples of FLOW-AID experimental sites (Lettuce-Netherlands, Container Crops-Italy)

New partners and projects in soil cultivation

We seek European wide partners that want to embark on collaborative projects among universities and companies involved in water technology and management. Intended projects are demonstration of current expertise and technologies for optimal water and nutrient use and prevention of leaching with target area horticulture in (semi) arid zones in the Mediterranean countries (Europe, Middle East, North Africa).