Coping with water scarcity

When the temperature rises five degrees and there is 20 percent less rain, will there still be food and something called agriculture in Greece, Italy or China?

Losses of water are high with traditional irrigation. The new SAFIR system may be fed with treated wastewater and activates the plants' own biological water saving ability. Foto by Guitong Li.

The SAFIR project contributes to solving this challenge, addressing two major public concerns at the same time: the safety and quality of food products, and the increasing competition for clean freshwater.

Since "safe foods are produced in safe environments", the challenge for the next years will be to produce safe and high quality foods while at the same time reducing the use of natural resources and the impact on aquatic ecosystems often already polluted. These problems are linked, since most of our vegetables are produced using irrigation water from the same ecosystems.

Globally, agricultural irrigation is the number one user of freshwater. Agriculture consumes about 70% of all water withdrawn worldwide, and up to 95% in some developing countries. When it comes to cutting down freshwater demand, it is therefore logical to focus on agriculture and to investigate options in this sector.

To ensure food safety and quality, the innovative SAFIR irrigation systems combine state-of-the-art water-cleaning technology with high-efficiency irrigation systems. The water treatments consist of either a membrane bioreactor for recycling of heavily polluted water such as domestic wastewater or a modular system suitable for less polluted surface waters. These small-scale devices supply subsurface irrigation systems at field and farm scale.

SAFIR has assembled a multi-disciplinary team, with food safety and quality experts, engineers, agronomists and economists from 17 research institutes and private companies in Europe, Israel and China working together. The project assesses potential risks to farmers and consumers. Heavy metals and pathogens are tracked through the whole chain from low-quality input waters, after pre-treatment, in the soil and, finally, in the food products.

Not only fresh produce but also the food-processing step is considered.

The SSICA facility in Parma for semi-industrial food processing. Foto by Luca Sandei.

The results will be useful for ensuring the safety of the specific technologies and will in addition provide data for risk assessment in general of various irrigation practices. This will help in setting standards and be used in defining good agricultural practice for product certification schemes.

Contact person:
Finn Plauborg
Project Coordinator
University of Aarhus
email: Finn.Plauborg@agrsci.dk
Website: www.SAFIR4EU.org

EU Scientific Officer:
Massimo Burioni

The first lessons of SAFIR are:

- That low quality water can be used. European and Chinese field experiments with potatoes and tomatoes grown on treated wastewater (vs. drinking water) indicate that contaminants and pathogens are very low in both the irrigation water delivered to the crops and the final product, and that food quality is good.
- That water can be used more efficiently. Up to 20% of the irrigation water could be saved using irrigation methods, which stimulate the plants' own, biological water saving capability.
- That computer systems to aid decisions can be very helpful. To maximize the benefit to farmers and other stakeholders, SAFIR results are being integrated into mathematical models that describe water distribution in soils, leaching of nitrate, survival of pathogens and the growth of plants in relation to the irrigation pattern. Coupled with farm management and economic models, a new intelligent tool for efficient and safe use and re-use of low-quality water for irrigation will soon be available.