

SAFIR

Safe and High Quality Food Production using Low Quality Waters and Improved Irrigation Systems and Management

1. Project summary

The project addresses two fundamental problems that over the past decade increasingly have become concerns of the general public: the one problem being the jeopardizing of safety and quality of our food products, while the other being the increasing competition for clean fresh water. The project has a multi-disciplinary approach, which integrates the European as well as the global dimension of the EU-policy on food quality and safety. The main driving force behind the project idea is new research results, which demonstrate that irrigation pattern can increase the water use efficiency as well as the quality of vegetable crops. Furthermore, recent innovations in the water treatment and irrigation industry have shown potential for the use of low quality water resources, such as rivers and other surface water, for irrigation of vegetable crops without jeopardizing food safety or quality.

The project includes three components:

- 1) The technological development of water saving irrigation systems and management for use of low quality water resources. Technological advances will be made in the field of cost effective tertiary water treatment technology for on-farm use. Irrigation equipment for sub-surface irrigation systems will be tested in the field and developed to facilitate a new water saving strategy, PRD-irrigation, which improves water use efficiency and the quality of the produce.
- 2) Impact of the technology on product quality and safety, production system and the environment as well as a risk assessment from farm to fork.
- 3) A component concerning the feasibility and application of the system. The financial and economic aspects will be investigated and institutional and consumer barriers will be identified. A Decision Support System will be developed for the on-farm management of water resources. A range of dissemination activities addressing national and EU authorities, commercial stakeholders from the food sector, and farmers' organizations is included.

Food safety and quality is an overriding concern both inside and outside the EU community. Vegetables are a very important part of the diet both in the EU and China where an increased consumption is seen as important for the promotion of the health and well being of citizens. By contributing to the standards for safe irrigation of vegetables and by devising practical ways of achieving improved quality and safety, SAFIR will contribute to stabilize and increase the market for vegetables in the EU as well as for the export market. Europeans, in general, believe that health risks linked to the environment have increased in the last ten years, with some 31.3% stating that they think the risks have increased a lot, and another 28.4% stating they have increased a little (Eurobarometer 183, 2003) with Greeks, Italians, Portuguese the three most concerned groups of Europeans. In every country, the modern European consumer shows increasingly higher interest in high quality foods and the clear awareness that "safe foods are produced in safe environments". When asked about the main characteristics of a "safe environment" then sense of the consumers is primarily clean water and air. Moreover, in the last years, several advertising campaign focused on the high quality of the environment in which the food were produced as a primary added value of the production. As a consequence primary food industries and retailers organisations are more and more considering an environmental label as a relevant marketing issue, and they ask the producers to take care of the quality of the natural resources they use. The challenge for the next years will

therefore be to produce safe and high quality foods in a polluted environment reducing at the same time both the use of natural resources and the impact on the agroecosystems.

The project will investigate the main vegetable crops in Europe: potatoes and tomatoes (both for processing and fresh market)

The project will be carried out by 15 Research Institutes, covering all the necessary expertise from agronomy to epidemiology, taking in account transformation processes, hydrology, economics and modelling as well. Among the project partners there are two leading industries in the sector of irrigation device and water treatment.

Expected Results of SAFIR

As contribution to the state of the art and in response to the problems of water shortage and low water quality, SAFIR will focus its S & T activities in three areas:

New Irrigation Systems for Safe and Quality Food Crops

SAFIR will develop cost effective tertiary water treatment technology adapted to use by farmers or cooperatives to upgrade water to required water quality specifications for safe irrigation of vegetables and to be suitable for subsurface drip irrigation systems. The irrigation equipment will be developed to facilitate the new water saving strategy called PRD-irrigation. The impact will be studied and used to find technical solutions that optimize product quality in terms of taste and appearance while making best use of plant nutrients in low quality waters and keeping residual pathogens and other harmful bio-accumulative compounds out of contact with vegetables. Management strategies for this will be developed and demonstrated by conducting field experiments, analysing the results and developing a management model. The model will be able to handle the new additional technological input and management options at field scale and tested on two of the main vegetable crops in Europe, potato and tomato.

Quality and safety of fresh and processed food from farm to fork

The safety of the novel irrigation technologies and management systems, which will be developed, is an over-riding concern of the project. The studies described in the following will assure the safety of the developed technology and make it an integral part of management. Mobility and accumulation of selected toxic elements in the system irrigation water-soil-subsoil-crop-food under irrigation with low quality water will be determined. Survival of viral, bacteriological and parasite indicators will be determined in laboratory and field experiments. Important environmental and soil parameters affecting microorganism survival will be assessed. The microbiological quality of food products will be analyzed by standard methods with a special focus on occurrence and transmission of protozoan parasites. Risk assessment approaches and possible epidemiological studies will be used to identify risk factors for food safety and assess occupational health risks for farmers and food handlers. To better understand and assess the effect of the irrigation water quality and management on the human diet, the produced vegetables will be treated in an experimental industrial plant applying mild technologies (widely used to keep intact flavour and taste). Transformation done at low temperature, without pasteurisation but with a normal level of concentration of the raw product, will allow the assessment of the maximum level of risk for the end consumer. Overall the findings of these studies are believed to give significant inputs to future revisions of EU, international (Codex Alimentarius) and national hygiene and water quality regulations as well as guidelines for good agricultural practise (e.g. the EUREPGAP scheme).

Feasibility and applications to food production sector

The financial implications for the farmer as well as the economic costs and benefits will be analysed. Furthermore barriers such as legal issues for the use of the combination of low quality

water and the improved irrigation system will be identified and discussed with key stakeholders. A decision support system (DDS) will be developed as a farmers' application tool for optimising irrigation single crop management schemes as well as water allocation and water-use-efficiency at the aggregate farm level.

It is envisaged that the involvement of a stakeholder group during the lifetime of the project, and especially their invitation to the yearly meetings, may have a great influence to the public awareness of SAFIR results, as these stakeholders will be selected from important both private and public organisations.

All the World Processing Tomato Council and AMITOM members are invited, as leading stakeholders of the food processing sector, to take part of the EU project stakeholders group.

For further information please contact:

**A Battilani
Consorzio di Bonifica CER
Via E. Masi, 8
40137 Bologna - Italy
e-mail battilani@consorziocer.it**