ISAFRUIT: The total chain approach

Horticultural science has a key role to play in the EU mission to encourage increased consumption of fruit to improve human health and well-being. However, such challenges cannot be met by horticultural scientists alone. An interdisciplinary approach is required to understand why, despite well-publicised health benefits, the quantities of fruit being consumed are not increasing and what changes should be made to increase the consumption of fruit by European consumers. Since 2006, the ISAFRUIT Project has worked towards increasing fruit consumption in Europe.

Being unique in many ways, the ISAFRUIT Project has taken a holistic view of the barriers to increasing fruit consumption: consumer perceptions, fruit availability, quality and convenience, and environmentally-friendly production. Combining the expertise of over 300 scientists from 60 research and development institutions as well as small- or medium-sized enterprises (SMEs) in 16 countries across Europe, the USA, and New Zealand, ISAFRUIT is one of the largest integrated EU projects. It is the only project in the area of food quality and safety that is entirely focussed on fruit. Following EU FP6 policy, the project is based on a Fork-to-Farm, total fruit chain, approach.

Within ISAFRUIT, social scientists have investigated the reasons for consumers' behaviour and their attitudes towards innovations by asking: What are the drivers behind the buying decisions for fruit and fruit-derived products? The characteristics of fruit and fruit product supply chains have also been analysed in order to identify their capacity to act in a more co-ordinated fashion.

In order to improve the health and well-being of consumers, the impact of regular consumption of fruit and innovative fruit-derived products on health has been evaluated. A greater need to increase fruit consumption should result from a better understanding of the traits responsible for the beneficial effects on human health of fruit consumption, particularly in the areas of combating cardio-vascular diseases and obesity.

Increasing consumer awareness of, and interest in, the relationship between diet and health has led to an increase in the development of functional foods (i.e., fresh or processed foods with additional health-promoting effects beyond their basic nutritional value) to meet consumer demands for healthy and convenient foods. Functional foods are created by adding 'nutraceuticals' such as prebiotics, probiotics, algal calcium, or honey to food products. It is emerging that some of the by-products of fruit processing might also be used as innovative food products, providing the consumer with added health benefits, while reducing waste.

Processed fruit products may be more convenient for the busy consumer, therefore novel fruit products and processes have been developed and the health properties of these foods have been investigated in ISAFRUIT. Innovative fruit products are also being developed, which may be more convenient for "out of home" consumption (e.g., at work, on public transport, in schools). A key route to achieving increased fruit consumption by "time poor" consumers is to increase convenience. These consumers want to have access to healthy food that is both safe and represents good value-for-money.

An area of growing concern is the significant number of European consumers who suffer from fruit allergies, an obstacle to increased fruit consumption. Close co-operation among ISAFRUIT scientists (human health experts, fruit geneticists and horticulturists) is addressing this problem. Greater awareness by horticulturists is resulting in a reduced expression of allergens through altered growing techniques. Work has been conducted on novel transgenic apple trees obtained using gene silencing techniques. Fruit from these trees are yet to be tested.

ISAFRUIT researchers have studied the genes responsible for important fruit quality traits, including allergenicity. They have carried out the largest study, to date, of the levels of consumer acceptance of existing, as well as innovative apple and peach varieties across Europe. This knowledge will facilitate the delivery of better varieties to markets, including prospects for reduced chemical inputs and low- or allergen-free products.

Consumer awareness of environmental issues, new and restrictive EU pesticide regulations, and the demands of the many stakeholders in the supply chain, continuously challenge European growers to meet minimum residue level (MRL) requirements. Within ISAFRUIT, investigations into environmentally, socially, and economically sustainable production methods have been undertaken. Precision production methods to reduce the application of pesticides and fertilisers, innovative crop management strategies that address the needs of integrated or organic fruit producers, and alternative thinning methods (e.g., the inhibition of photosynthesis), have been major research foci for ISAFRUIT crop physiologists. Applied and fundamental research are leading to the development of state-of-the-art techniques to use natural resources, such as light and water, more sustainably, while improving the quality and health-related profile of fruit.

ISAFRUIT project researchers have, to date, presented results in *ca.* 300 deliverables, activities, and reports representing *ca.* 4,000 pages. The scientific and technological innovations arising from the project are the focus of a large number of dissemination events across Europe. ISAFRUIT results have been presented at events such as the annual FruitLogistica event and to the EU Commission, where key actors in the fruit industry can be reached more easily. This special issue of the *Journal of Horticultural Science & Biotechnology* is a further powerful vehicle for communicating information arising from the ISAFRUIT project.

The researchers involved in ISAFRUIT are determined to demonstrate that the work carried out has fulfilled the goals defined at the beginning of the project. Integration between the various disciplines and approaches adopted by ISAFRUIT researchers in different fields has proved to be particularly challenging. Therefore, an internal quality evaluation mechanism has been established to provide an objective assessment of the degree of integration of disciplines and the success of ISAFRUIT in supporting an increase in fruit consumption (see the first paper *"A search for a systematic method to bridge between pre-harvest, post-harvest and consumer research aimed at increasing fruit consumption: The "Vasco da Gama" process"*).

The ISAFRUIT project ends in September 2010, and a comprehensive synopsis of its achievements and influence on fruit consumption will be presented at the 28th International Horticultural Congress in Lisbon, Portugal, between 22–27 August 2010.

Dr. Ole Callesen
ISAFRUIT Co-ordinator
Aarhus University, Aarslev, Denmark