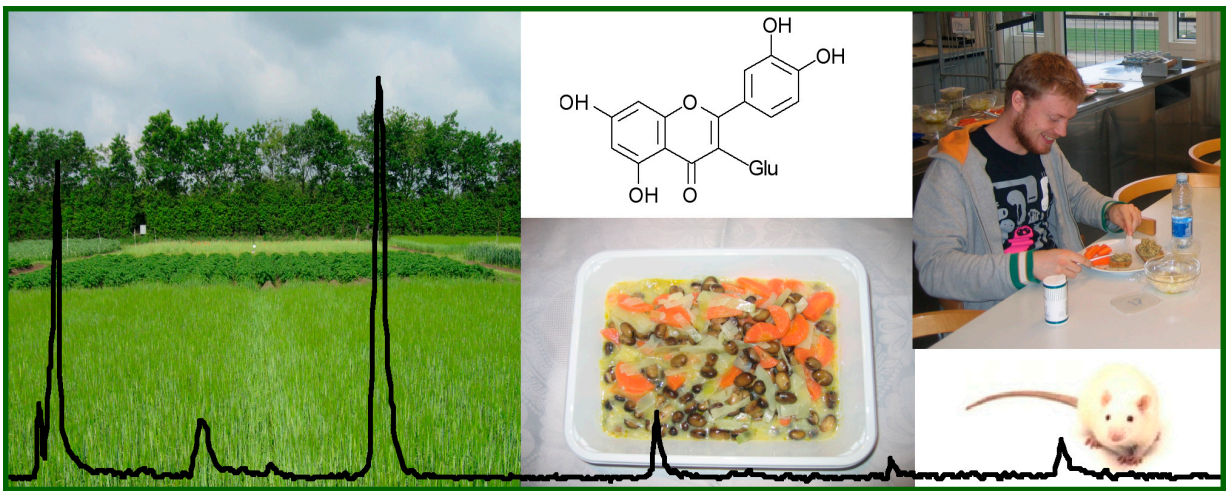
Organic food and health

OrgTrace 2007-2010

ICROFS

International Centre for Research in Organic Food Systems



In OrgTrace a wide range of plant products are produced at different geographical locations and in different agricultural systems in order to investigate if organically produced plants relative to conventional plants have a higher human bioavailability of chemical components with health promoting effects

Organic food and health

- Health effects of organically grown plant food products

Trace elements, bioactive secondary metabolites and vitamins are among the most important quality parameters in plants. Yet, very little information is available on their content, bioavailability and health effects of organically grown plant food products.

The main objective of OrgTrace is to study the impact of different agricultural management practices relevant for organic farming on the ability of cereal and vegetable crops to absorb trace elements from the soil and to synthesise bioactive compounds (secondary metabolites, antioxidant vitamins and phytates) with health-promoting effects. Based on different plant products produced in OrgTrace, diets are composed and the bioavailability of health-promoting substances is analysed in a human intervention study. Furthermore, various health effects such as immune system responses are studied using rats as a model. OrgTrace is the first study to follow selected bioactive compounds all the way from the plant and soil system to absorption in the body.

Are organic foods healthier?

The quality and safety of food are important issues, that are of increasing concern to the general public. The consumption of organic foods has been steadily increasing during the last decade, particularly in Western countries. Many consumers perceive organic foods to be of better quality, healthier and more nutritious than food produced using conventional methods, but conclusive research on possible impacts on animal and human health is lacking. Currently, there is no solid scientific evidence, that can support or refute such consumer perceptions. Thus, there is an urgent need for further investigations into human health effects of organic food products.

As organic products increase their market share and become more visible on the market, a polarisation of the debate occurs: Proponents of organic or conventional agriculture accuse each other of using unsubstantiated claims about risks or benefits in an attempt to promote their own commercial interests. Consequently, it is in the interest of both consumers and policy-makers to have access to independent scientific results, that can be used to secure focus and improve the quality of the debate as well as providing foundation for possible nutritional recommendations by the authorities.

The objectives of OrgTrace

The overall scope of OrgTrace is to improve the fundamental knowledge of organically grown foods in order to further document their quality in relation to agricultural practice. This will be realised in the present project by investigating the influence of a variety of rigidly controlled cultivation methods on the content of bioactive compounds of importance in human nutrition as well as for promotion of human health.

The specific OrgTrace objectives are:

1. To screen the content of trace elements together with other relevant bioactive constituents in a wide selection of commonly consumed organic crops
2. To study the effects of foods on health and wellbeing after long-term consumption using the rat as a model
3. To assess the bioavailability of bioactive compounds in human intervention studies employing prepared foods based on the cultivated crops

The work packages of OrgTrace

Spring barley, winter wheat, potatoes, oil-seed rape and faba beans are grown in three different rotations (two organic systems and one conventional) at three different geographical locations, each reflecting typical soils used in Danish agriculture. In addition, white cabbage, onion, carrots and oat are produced in the same rotations as listed above at one location specialised in horticultural vegetable production.

Soil and plants are sampled in 2007 and 2008, samples are prepared for analysis and diets are composed for rat-feeding trials and human intervention studies.

Wheat is produced at three different locations (Jyndevad, Foulum and Flakkebjerg) in two different organic and one conventional agricultural system

Rats are used as a model to investigate behavioural and immune effects of organic and conventional diets produced in OrgTrace

OrgTrace consists of five work packages, each with a number of key tasks that contribute to fulfilling the overall objectives listed above. A very condensed summary of these key tasks is presented below:

Key task A: Multi-elemental classification analysis of plant and soil samples

Approximately 70 different elements of the periodic table are analysed in all plant and soil samples in order to generate an elemental fingerprint, which can be analysed using multivariate statistics to classify samples. This technique has, in combination with isotope ratio measurements, previously been shown to be a very strong tool to determine the origin of plant products and reflect the cultivation system. In OrgTrace the methodology is for the first time used to analyse if a unique organic fingerprint can be identified even if different plants species, agricultural rotations and geographical locations are considered simultaneously.

Key task B: Identification of bioactive selenium and sulphur metabolites in plants

Selenium and sulphur molecular species are among the most potent bioactive metabolites found in plants. Harvested plant products will be analysed for a wide range of health-promoting substances and any new hitherto unknown metabolites will be identified and characterised if present in significant amounts.

Key task C: Identification of antioxidative metabolites in plants

The presence of plant metabolites with antioxidative properties is believed to be a major health-promoting factor in human nutrition. A wide range of the most important metabolites is measured in the harvested plant products including: vitamins, carotenoids, polyacetylenes, flavonoids, proanthocyanidins, phytates etc.

Key task D: Characterization of the health status in rats

Diets composed of plant products from the different geographical locations and agricultural systems in OrgTrace will be fed to rats in order to examine impacts on various biomarkers for health and well-being. Special attention will be given to effects on the immune system according to the various dietary treatments.

Key task E: Human bioavailability

The bioavailability of essential trace elements and selected bioactive metabolites will be analysed in a human intervention study. Groups of young male subjects will consume two different organic diets or one conventional diet. Diets, blood, urine, and faeces will be analysed in order to quantify possible differences in bioavailability among cultivation systems.

This folder was produced in March 2008 and consequently no data is available yet.

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- Health effects of organically grown plant food products (OrgTrace 2007-2010)

Photo: Erling Nielsen

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Links

The project website: www.orgtrace.elr.dk/uk
www.icrofs.org

About ICROFS

The International Centre for Research in Organic Food Systems (ICROFS) is a "centre without walls" where the research is performed in interdisciplinary collaboration between research groups in different institutions. The centre is an expansion of the former research centre DARCOF, which the Danish Government in 2008 decided to give an international mandate and an international board.

The main purpose of ICROFS is to coordinate and monitor international research in organic food and farming systems in order to achieve optimum benefit from the allocated resources. Further, the aim of ICROFS is to initiate research and create impact of the research results through support and dissemination of high quality research of international standard.

More information at www.icrofs.org