

AGronomical and TEChnological methods to improve ORGanic wheat quality (AGTEC-Org)

AGTEC-Org

Methods to improve quality in organic wheat

It is a challenge to organic farmers, millers and bakeries to fulfil consumer expectations of providing healthy and safe products without impairing yield performance. The quality of organic grain can be modified by agronomic conditions such as crop management, crop rotation, and soil fertility. Therefore, food processing technologies such as the post-harvest handling of the grain and the flour processing are also key factors in producing bread of high nutritional value without contaminants. This project focuses on the optimization of agronomic practices and grain fractionation processes in order to obtain wheat and flour with improved nutritional value, health and sensory characteristics.



The overall objective of the project "AGronomical and TEChnological methods to improve ORGanic wheat quality (AGTEC-Org)" is to identify agro-nomical and food processing technologies that enhance the baking quality and the nutritional value of organic wheat and reduce mycotoxin contamination. Specific objectives are to:

- ▶ Evaluate the current practices for organic grain wheat production and flour-processing in Europe,
- ▶ Improve crop management strategies to enable bread-quality wheat to be produced on organic farms with and without livestock,
- ▶ Develop optimal post-harvest treatment to prevent mycotoxin contamination and enhance breadmaking quality and nutritional value,
- ▶ To generalise results from experiments in order to enhance farm management strategies in diverse climates and soil types.

Surveys and field experiments

A database on organic wheat and flour production in Europe will be set up based on interviews and a review of literature.

The effects of soil tillage and fertility managements will be assessed in three long-term field experiments combined with a field survey. The trials and field survey represent various soil types and climatic conditions. The experimental treatments compare different tillage management.

A database on farmyard manures, mixed composts and organic commercial fertilizers will be completed to provide information on carbon content, nutrient content and nitrogen mineralization kinetics. The effects of animal manures and organic fertilizers and nitrogen availability will be assessed in long-term field experiments.

The influence of legume green manure in a crop rotation will be investigated in two different soil types and climates. A study will be carried out on the influence of the removal of green manure for fodder use and its replacement with farmyard manure, simulating a livestock system in addition to stockless systems. Interactions between type of green manure and time of incorporation will be investigated.

Intercropping experiments on winter wheat-pea and on wheat-clover mixtures will also take place.

From all the field experiments weed and disease pressure at flowering and wheat maturity will be evaluated. Wheat grain yield, grain protein content and composition will be determined. The risk of mycotoxin contamination will be investigated.



Investigation of post-harvest treatments

Grain samples from the field experiments will be selected and tested in milling tests with either roller milling or stone milling using three different extraction rates. Flour will be analysed for its technological, nutritional and hygienic quality and the optimal extraction rate will be determined.

Pre-treatments such as dehulling and ozonation will be tested as well as post-physico-chemical treatments such as heat. A combination of different complementary treatments will also be studied in order to define optimal conditions for flour characteristics improvement.

Scenarios and synthesis

Soil-plant-climate models will be used to evaluate effects of modifications of crop rotation and crop management on grain yield and protein, soil organic matter levels, nitrogen

leaching and nitrous oxide emissions. This will be performed by setting up these models for several sites in Europe, corresponding to the experimental locations using the soil and climate characteristics. The models will be run for several years of climate data for each site to account for climatic variation, and the results will be compiled and compared across sites and management practices to get a total environmental evaluation of the crop management practices.

An economic simulation model will be developed analysing the economic impacts of innovations from the project for typical quality-wheat producing farms in Switzerland, Italy, Denmark and France. The model will simulate the financial effects for varying levels of yields, costs and prices and will provide information about sensitivity and robustness. Furthermore, the limitations and constraints for on-farm implementation will be identified.



Project coordinator:

Christophe David, ISARA Lyon, France, e-mail: davidc@isara.fr

Project partner:

Joséphine Peigné & Florian Celette., ISARA Lyon, France

Anne Aveline, Guénaelle Hellou & Mathieu Carof., ESA Angers, France

David Dubois, Jürg Hiltbrunner & Jochen Mayer, Agroscope Reckenholz Tänikon, Research Station (ART), Switzerland

Paul Mäder, Andreas Thommen & Matthias Stolze, Forschungsinstitut für Biologischen Landbau (FiBL), Switzerland

Jürgen K. Friedel, Gabriele Pietsch & Bernhard Freyer, Organic Farming Division, University of Natural Resources and Applied Life Sciences Vienna (BOKU), Austria

Ingrid K. Thomsen, Jørgen E. Olesen & Susanne Elmholt, Aarhus University, Denmark

Marina Carcea, Vincenzo Galli & Francesco Melara, Cereal Research Dept., Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione (INRAN), Italy

Joel Abecassis, Marc Chaurand & Marie-Françoise Samson, Cereal Technology Dept., INRA Montpellier, France

Marie-Hélène Jeuffroy, Agronomy Dept., INRA Grignon, France

Participating institutes

ISARA Lyon, Agrosystems Env. Production Dept., France

ESA Angers, Agriculture Production Env. Dept., France

Agroscope Reckenholz Tänikon, Research Station (ART), Switzerland

University of Natural Resources and Applied Life Sciences Vienna (BOKU), Organic Farming Division., Austria

Aarhus University, Denmark

Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione (INRAN), Cereal Research Dept., Italy

INRA Montpellier, Cereal Technology Dept., France

INRA Grignon, Agronomy Dept., France

Work packages

In the project the following work packages will be conducted:

WP1 Project management and communication

WP2 Field experiments

WP3 Post-harvest treatments

WP4 Grain and flour quality

WP5 Scenario analyses and synthesis

Further information

You will find further information at the project website <http://www.agtec.coreportal.org>

The project is initiated as a result of the cooperation in CORE Organic. In this EU supported ERA Network, 11 European research funding organisations have launched a joint call, which intends to step up cooperation between national research activities in organic food and farming. Further information on CORE Organic can be obtained at www.coreorganic.org.

By subscribing to the CORE Organic news you can follow the progress in the project. Subscription is possible via www.coreorganic.org.

