CORE organic

AGronomical and TEChnological methods to improve ORGanic wheat quality

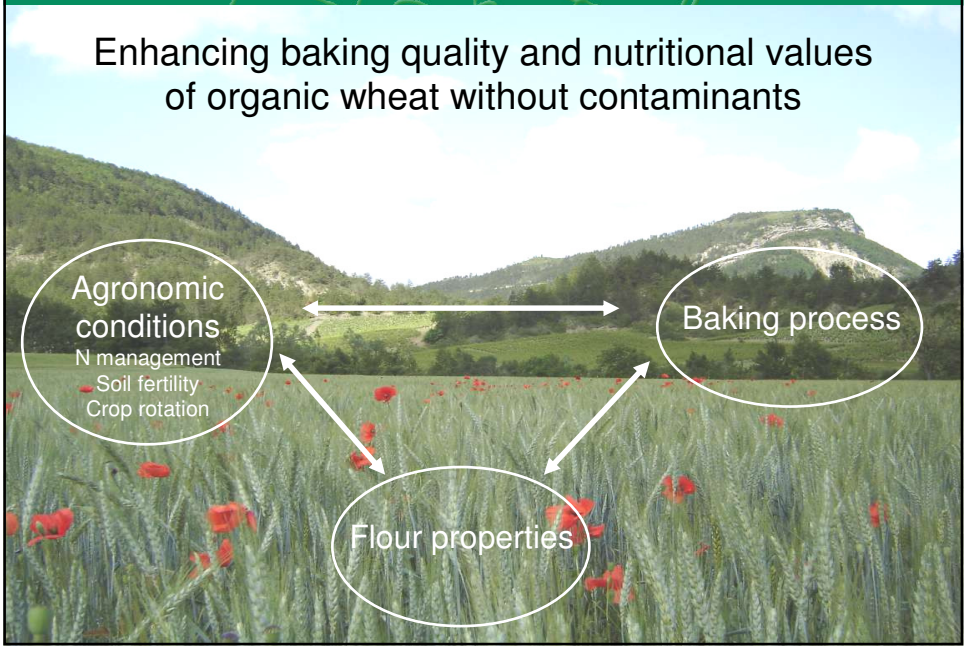
David C, Abecassis J, Carcea M, Dubois D, Embolt S, Friedel JK, Hellou G, Jeuffroy MH, Mäder P, Peigne J, Stolze M, Thomsen IK,and co

ISARA, France, ESA France; Agroscope Reckenholz Tänikon, Research Station (ART), Switzerland; Forschungsinstitut für Biologischen Landbau (FiBL), Switzerland; University of Natural Resources and Applied Life sciences (BOKU), Austria; Danish Institute of Agricultural Sciences (DIAS), Denmark; Instituto Nazionale di Riserca per gli Alimenti e la Nutrizione Roma (INRAN), Italy and Instituto, INRA Montpellier, INRA Grignon, France

Agroscope Reckenholz-Tänikon ART

CORE organic

Enhancing baking quality and nutritional values of organic wheat without contaminants



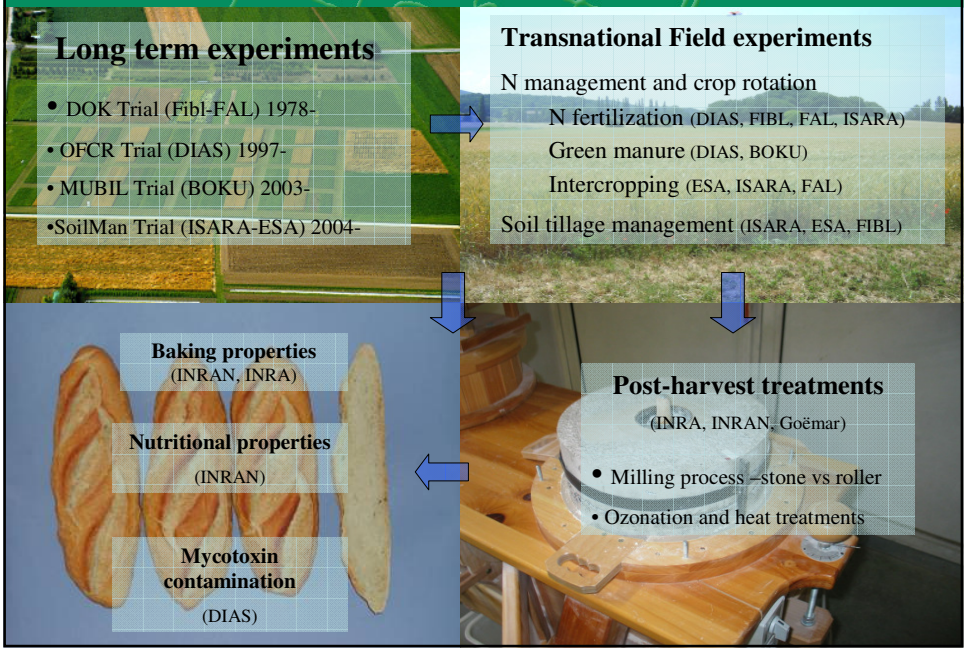
CORE organic

Objectives

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

CORE organic

Common use of research facilities



CORE organic

Exchange scientific expertises

FIBLTrial

3 experimental factors – 8 treatments
1 site

Mouldboard ploughing vs Reduced tillage

Slurry vs Slurry+manure compost

Biodynamic preparations vs no preparations

SoilManTrials

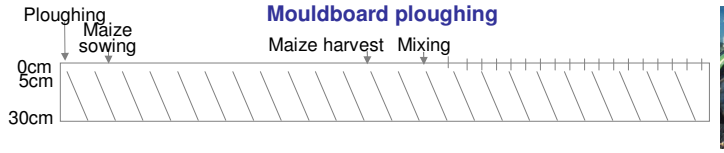
1 experimental factor 4 treatments – 2 sites

Mouldboard ploughing - 30 cm - soil inversion

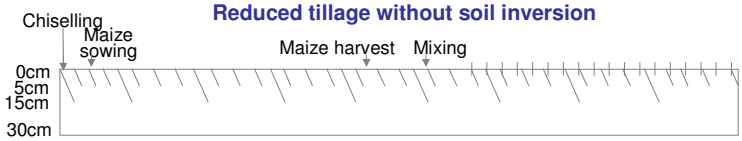
Shallow mouldboard ploughing - 15 -20 cm - soil inversion

Reduced tillage with line tool 10 - 15 cm– no soil inversion

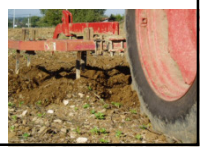
No tillage - 0 -5 cm – no soil inversion



Mouldboard ploughing



Reduced tillage without soil inversion



CORE organic

Combine & compare agronomic solutions

Intercropping or undersowing system

wheat-pea / wheat-clover mixtures

3 experimental factors – 24 treatments
1 site

Wheat / Pea ratio : 50/50 - 70/30 – 100/0 – 0/100

N fertilization strategies
Time of N application (3 dates)
N amount (2 levels)

3 experimental factors – 5 sites

Seed rate of clovers grass (3 levels)

N fertilization

3 experimental factors 4 sites

Crop rotation with high vs low proportion of N-fixing crops

N fertilization with vs without supply of animal slurry or manure

Biodynamic vs Organic systems

Green manure

2 experimental factors 4 treatments – 3 sites

Type of green manure

Time of incorporation

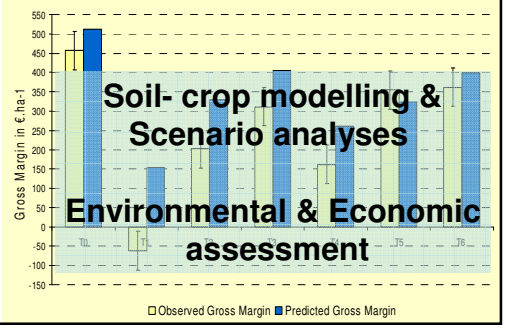
CORE organic

Innovative agronomical and technological methods

Intercropping and undersowing system on organic wheat

Ozonation and heat treatment

Superficial tillage on organic grain systems

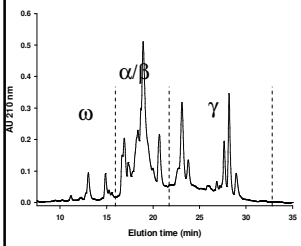


Soil- crop modelling & Scenario analyses

Environmental & Economic assessment

CORE organic

Multifactorial analysis



Bread making properties

Dough reological analysis
Redox status
Zeleny sedimentation index
Gluten index
Flour reological properties

Mycotoxin contamination

Fusarium sp. Detection

DON concentration

Nutritional values

Dietary fibre
Bound Hydrophilic antioxidants
Hardness
Ash
Total protein

CORE organic

Added value of the collaboration

- The use of long term experiments, surveys and analytical trials
- The assessment of innovative crop management and milling processes
- The combination of agronomical and technological methods
- A multidisciplinary consortium
- A permanent link with farmers and millers through participatory research

CORE organic

Context

- 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.

CORE organic

WP1. Project management & communication with stakeholders

WP2. Fields experiments

- Soil tillage management
- N fertilization
- Green manure
- Intercropping

WP3. Post harvest treatments

- Pre and post-physico-chemical treatments
- Milling process

WP4. Quality assessment

- Grain and flour composition
- Mycotoxin

WP5. Scenario analyses and synthesis

- Soil-crop modelling and environmental assessment
- Economic assessment

CORE organic