Reduced tillage and green manures for sustainable organic cropping systems TILMAN-ORG (2011-2014)

Introduction

Coordinator: Paul Mäder
Co-Coordinator: Christophe David

www.tilman-org.net

Core Organic seminar, Amsterdam, May 15, 2013

TILMAN-ORG

- **“The TILMAN-ORG project’s overall goals are to design improved organic cropping systems with:**
  - enhanced productivity and nutrient use efficiency,
  - more efficient weed management and increased biodiversity, but
  - lower carbon footprints (in particular increased carbon sequestration and lower GHG emissions from soils).”
- **15 partners of 11 countries:** Switzerland, France, Germany, Netherlands, Belgium, Luxemburg, United Kingdom, Estonia, Italy, Spain, Austria
- **Disciplines:** Agronomy, plant, soil, weed sciences, molecular ecology, plant nutrition, modeling, sociology
- **Dissemination:** Peer reviewed and farmers press articles, leaflets, videos, field days, conferences, workshops, web page

TILMAN-ORG project structure

WP1: Trial overview (reduced tillage under OF in Europe)

WP2: Meta analyses (trial data, literature)
Farmer interviews

WP3: Carbon sequestration
Greenhouse gas emissions

WP4: Weed management
Ecosystem services

WP5: Nutrient management
N modelling (NDICEA)

WP6: Prototyping improved organic cropping systems and multi-criteria assessment (MASC)

Main results, added value at EU level

› Main results

- In Europe, two main groups of organic farmers using conservation techniques: Soil conservationists, and agro-technically challenged
- More weeds and higher biodiversity in reduced tillage systems, but yields rarely reduced, new methodology for assessing eco-functionality of weeds
- Soil organic carbon and soil biological activity higher under reduced tillage
- NDICEA suitable in some trials to model N dynamics, further calibration
- New trials established in a co-ordinated manner combining reduced tillage x green manure
- Prototyping started for different agro-climatic zones (with knowledge from literature review, farmers' interviews, expert knowledge)
- MASC for multi-criteria assessment improved (weed algorithm)

› Added value at EU level

- Data compilation of existing long-term trials and grey literature across Europe
- Transnational knowledge exchange of farmers and researchers
- Pooling expert knowledge in different disciplines (capacity building)
- Standardisation of methods

Role of ecological services providing crops (ESCs)

Not directly aimed at yield

To provide ecosystem services (examples)

- nutrients supply and management (i.e. fertility building crop)
- water holding capacity
- weed control
- disease and pest control (different mechanisms);
- pollination services
- C sequestration
- resilience to (extreme and severe) weather conditions
- ………

ESCs contribute to reduce negative externalities of agriculture (i.e. environmental and/or social costs)

(Foley et al., 2011; Kremer and Miles, 2012; Thorup Kristensen et al., 2012;)

Introduction of ESCs in vegetable cropping systems

1. As ecological infrastructures (not in the rotation)
2. Within the rotation (*complementary crops*)
   i. ESC is grown between subsequent yielding crops (*YCs*) of the rotation (*inter-rotated ESCs*)
      i. place in the rotation
      ii. management (termination)
   ii. ESC is grown intercropped within the yielding crop (*living mulch*)

InterVeg

Complementary (not alternative) strategies, contributing to temporal and spatial in-system diversification

(Masiunas, 1998)

InterVeg research hypothesis and aims

The main *__hypothesis of the research__* is that the introduction and the proper management of living mulch in vegetable production systems (in comparison to the sole cropping systems) would allow:

- comparable yields and similar produce quality
- lower environmental impact (i.e. reduction of potential risk of N leaching)
- effective weed management
- favorable pest/beneficial insect interactions
- not-renewable energy consumption and production costs reduction

InterVeg consortium

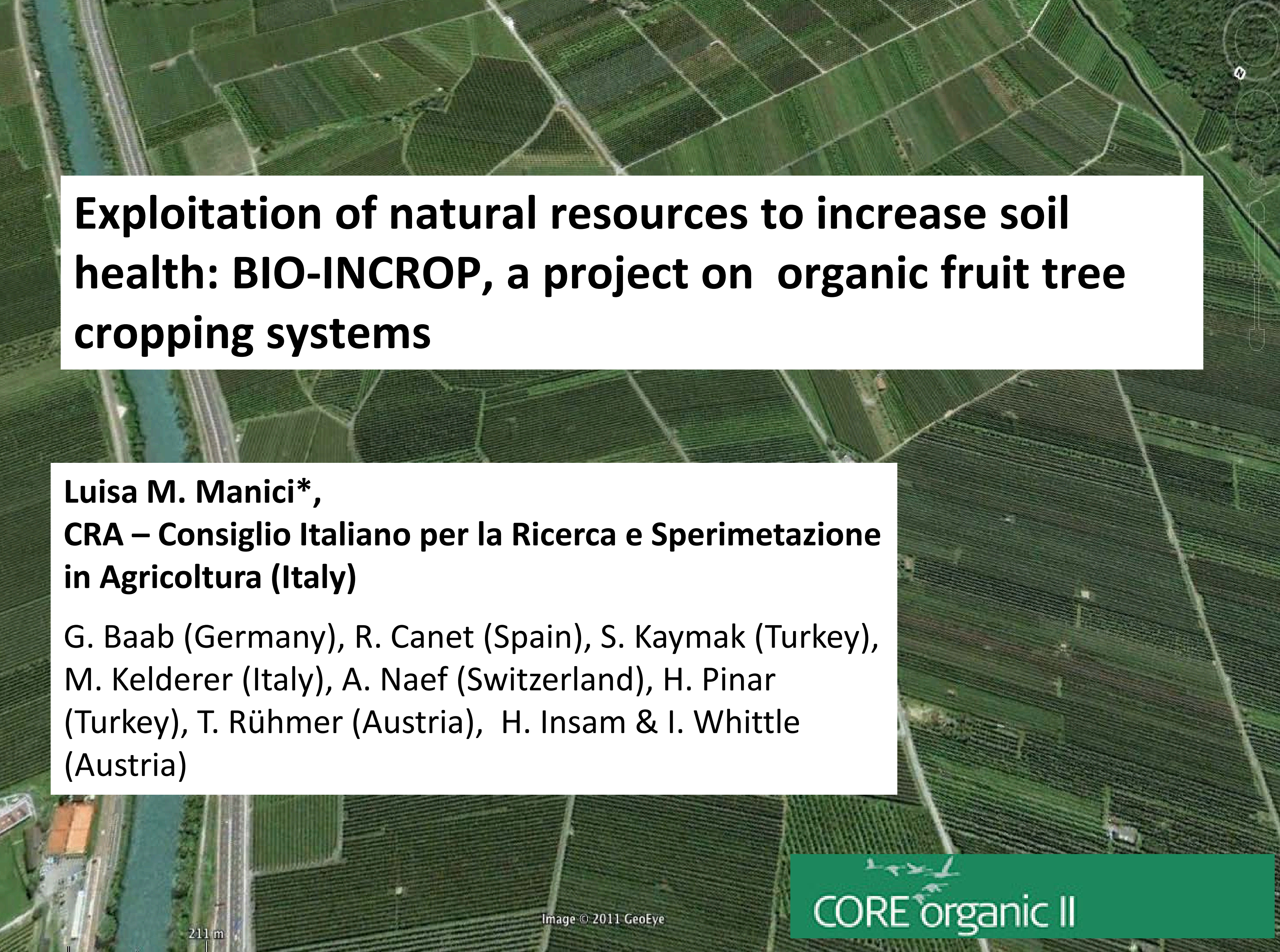
Institutions	People
Consiglio per la ricerca e la sperimentazione in agricoltura (2 Research Centers: RPS and ORA) – IT	Stefano Canali Fabio Tittarelli Gabriele Campanelli Corrado Ciaccia
Associazione Italiana Agricoltura Biologica (AIAB) - IT	Livia Ortolani Cristina Micheloni
Università di Bologna - IT	Giovanni Burgio
University of Kassel - DE	Peter von Fragstein
Aarhus University - DK	Hanne L. Kristensen
University of Maribor - SLO	Franci Bavec

WP	Title	Leader
1	Coordination	Stefano Canali
2	Experimental sites establishment, management and harvest quality evaluation	Hanne L. Kristensen
3	Reduction of off-farm inputs for fertility management	Fabio Tittarelli
4	Functional biodiversity and beneficial insect population management	Giovanni Burgio
5	Weed management and energy saving	Stefano Canali
6	Stakeholders involvement and dissemination	Livia Ortolani

Exploitation of natural resources to increase soil health: BIO-INCROP, a project on organic fruit tree cropping systems

Luisa M. Manici*,
CRA – Consiglio Italiano per la Ricerca e Sperimetazione in Agricoltura (Italy)

G. Baab (Germany), R. Canet (Spain), S. Kaymak (Turkey), M. Kelderer (Italy), A. Naef (Switzerland), H. Pinar (Turkey), T. Rühmer (Austria), H. Insam & I. Whittle (Austria)



CORE organic II

BIO-INCROP project is a multidisciplinary project based in the hypothesis that the response of soil microbial communities toward agro-management practices may be the means for solving replant disorders or soil fertility decline of fruit tree orchards and permanent crops.

Research Actions based on the exploitation of two categories of natural resources

1. Biological resources **indigenous** to soil system of the orchards
2. Natural resources **exogenous** to orchards (waste-deriving material, bio-formulates, cover crops)

Main objectives

1. Developing innovative cropping techniques aimed at : i) increasing soil microbial **biomass and diversity**, ii) increasing **indigenous** beneficial microbial species ; iii) reducing the **impact** of soil borne fungal **pathogen** on fruit trees.
2. To support **critical adoption** by farmers of organic amendments and bio-products available on the marked as suitable for organic agriculture.
3. To increase **awareness** of stakeholders that **biodiversity** has not only an impact on the environment's safety, but it is also an important resource for developing innovative technologies for organic and sustainable agriculture.

FP7 ERA-Net project (no. 249667)

VineMan.org

Integration of plant resistance, cropping practices, and biological control agents for enhancing disease management, yield efficiency, and biodiversity in organic European vineyards

Aim

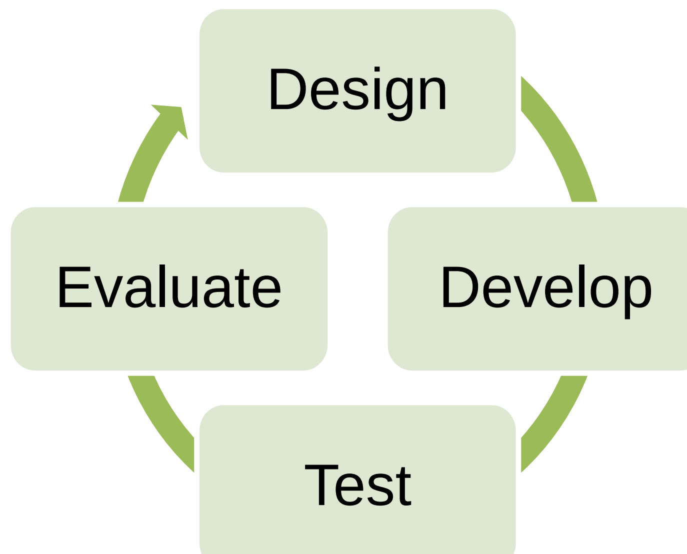
develop innovative cropping systems for managing organic vineyards

able to:

- improve control of key plant diseases
- enhance grape production
- reduce mycotoxin contamination
- increase microbial biodiversity
- minimize the environmental impact

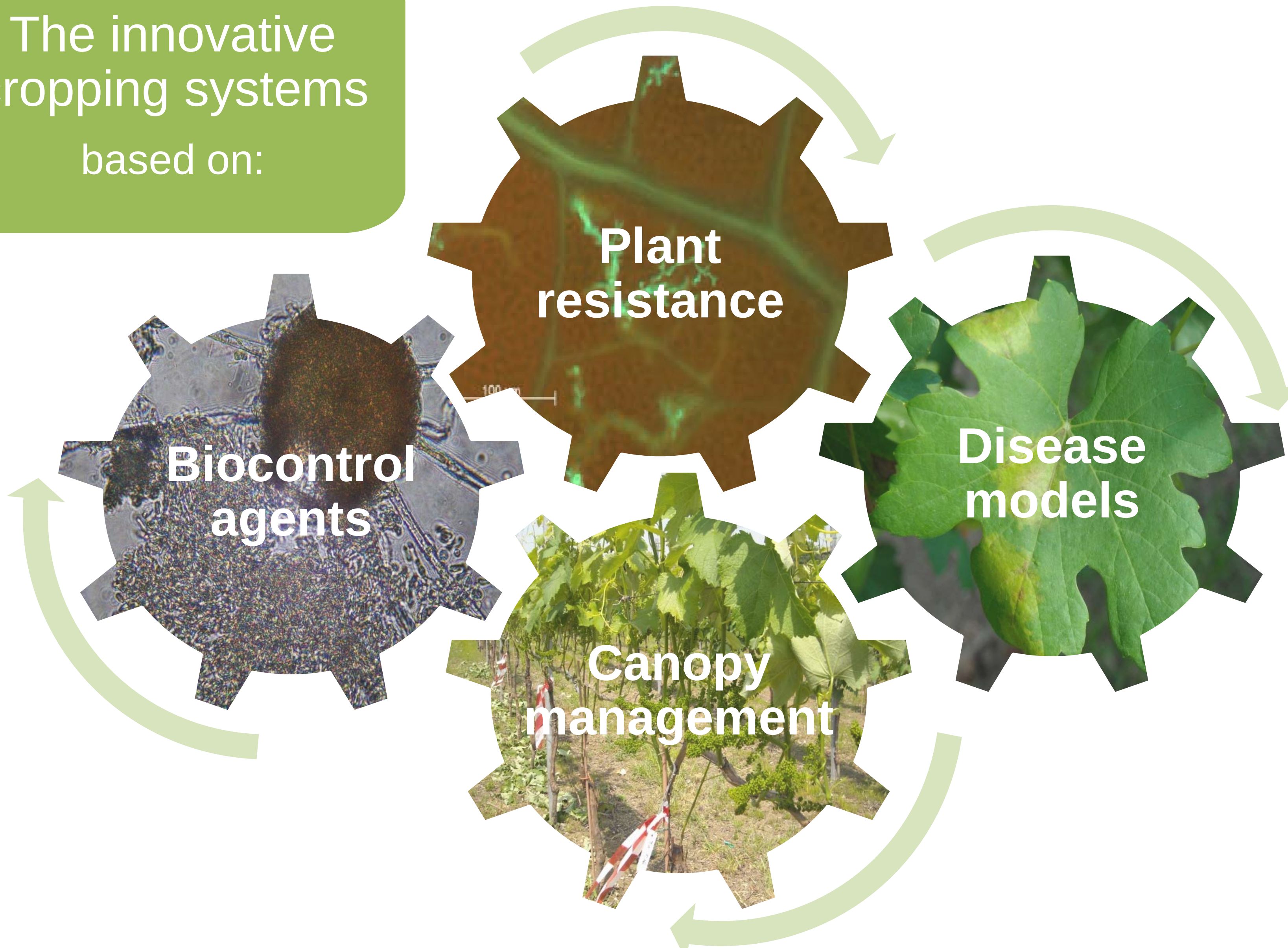
How

through a design-assessment-adjustment cycle

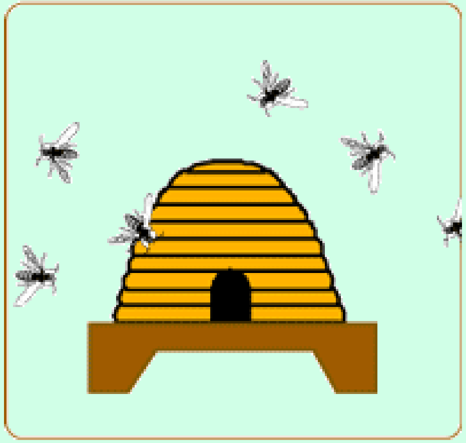


The innovative cropping systems

based on:



Targeted precision biocontrol and pollination enhancement in organic cropping systems



CO2 Amsterdam 15.5.2013

General objective of BICOPOLL:

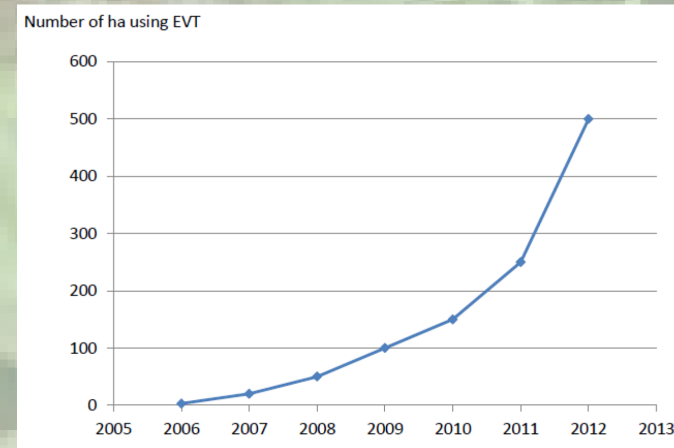
to improve the yield and quality of organic fruit and berry production via efficient, innovative plant protection and improved pollination

Specific objectives:

- to provide a pan-European **case study on** protecting **organic strawberry** cultivations from its most important disease, the grey mould, using bee vectored biocontrol and improved pollination
- to improve the efficiency of the entomovector technology via **gap filling research** on manipulation of bee behavior, components of the cropping system, and on the plant-pathogen-vector-antagonist -system
- to **improve** inoculum **dispensers** and **carrier materials**
- to investigate possibilities of **expanding the use** of the entomovector concept into other organic berry and fruit growing systems

Significant achievements in the first year:

- excellent field results obtained in first trials in Estonia, Italy, and in the UK, besides the commercial success in Finland



- several points for improving the entomovectoring system have been identified, and will be tested in 2013

- rapid and reliable monitoring methods for the biocontrol fungus have been developed (qPCR), for evaluating the efficiency of vectoring and the safety of the method to consumers and bees

- plenty of publicity to the project!

CORE organic II

Softpest Multitrap

Background:

European tarnished plant bug
(*Lygus rugulipennis*)

Strawberry blossom weevil
(*Anthonomus rubi*)

Raspberry beetle
(*Byturus tomentosus*)

Cause large losses in yield (10 - >80%) and quality of organically grown strawberry and raspberry

<u>Objective:</u> By exploiting natural semiochemical mechanisms of sexual and host plant attraction, to develop effective traps for these insect species or repealing them from the field

CORE organic II

Softpest Multitrap

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-Karlson, KTH)

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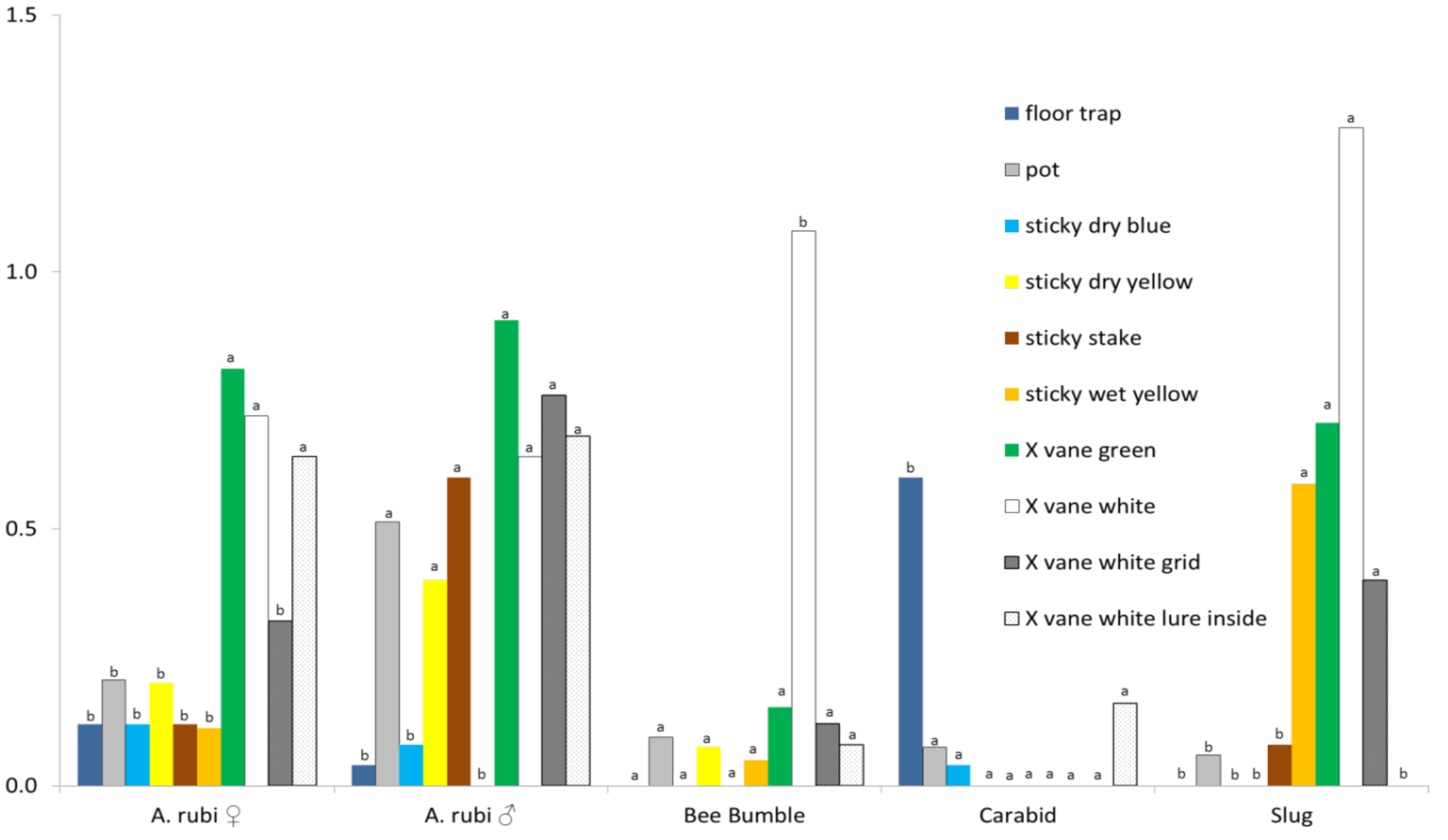
Softpest Multitrap

Some preliminary results:



HealthyHens

*Laying hens: **2nd most important species** after cattle **in organic husbandry**!*

<u>Challenges in organic egg production:</u>

- Free range: Parasites, sufficient use, (patchy) nitrogen input
- Aim: 100 % organic feed / restrictions concerning protein feed
- No beak trimming
- Day light
- Alternative medical treatments

HealthyHens

Epidemiological approach with cross sectional design

- 9 project partners in 8 countries
- 107 organic layer flocks
  - 2 farm visits
  - slaughterhouse visits for 70 flocks

October 2011 to September 2014

HealthyHens

WP0: Common cross sectional design

- Husbandry
- Feeding
- Hygiene
- other Management
- (Genetics)

WP1: Parasite infestation

WP2: Use of free range

WP3: Feather and injurious pecking

WP4: Other health problems (e.g. keel bone and foot lesions)

- Laying performance
- Mortality
- Body weight

ICOPP

Improved contribution of local feed to support 100% organic feed supply to pigs and poultry

An ERA-net project with 13 partners/10 countries
1/10-2011-30/9-2014

John E Hermansen, Dept. of Agroecology, Aarhus University

Expected output: New validated systems that are economical viable as well as animal welfare - and environmental friendly and adapted to local agro-ecological conditions

- Improved knowledge of availability and nutritional value of new organic feed ingredients - focus on local feed resources
- Improved understanding of the possible benefits of roughage inclusion in relation to nutritional and behavioural needs as well as its impact on health and welfare
- Understanding how direct foraging in the outdoor area can contribute to meeting the animals nutritional needs
- Assessing the economic and environmental consequences of increased reliance on local organically produced feed

The Results

The research and development will result in appropriate feeding strategies established for organic farming with 100% organic feed, which are profitable, have low environmental impact and high animal welfare.

Follow the progress of the project and learn the results on these websites:
www.europeanfarmersnetwork.org/
www.thepoultrysite.com
www.thepigsite.com

For more information in the UK please contact:

Dr Jo Smith or Rebecca Nelder at
The Organic Research Centre, Elm Farm,
Hamstead Marshall, Newbury RG20 0HR
01488 658298
www.theorganicresearchcentre.com

OR
Ruth Clements BVMS MRCVS
FAI Farms Ltd of The Field Station, Wytham,
Oxford. OX2 8QJ.
01865 790880
www.faifarms.co.uk

CORE organic II

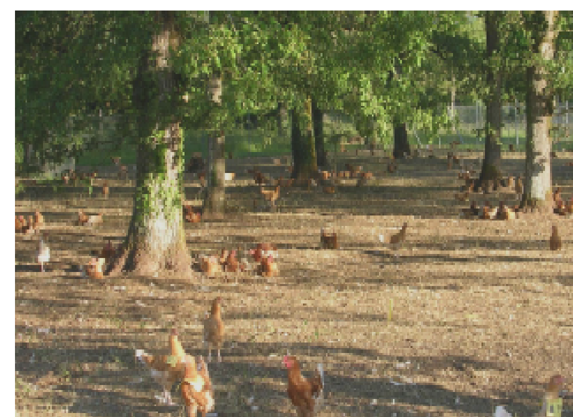
ICOPP is a CORE Organic II project
www.coreorganic2.org

The Project Consortium

The Organic Research Centre Elm Farm
SLU
MTT
fai
vTI Johann Heinrich von Thünen-Institut, Institute of Organic Farming
Lithuanian Institute of Agrarian Economics
lfz raumberg gumpenstein
BOKU
ITAB Institut Technique de l'Agriculture Biologique
Aarhus University, Department of Agroecology
INRA
Livestock Research Wageningen UR
FiBL
Louis Bolk Instituut, the natural source of knowledge
Hochschule Weihenstephan-Triesdorf, University of Applied Sciences

ICOPP

Improved Contribution of Local Feed to Sup
100% Organic Feed Supply to Pigs and Pou



CORE organic II

Introduction

ProPIG

Farm specific strategies to reduce environmental impact by improving health, welfare and nutrition of organic pigs

C. Leeb

Amsterdam, 15th May, 2013

2nd CORE Organic II research seminar

University of Natural Resources and Applied Life Sciences, Vienna
FiBL
BIOINSTITUT
FRIEDRICH-LOEFFLER-INSTITUT FLI Bundesforschungsinstitut für Tiergesundheit Federal Research Institute for Animal Health
INRA
AARHUS UNIVERSITY DEPARTMENT OF ANIMAL SCIENCE
CRA CONSIGLIO PER LA RICERCA E LA SPERIMENTAZIONE IN AGRICOLTURA
Newcastle University

Three Systems

75 farms in 8 countries

To identify

- animal - environment interactions in three systems

Hypothesis

- all systems are able to ensure good welfare and low environmental impact
- when well managed

=?

=?

Indoor with concrete outside run

Partly outdoors

Outdoors

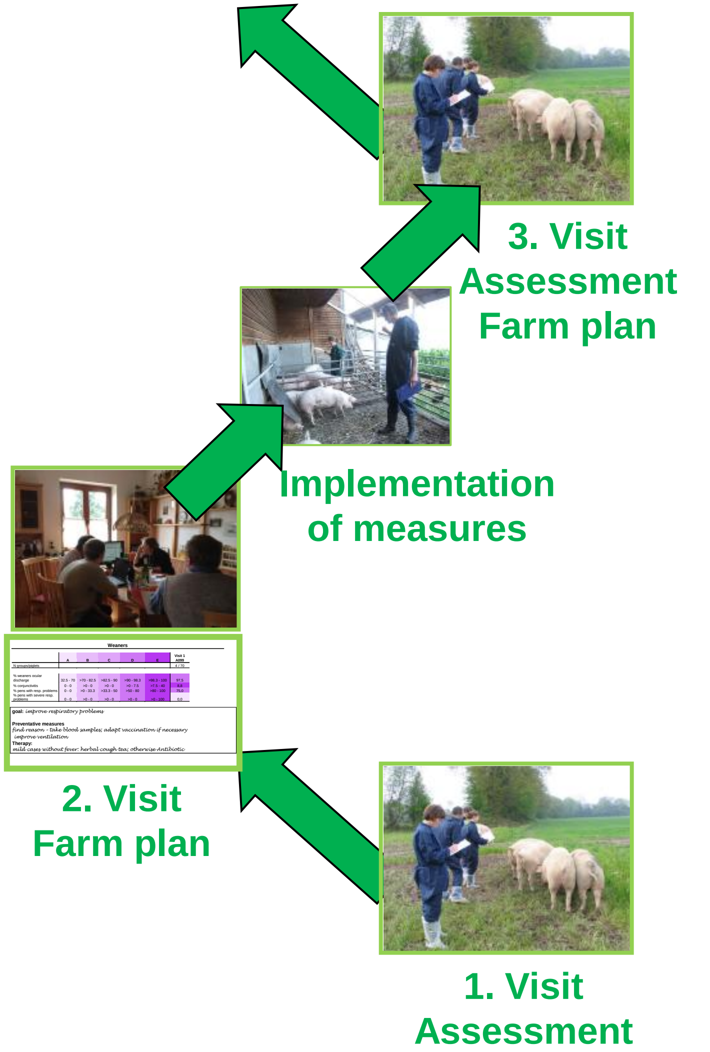
Farm specific strategies for improvement

To develop and implement

- **Farm specific strategies** to:
  - reduce environmental impacts
  - by improving health, welfare, nutrition and management of organic pigs



- To **disseminate knowledge** to national advisory bodies and farmers



SafeOrganic:

Restrictive use of antibiotics in organic animal farming - a potential for safer, high quality products with less antibiotic resistant bacteria

CORE organic II

Antibiotic usage in organic pigs

– Will consumers benefit from restricted antibiotic usage in organic pigs?

SafeOrganic

Title of the project:
Restrictive use of antibiotics in organic animal farming - a potential for safer, high quality products with less antibiotic resistant bacteria.

Project introduction

Søren Aabo - Coordinator (DTU)

Partner countries:
Denmark (DTU & UCPH), Sweden (SVA), France (ANSES), Italy (IZSVe), Czech Rep. (VRI)

Aim:

To enable slaughterhouses to reduce spread of antibiotic resistant (AR) bacteria and organic farmers to market meat products of higher food safety quality

Objectives - SafeOrganic:

- To document potential lower AR levels in organic pigs
- To investigate the level of AR cross-contamination at slaughter slaughterhouse to display the herd status
- To investigate the level of AR cross-contamination at slaughter
- To document the certainty of ... sampling at slaughterhouse to display the ...
- To investigate at possible a correlation between observed AR and consumption of antibiotics

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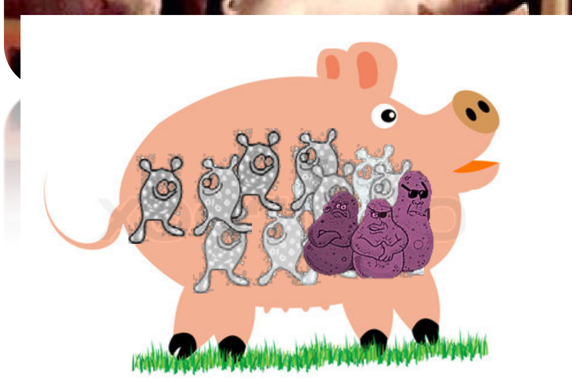

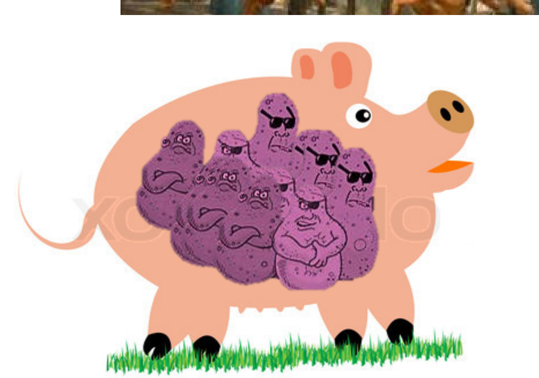

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Work packages - SafeOrganic

Core

Herd factors related to AR
WP 2.1 SE, IT

AR in Organic & Conv. Herds
WP 2.3, ALL

Difference in genotype diversity between Org & Conv. herds,
WP 4.2 FR,DK

Transfer of AR between organic and conventional pigs at slaughter,
WP 3.1, DK, FR, SE

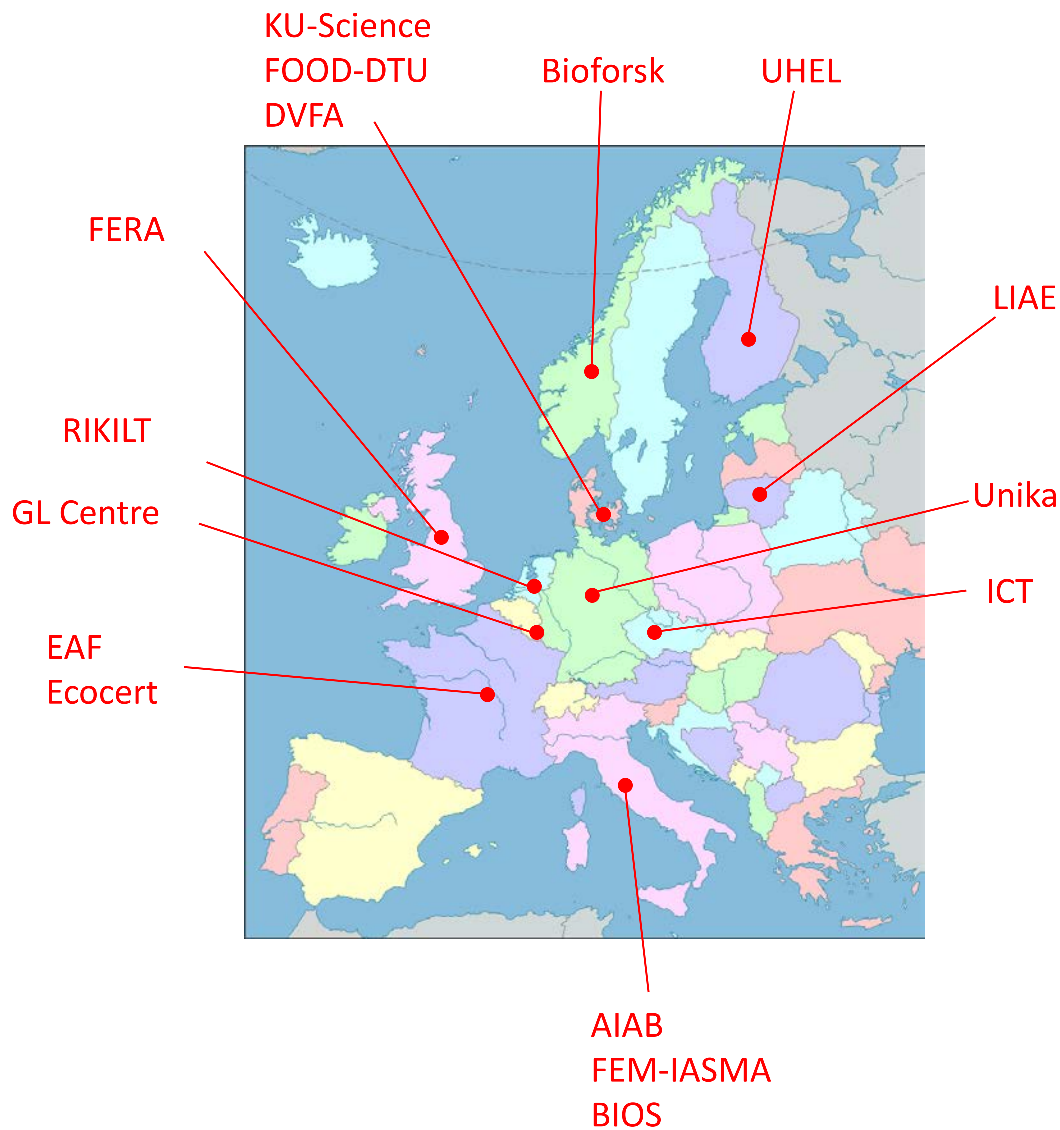
Convenient testing of herd status
WP 2.2, DK

Microbiota and resistance gene analysis
WP 4.3 CZ / ALL

Correlation? – AR patterns and antibiotic consumption
WP 4.1, DK, IT, ALL

AUTHENTIC FOOD

AuthenticFood partners



Coordinated by Professor Søren Husted
Faculty of Science, University of Copenhagen

Presented by Professor Saskia van Ruth
Wageningen University

Research objectives of ”AuthenticFood”

To develop and test a portfolio of analytical techniques for authentication of organic plant foods:

- Ionomics
- Stable isotopes
- Metabolomics
- Pesticide screening

To evaluate the techniques in corporation with European certification and inspection bodies:

- Ecocert - France
- BIOS - Italy
- DVFA - Denmark

AUTHENTIC FOOD

Workpackages

- WP1: Project coordination (Søren Husted, UCPH)
- WP2: Sample production and distribution (Cristina Micheloni, AIAB)
- WP3: Multi-elemental analysis (ICP-MS), ^{31}P (NMR) (Søren Husted, UCPH)
- WP4: Stable isotopes, δ^{2}H, δ^{13}C, δ^{15}N, δ^{18}O, δ^{34}S, nitrate and sulfate isotopes, δ^{15}N in amino acids (Federica Camin, FEM-IASMA)
- WP5: Metabolomics, phenolic content, volatile analysis, fatty acids, sensory profiles (Saskia van Ruth, RIKILT)
- WP6: Pesticide residues (Cedric Guignard, GL Centre)
- WP7: Chemometrics (Torfinn Torp, Bioforsk)
- WP8: Results dissemination (Johannes Kahl, UniKa)

AUTHENTIC FOOD

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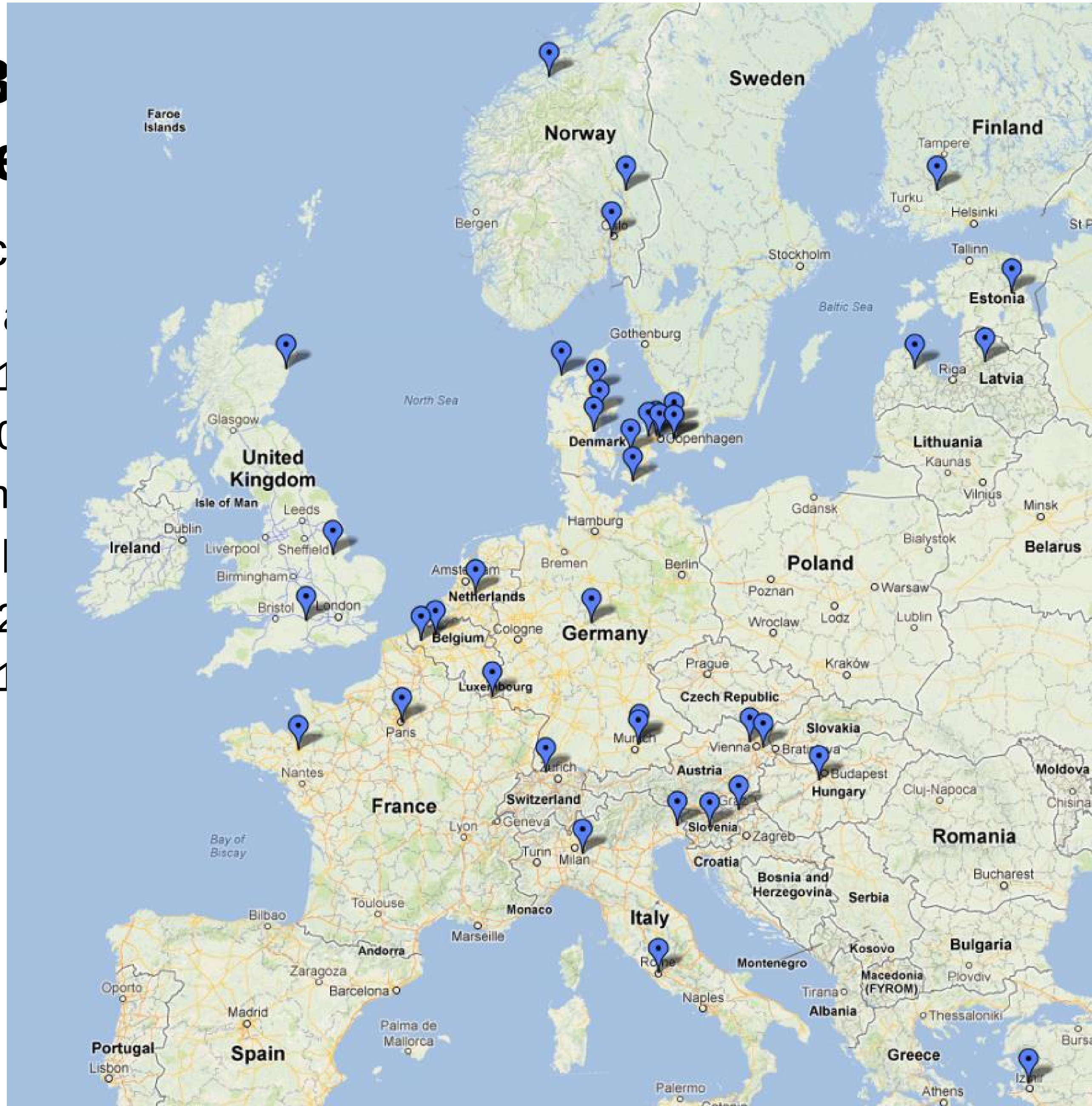


COBRA’s Aims

- To support and develop organic plant breeding and seed production
- Focus on increasing the use and potential of plant material with **High Genetic Diversity**
- Cereals (wheat and barley) and grain legumes (pea and faba bean)
- Coordinating, linking and expanding existing breeding and research

Work plan

HealthyGrowth: From niche to volumen with integrity and trust

Main rationale of HealthyGrowth:

- That a healthy and sustainable growth in the organic market depends on the ability of market chains
- to combine volume and marketing
- with measures that secure integrity and trust based on the organic values and principles,
- and thereby generating a prize premium that can be distributed along the chain.

The main hypotheses:

- Mid-scale value chains operate by a different marketing logic than either small- or large-scale chains, based on different forms of organisations, partnerships and strategies
- that this enables them to combine growth in volume with a high and growing level of organic values throughout the market chain as a sound foundation for organic integrity and consumer trust

The aim:

- is to study a range of successful mid-scale food value chains
- and show the fundamental prerequisites for their success in combining volume and values
- in order to support the development of new organic value chains and provide new opportunities for organic actors.

IMPROVE-P

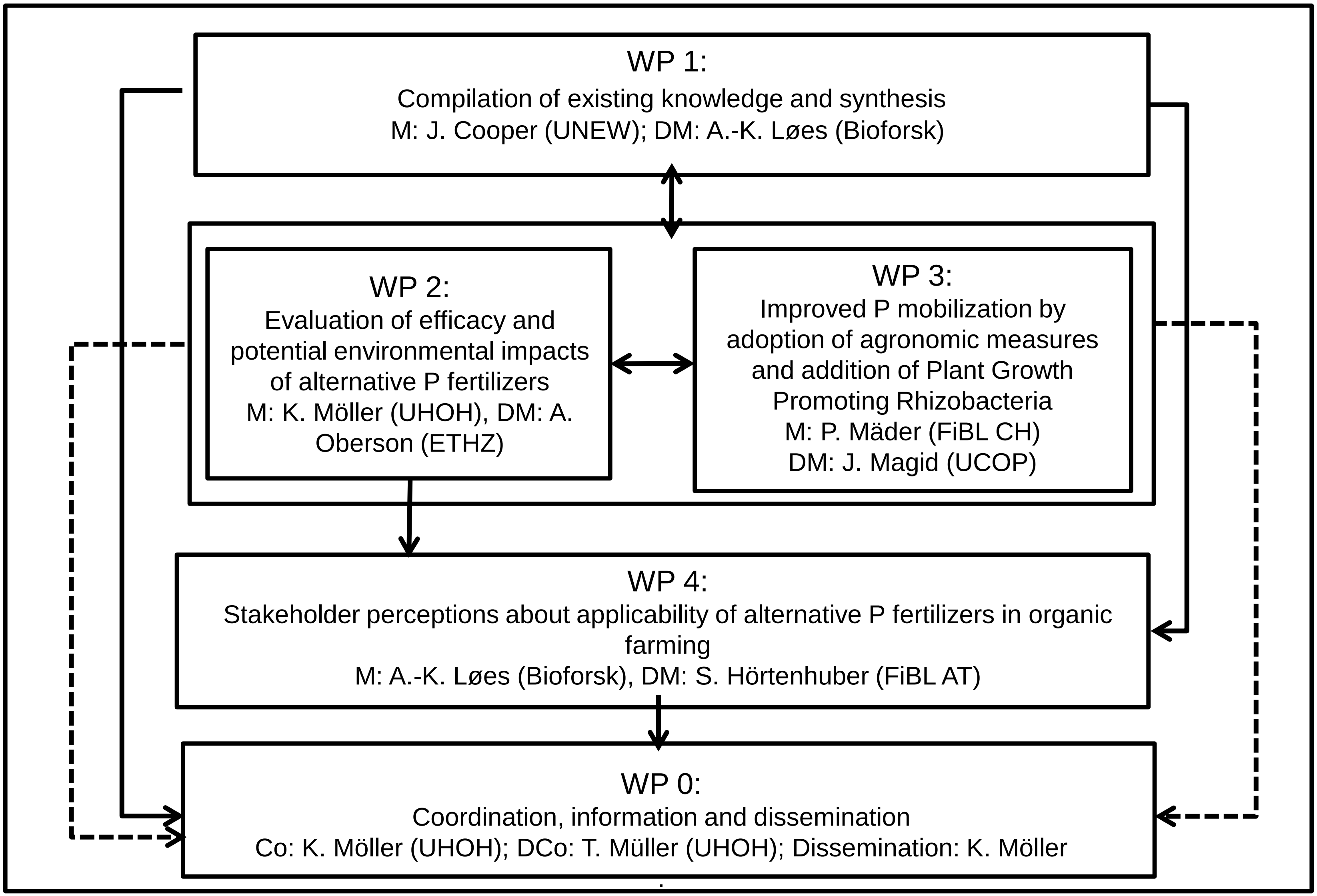
IMproved Phosphorus Resource efficiency in Organic agriculture Via recycling and Enhanced biological mobilization

Coordinators: Kurt Möller & Torsten Müller

Partners: Anne-Kristin Løes, NO; Jürgen-Kurt Friedel, AT; Andreas Kranzler, AT; Astrid Oberson, CH; Paul Mäder, CH; Jakob Magid, DK; Julia Cooper, GB

UNIVERSITÄT HOHENHEIM

Project structure of IMPROVE-P



Aims and objectives

- Improvement of the long term P status of OF soils
- Development of optimized systems of efficient P recycling
- Increased P use efficiency through stimulation of biological soil processes (green manures, crop rotation and PGPRs)
- Assessment of potential environmental issues arising from the use of APF
- Development of recommendations based on results of the experiments and stakeholder inputs