

MANAGEMENT OF FARMING, FOOD AND FORESTRY  
SYSTEMS & VALORIZATION OF THE TERRITORY

# Sustainable management



## Parallel Thematic Session

### MANAGEMENT OF FARMING, FOOD AND FORESTRY SYSTEMS & VALORIZATION OF THE TERRITORY

#### Sustainable management

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## Horizon 2020: AFINET: Agroforestry Innovation Networks



### Practical problem

AFINET aims to solve the lack of agroforestry (AF) knowledge exchange between farmers, foresters, researchers, advisers and government services and to foster the correct implementation of AF practices, helping to increase farm profitability and environmental benefits.

### Partners

#### Names:

USC - University of Santiago de Compostela - Coordinator (ES); ORC - Organic Research Centre (UK); EV ILVO - Institute for Agricultural and Fisheries Research (BE); ISA - Instituto Superior de Agronomia (PT); IUNG-PIB - Institute of Soil Science and Plant Cultivation (PL); INAGRO (BE); SoE-KKK - University of West Hungary Cooperational Research Centre Nonprofit (HU); ABACUS Agriculture (UK); IBAF-CNR - Istituto di Biologia Agro-ambientale e Forestale - Consiglio Nazionale delle Ricerche (IT); EURAF - European Agroforestry Federation; AFAF - Association Française d'Agroforesterie (FR); FEUGA - Fundación Empresa-Universidad Gallega (ES); EFI - European Forest Institute (FI).

### Project

#### Objectives:

Support Agroforestry innovation and enhance knowledge transfer through:

- "Regional Agroforestry Innovation Networks" (RAINs), working groups where farmers, foresters, researchers, advisers and government services come together.
- The creation of a "Knowledge Cloud", a user-friendly on-line repository.

#### Expected results:

- To address the knowledge gaps and other challenges facing the Agroforestry sector, providing greater access to research findings and practices.
- To support the implementation of innovations identified by the RAINs members, promoting new operational groups.
- Influencing EU, national and regional policies, encouraging the participation of policy-makers in the RAINs and communicating the project outcome.

#### Results so far/first lessons:

9 RAINs have been created: Spain, UK, Belgium, Portugal, Poland, Hungary, Italy, France and Finland. Each of them has focused on a specific theme, based on the interests of local stakeholders. First RAINs meetings have been held between July and Sept. First communication and dissemination activities and on-line presence have been developed.

Project website: <http://www.agroforestry.eu/afinet>

#### Who will benefit:

Practitioners who are expected to implement the solutions identified and researchers who access knowledge from the field.

Start: January/2017  
End: December/2019

Budget: 1.999.987 €



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Supported by:



Start: 01/01/2016  
End: 31/12/2018

Budget: 334.957 €

## Operational Group:

Les Arbonovateurs, for resilience in fruit growing and fruit growers proud of their craft

*Les Arbonovateurs*

## Practical

### problem

Fruit growers have two main problems.

Water management of orchards in the territory is a strong issue for the different players on a deficit water catchment area, particularly in dry periods. On the other hand, the issue of pesticides in the air requires solutions that can radically change the current situation.

## Partners

### Type:

Farmers association

### Name:

GIEE Arbonovateur

Research institute

Centre d'Expérimentation Fruits et Légumes

Farmers organisation

Chambre d'Agriculture de Tarn et Garonne

## Project

### Objectives:

Improve water management in orchards, analysing different irrigation systems and designing decision tools.

Create a method for adapting the spray volume to the volume of the tree, so that the quantity of pesticides in the air decreases.

### Expected results:

Improved water management through the choice of more adequate irrigation systems and by enhancing their efficiency, thus adjusting the water quantity to the needs.

Development of a new method of adaptation of the spray volume to the volume of the tree, which limits the excesses of pesticides and the impact on the environment.

### Results so far/first lessons:

The water savings in optimized management are around 30%, i.e. 1000 m3 / ha on average for several years in apples. These data are being verified at CEFEL.

### Who will benefit:

Fruits growers and the environment in general.

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# SUSTAINABLE MANAGEMENT



Supported by:



Start: January/ 2012  
End: March/ 2015

Budget: 413 397 €

## PRODER:

### Effects of soil management on productivity and sustainability of grape vineyard system – GreenVitis

Efeitos da gestão do solo na produtividade e sustentabilidade do sistema vitivinícola duriense – Green Vitis

## Practical problem

The agriculture is considered responsible for about 30% of CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub> emissions (GHGs), which is a major environmental problem. The improvement of soil management in permanent crops can itself decrease those emissions, among other benefits.

## Partners

### Type:

Agri enterprise  
Research/Teaching  
Research /Teaching  
Association

### Name:

Quinta do Vallado – Sociedade Agrícola, Lda  
Universidade de Trás-os-Montes e Alto Douro  
Instituto Politécnico de Bragança  
Associação para o Desenvolvimento da Viticultura Duriense

## Project

### Objectives:

To evaluate the effect of different soil management practices (conventional tillage, cover crop with spontaneous flora and cover crop seeded mixture) in a vineyard of the Douro Region, to the management sustainability of the system

### Expected results:

It is expected to improve the organic matter, soil carbon and soil structure, decreasing soil emissions and footprint, microclimate, ecophysiology, nutrient recycling, decreasing soil erosion, water use, weed and disease management, biodiversity, yield and quality, in order to improve sustainable management of the wine-growing system

### Results so far/first lessons:

Reduction of CO<sub>2</sub> emissions by decreasing the conventional practices of soil mobilization (intensive tillage); dissemination of soil management practices to farmers, associations and academics through seminars and conferences

### Who will benefit:

Vine-growers and its associations, technicians, researchers, government bodies and the civil society in general



Supported by:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 727929



Start: June/2017  
End: December/2020

Budget: 5.996.175 €

## Horizon 2020:

TOMRES: a novel and integrated approach to increase multiple and combined stress tolerance in plants using tomato as a model

## Practical problem

Water and fertilizer availability is decreasing, while the demand for these valuable resources increases. Soil leaching of N and P has a negative impact on water quality. Despite considerable effort, tomato cultivars with significant drought tolerance and/or superior Nutrient Use Efficiency (NUE) have not been reported.

## Partners

### Names:

Uni Torino (IT); Agricultural Uni Athens (GR); Agroilla (ES); Casella Macchine Agricole Srl (IT); CONFAGRICOLTURA (IT); Edypro Fertilizantes, S.L. (ES); EPSO (BE); Gaia Epicheirein Anonymi Etairaia Psifiakon Ypiresion (GR); Gautier Semences SAS (FR); Institut Jozef Stefan (SI); INRA (FR); Neurather Gärtner GbR (DE); Novareckon Srl (IT); Raffaele Tamburrino (IT); Research and Development Institute for Horticultural Products Horting (RO); Rheinische Friedrich-Wilhelms-Uni Bonn (DE); STC Research Foundation (UK); Strigolab Srl (IT); Technion – Israel Institute of Technology (IL); The Hebrew University of Jerusalem (IL); The James Hutton Institute (UK); Uni of Nottingham (UK); Uni Milano (IT); Uni Napoli Federico II (IT); Uni de Les Illes Balears (ES).

## Project

### Objectives:

The overall goal of TOMRES is to enhance resilience to combined water and nutrient stress and to maximize water and nutrient use efficiency by designing and testing in the field novel combinations of genotypes and management practices reducing the environmental impact of agricultural activities.

### Expected results:

Novel traits will be identified and rootstocks and scions displaying increased Water Use Efficiency and Nutrient Use Efficiency, while retaining fruit quality and yield, will be selected. Crop management strategies will be optimized, environmental and socio-economic impact will be assessed, and a Decision Support System will assist field testing of genotype x management practices, and transfer to farmers.

### Results so far/first lessons:

First-year testing of tomato accessions for improved water and nutrient use efficiency is now underway.

### Who will benefit:

Consumers, organic, low-input and conventional farmers, extension services, breeders, companies, and policymakers.

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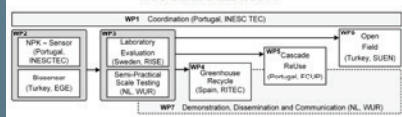
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## DEMONSTRATION SITES



## WPs ORGANIZATION



Start: April/2017  
End: March/2020

Budget: 1.080.448 €

## Cooperation supported by FCT, I.P.:

Integrated monitoring and control of water, nutrients and plant protection products towards a sustainable agricultural sector.

## Practical problem

With selective sensors for nutrients and PPP available, the water quality can be more easily monitored and appropriate precautions can be taken to minimize leakages and optimize water quality and thus durable use.

## Partners

Type:

Name:

Research/ Teaching

INESC TEC - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência; FCUP - Faculdade de Ciências da Universidade do Porto; WUR - Universidade de Wageningen; EGE UNIVERSITY; RISE; SÜEN

Other company

EGE LIFE SCIENCES; RITEC

## Project

Objectives:

Development and evaluation of innovative optical fiber sensors for NPK nutrients;  
Development and evaluation of innovative sensors for simple, rapid and sensitive monitoring of PPP;  
Development of participatory policy models for agricultural input optimization and water quality monitoring.

Expected results:

Better use and protection of European natural resources; Improvement of environmental water quality and protection of human health;  
Reducing operational and energy cost;  
Industry: boosting the European water technology sector;  
Contribution to expand Water RDI.

Results so far/first lessons:

The project has started in late April 2017 and it is in an early state of development. The most important achievement so far is the definition of two common pesticides for all partner's countries, to which biosensors will be developed. Moreover, some visits to practical greenhouses and open field crops were performed, to get knowledge on fertigation equipments and drip irrigation.

Who will benefit:

Farmers, sensor market, agricultural organisations, food consumers.

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Fundo Europeu  
de Desenvolvimento Regional

## Colaborative Business R&TD Projects:

**ModelMeat – A model for the optimisation of environmental and nutritional performance in extensive animal production**

*ModelMeat - Modelo de Otimização de Ambiente e Qualidade do Produto para Serviços de Apoio à Competitividade dos Agentes da Fileira da Produção Animal Extensiva*

### Practical problem

Extensive meat production systems have several environmental benefits that farmers are unable to leverage in the market due to the absence of a decision support system to quantify and optimise their environmental, economic and nutritional advantages.

### Partners

#### Type:

Agri enterprise  
Research/Teaching

#### Name:

Terraprima – Serviços Ambientais, Sociedade Unipessoal Lda.  
Universidade Católica Portuguesa – Escola Superior de Biotecnologia

### Project

#### Objectives:

The goal of Project ModelMeat is to develop a decision support service for integrated sustainability management in the extensive livestock production sector, starting with a sample of 1,000 farmers in Portugal. A software tool will be developed with the integrated implementation of ModelMeat.

#### Expected results:

Tool to estimate grazing feed intake using remote sensing (drone flights, satellite data);  
A Dynamic Energy Budget (DEB) model of animals;  
Environmental (greenhouse gas) and economic characterisation of management practices using parametric Life Cycle Assessment (LCA);  
Estimation of nutritional, health and sensory features of extensive meat, and their economic valuation by consumers.

#### Results so far/first lessons:

ModelMeat established a partnership with an initial group of farmers that were surveyed to obtain a list of relevant inputs and management practices. An online system was developed for data collection. Data was collected for the environmental calculation tool. Grazing exclusion cages were installed in all grazing land in these farms to estimate yield. The DEB model is currently being built.

#### Who will benefit:

ModelMeat will help farmers test/optimize extensive production (environmentally and economically, and product quality).

Start: October/2016  
End: September/2019

Budget: 885.386 €



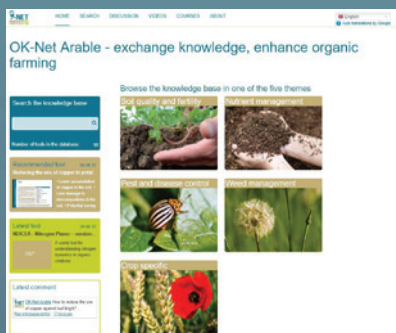
## Horizon 2020:

### OK-Net Arable: Organic Knowledge Network Arable



#### Supported by:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 652654



Start: March /2015  
End: February /2018

Budget: 2.159.633 €

## Practical problem

Concerns have been raised on the productivity of organics compared with conventional farming. But evidence shows that farmers with more experience have higher yields. Exchange of knowledge among farmers, advisers and scientists is hence crucial to improve yields in organic farming.

## Partners

#### Names:

IFOAM EU (SE); FiBL Switzerland (CH); Organic Research Centre (UK); Bioland Beratung (DE); International Centre for Research in; Organic Food Systems (ICROFS)(DK); Associazione Italiana per l'Agricoltura Biologica (AIAB)(IT); European Forum for Agricultural and Rural Advisory Services (EUFAR)(LV); CIHEAM-IAMB (IT); FiBL Germany (DE); FiBL Austria (AT); Ökologische Landwirtschaftsforschung (ÖMKI) (HU); ConMarcheBio (IT); Eesti Mahepõllumajanduse Sihtasutus (EE); BioForum Vlaanderen (BE); Institut Technique de l'Agriculture Biologique (FR); Danish Agriculture & Food Council (DK); Bioselena (BG)

## Project

#### Objectives:

The project will synthesize available knowledge about organic arable farming and identify the best tools for exchanging this. The tools will be made available on an online platform (farmknowledge.org). The project will also create opportunities for farmers to exchange experiences face-to-face.

#### Expected results:

- Easily understandable end-user material based on latest scientific and practical knowledge of organic arable farming
- Online platform offering evidence-based end-user material as well as facilitating farmer-to-farmer learning (farmknowledge.org)
- European network of farmers for the exchange of experiences and knowledge
- Higher productivity and more stable yields in organic farming

#### Results so far/first lessons:

OK-Net Arable has launched a knowledge platform (farmknowledge.org), which farmers can use to find practical organic solutions, and at the same time discuss how they work on the field. OK-Net Arable has also brought together the challenges identified by participating farmers. Data show a wide range of crop yields. This indicates there is need, but also a clear possibility to improve farm yields. Project website: <http://www.ok-net-arable.eu/>

#### Who will benefit:

OK-Net Arable targets less and more experienced organic farmers, as well as farm advisers.

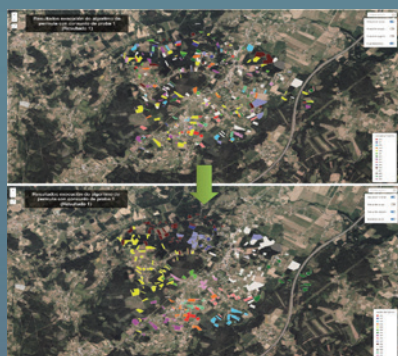


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Supported by:



Start: 21/07/2017  
End: 31/10/2018

Budget: 102.992 €

## Operational Group:

### Software to improve land management in livestock cooperatives

*Deseño dunha aplicación informática para a mellora da xestión de terras nas cooperativas gandeiras*

## Practical

### problem

Territorial structure of Galician livestock farms is very fragmented and their plots usually have small dimensions and a high dispersion. These circumstances hinder the economic efficiency and environmental sustainability of farms, requiring a higher amount of inputs to maintain them.

## Partners

### Type:

### Name:

Local Action Group  
LEADER

Association for Rural Development Mariñas-Betanzos

Dairy cooperatives

Cusoviam; Os Irmandiños

Research institutes

University of Santiago Compostela, Laboratorio do Territorio; University of A Coruña, Centro de Arquitectura de Computadores; Mabegondo Agricultural Research Centre

State organisation

Galician Institute of Food Quality (INGACAL)

## Project

### Objectives:

Develop a computer software that, depending on different initial situations, proposes the reorganization and grouping of the plots belonging to different farms.

Improve the territorial base of farms and thus facilitate the production of fodder, as the basis for animal feed.

### Expected results:

The creation and dissemination of the software will allow the reallocation of plots among farmers (swaps of land use), while their farms keep the same size and land ownership doesn't change.

The plots that each farmer manages become closer to each other, reducing production costs and improving agricultural sustainability.

### Results so far/first lessons:

The first version of the software was tested with livestock farms from several pilot areas. Its usefulness in the reduction of distances and the creation of management plots with bigger size was confirmed. The need to incorporate changes in several factors (areas or valuation of plots according to their logistic and agronomic aptitude) was also identified.

### Who will benefit:

Farms (79.900 in Galicia), professionals in the sector, public administration and stakeholders in general.

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Supported by:



Start: November/ 2017  
End: December/ 2020

Budget: 232.319 €

## Operational Group:

The decline of cork oak forest (montado) in Alentejo.

*Declínio do Montado no Alentejo.*

## Practical problem

The mortality of oak trees is a serious threat to the preservation of the Montado system. *Phytophthora cinnamomi* is considered the main reason for the weakening and death of cork and holm oaks, and may be present in 30-80% of the decline areas, both in Portugal and in the south of Spain.

## Partners

### Type:

Agri association

Agri enterprise

Farmer

Research/ Teaching

### Name:

ACPA - Associação dos Criadores do Porco Alentejano; ANCPA - Associação Nacional dos Criadores do Porco Alentejano

Montaraz - Transformação Artesanal de Porco Alentejano Lda.; Barrancarnes, Transformação Artesanal, SA

Manuel Anemécio Lourenço; Duarte Nuno Salvador Simões

INIAV - Instituto Nacional de Investigação Agrária e Veterinária, IP.; ICNF - Instituto da Conservação da Natureza e das Florestas, IP

## Project

### Objectives:

To evaluate the potential of main herbaceous crops used as pastures in Montados, to biologically control *P. cinnamomi*. The aim is to obtain plant mixtures with allelopathic effect to reduce *P. cinnamomi* population. We intend also to find cost effective measures that can be applied on a wide scale.

### Expected results:

List of plants host/no host to *Phytophthora* and list of plants with potential allelopathic effect to the pathogen; introduction of enriched pastures with allelopathic activity to reduce the pathogen. We aim benefit the entire soil-tree-environment system and reduce *P. cinnamomi* population and consequently the infection.

### Results so far/first lessons:

The selection of allelopathic plants began in 2014. We have already some relevant species with suppressive effect on *P. cinnamomi* which will serve as the starting point for implementing the proposal. The knowledge of herbaceous species resistance to the pathogen, both from natural vegetation and used as pastures must also be assessed for their ability to reduce soil inoculum.

### Who will benefit:

The main beneficiaries are forest technicians, agricultural and producers associations, landowners and industry.

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Supported by:



Start: May/ 2014  
End: December/ 2017

Budget: 200.000 €

## PRODER:

### Yellow Corn: Intensive Farming and Biodiversity

Milho Amarelo: agricultura intensiva e biodiversidade

## Practical problem

Evermore consumers pay attention to the sustainability of the products they buy. Given the intensity demand in agricultural, especially in the cereals sector, such as corn, the biodiversity is decreasing and the inputs increasing. Increasing inputs is not a viable nor sustainable solution anymore.

## Partners

### Type:

Agri Association  
Consultant  
Agri Enterprise  
Research/Teaching

### Name:

Agrotejo  
Consulai - Consultadoria Agro Industrial  
Quinta da Cholda  
Instituto Superior de Agronomia

## Project

### Objectives:

In this project, the aim was to convert some parts of the land that weren't productive like the pivot corners and the road bands in ecological focus areas so that these areas would serve as home to the autochthonous organisms, increasing the biodiversity and the resilience of the culture.

### Expected results:

Enrich the marginal areas of the farm in diversity both in plant and in organisms with ecological interest;  
Identify and development of ecological focus areas indicators; Learn the value that these new ecosystems bring to the environment;  
Study different types of crops that could benefit the quality of soil and its biodiversity;  
Increase the resilience of agricultural activity to climate change.

### Results so far/first lessons:

Difficulties in defining ecological foci areas and quantifying their relative importance from an economic or environmental point of view

### Who will benefit:

Corn producers with an area of 100 ha or more



Supported by:



Start: 19/03/2015  
End: 31/12/2018

Budget: 470 000 €

## Operational Group:

### Zero herbicides in Mediterranean perennial crops

*Zéro herbicides en cultures pérennes méditerranéennes*

## Practical problem

Herbicides are on the spot, and farmers are looking for herbicides-free systems. There is the need for an innovative management system, which will allow to reduce the use of herbicides, and this project will be testing a system based on under row cover cropping.

## Partners

### Type:

State organisation

### Name:

Institut Français de la Vigne et du Vin

Farmers organisations

Chambre d'Agriculture de l'Hérault; Chambre d'Agriculture du Gard; Chambre d'Agriculture des Pyrénées Orientales; Chambre d'Agriculture de l'Aude

Research institutes

Centre Expérimental Horticole; Station d'Expérimentation Régionale pour les Fruits et Légumes

## Project

### Objectives:

The aim is to evaluate a weed management system based on under row cover cropping. Experimental fields were set to evaluate the agronomic impact of cover crops and to screen species that could fit an under-row setting. In addition, demonstration sites will be disseminating the results to farmers.

### Expected results:

Zero Herbicides system will save time and money to farmers, while being environmentally friendly. Several outputs are planned: (i) a technical guide for implementation and management of under row cover cropping systems, (ii) videos and technical articles will be published online and (iii) demonstration sites will be set to promote the results to farmers.

### Results so far/first lessons:

A set of cover crop species has already been selected. Field tests have shown that under row cover cropping was effective to protect the soil and needs less interventions. Nevertheless, in some cases we have observed lower yields due to competitiveness between cover crop and main crop. This could be a limitation to the adoption of cover crop based systems by farmers, in the Mediterranean area.

### Who will benefit:

Mainly organic farmers, in steep and/or stoned vineyards where mechanical weeding is very difficult.





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