

AGRICULTURE 4.0 AND RURAL DEVELOPMENT

Robotics Mechanization



Parallel Thematic Session

AGRICULTURE 4.0 AND RURAL DEVELOPMENT

Robotics / Mechanization

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Supported by:



Start: January/2018
End: August/2021

Budget: 295.000 €

Operational Groups:

Control of invasive species *Vespa velutina* and losses minimization in beekeeping production and honey production.

Controlo e minimização de prejuízos da espécie invasora Vespa velutina nigrithorax (Vespa velutina) na produção apícola

Practical problem

The *Vespa velutina* is a predatory species of the European bee, with consequences that are manifested in beekeeping and honey production and derivatives. Due to its advance to urbanized areas, it begins to be a social problem.

Partners

Type:

Research
Agri Association:

Other Association:

Local Administration:
Farmers

Name:

Universidade de Trás-os-Montes e Alto Douro (UTAD)

ApiMarão – Associação de Apicultores da Serra do Marão; APFMP – Associação de Produtores Florestais de Montemuro e Paiva

Dolmen - Desenvolvimento Local e Regional, CRL; ADER-SOUSA – Associação de Desenvolvimento Rural das Terras do Sousa

Município de Amarante

Joaquim Madureira; Alexandre Joaquim Pinto Morais; Avelino Luís Coelho da Mota Ribeiro

Project

Objectives:

Vespa velutina dispersion throughout the North Portugal is growing every year. This way, it is necessary to know the morphological and ecological conditions that favor its activity in order to reduce its presence in invaded areas to control its advance.

Expected results:

To create a GIS project with all the occurrences;
To create a space-time dispersion model based on spatial analysis;
To create a wasp nests search model ;
To model *Vespa* dispersion and create invasion potential maps; To develop a trap suitable to control the attack on the hives and weaken the *Vespa* nests.

Results so far/first lessons:

A provisional wasp dispersion model has already been created A model of trap and bait is already being tested

Who will benefit:

Beekeepers; Farmers; Populations of areas already invaded by *vespa velutina*; City councils; Civil Protection Office

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Supported by:



Start: May/ 2015
End: December/ 2017

Budget: 110 000 €

PRODOR:

FixPomo - Fixed spraying system to apply pesticides

FixPomo - Sistema fixo de pulverização para aplicação de produtos fitofarmacêuticos

Practical Problem

Evaluation of a fixed system per opposition of the traditional system to Apple protection.

Partners

Type:

Agri Enterprise
Research/Teaching
Other Association
Public/Local Authority

Name:

Ecofrutas Lda
Cerca da Ribeira LDA
Escola Superior Agrária de Santarém (ESAS)
Centro Operativo Tecnológico Hortofrutícola Nacional (COTHN)
Direção Geral de Alimentação e Veterinária (DGAV)

Project

Objectives:

The main objective is to test a new spray system through fixed sprinkler equipment versus the sprayers producing quality and regularity of production and contributes to the sustainability of the systems. Reduce the impact on the environment and improve working conditions for the operators

Expected results:

Development of a spray system that a better treatment opportunity, with reduced phytosanitary interventions, greater economy and less impact on the environment and improving working conditions of the applicators.

Results so far/first lessons:

Decrease in the time of labor, saving human resources. Similar plant protection Less residue content in fruit at harvest. Less impact to the environment

Who will benefit:

The first benefit goes to the consumers: products with higher quality, second the farmworkers, grower's, and environment.



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Supported by:



Start: 01/03/2017
End: 31/12/2019

Budget: 306.000 €

Operational Group:

Identification of common wild oat and other weeds from drone images

Hukkakauran ja muiden rikkakasvien tunnistaminen minihelikopterikuvista

Practical

problem

Common wild oat (*Avena fatua*) is a noxious weed that cannot always be controlled with herbicides. Especially at low infestation, weeding is necessary.

Partners

Type:

Research institute

Name:

University of Turku

Farmers

1 in Nousiainen and 1 in Mynämäki
(farmers in Nousiainen and Mynämäki are being progressively involved and cooperating in the project)

Drone company

PSFire

Project

Objectives:

Identification and localization of weeds, especially common wild oat, in cereal fields, from drone photographs. In addition to the weed identification, drone-based imaging will be used to map the field for stress symptoms in crops.

Expected results:

We expect to develop a method for using drones to locate common wild oat in cereal fields. An automatic method for the analysis of drone images taken just before the weeding time is the main aim but we also look for possibilities to detect common wild oat much earlier. We also do multispectral imaging and field measurements to assess the physiological state of the crop plants.

Results so far/first lessons:

We already see that common wild oat can surely be identified from drone photographs. The main challenges are (1) cost efficiency, (2) fast treatment of large amounts of images, (3) automatic pattern recognition of common wild oat.

Who will benefit:

Farmers, because weeding of common wild oat is a time-consuming nuisance in the middle of the very busy midsommer.

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Supported by:

PROGRAMA DE
DESENVOLVIMENTO
RURAL 2014-2020UNION EUROPEAN
Funding European Agriculture
for Sustainable Rural
DevelopmentStart: January/2017
End: December/2021

Budget: 482.000 €

Operational Group:

IntenSusVITI - Sustainable intensification of viticulture through mechanical pruning.

IntenSusVITI - Intensificação sustentável da vitivinicultura através da poda mecânica.

Practical problem

Portuguese vineyards have one of the lowest yields in the world, around 4 t/ha/year, severely limiting the sector's competitiveness. This low productivity is mainly due to the lack of innovative processes, especially in terms of pruning, and to the low fertility of vineyard soils.

Partners

Type:

Research /Teaching
Agri Enterprise

Agri Association

Name:

ISA - Instituto Superior de Agronomia

ACA - Adega Cooperativa de Almeirim; Quinta do Gradil - Sociedade Vitivinícola, SA; Quinta da Aroeira S.A.G., Lda.; Quinta de Lourosa - Sociedade Agrícola, Lda.; José Maria da Fonseca Vinhos S.A.; Sociedade Agro-Alimentar Da mascata, Lda.

AVIPE - Associação de Vitivinicultores do Concelho de Palmela; ATEVA - Associação Técnica dos Viticultores do Alentejo

Project

Objectives:

Produce grapes with low ecological footprint
Increase productivity through mechanical pruning and soil organic matter improvement
Develop new methods of risk estimation for sustainable pest protection
System optimization with precision viticulture techniques.

Expected results:

Wines from grapes with low ecological footprint. Mechanical pruning model relating pruning intensity with spatial variability. New practices to increase carbon sequestration in vineyard soils and ensure plant nutrition. Efficient methods for pest detection and risk estimation. Biotechnological and biological tools to control mealybugs.

Results so far/first lessons:

Mechanical pruning reduces costs and, potentially, increases yield. The yield increase is due to a higher number of bunches, though the berries were smaller. There seems to be a tendency for mechanical pruning to proportionate better conditions for the development of mealybugs.

Who will benefit:

Portuguese winegrowers, particularly ACA (250), ATEVA (2000) and AVIPE (300) members and the other project partners.

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PROGRAMA DE
DESENVOLVIMENTO
RURAL 2014-2020

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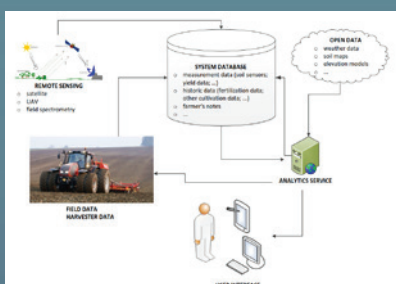
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AGRICULTURE & INNOVATION



Supported by:



The European Agricultural Fund
for Rural Development:
Europe investing in rural areas



Start: 01/01/2017
End: 31/12/2019

Budget: 395.000 €

Operational Group:

Agricultural business development with intelligent data analytics
(MIKÄ DATA)

Maatalouden liiketoiminnan kehittäminen älykkäällä data-analytiikalla (MIKÄ-DATA)

Practical problem

There is the need for decision-making tools which can support farm management and are easily accessible. In particular those tools that take into account the existing variability in terms of soils and nutrients.

Partners

Type:

Research institute

Name:

Tampere University of Technology

Advisory and development organisation

Pro Agria

In addition, a group of farmers and a harvester company are strongly involved in the project

Project

Objectives:

The main objective is to create an intelligent network service that is able to support decision-making in farms by providing easily accessible data and taking into account particular conditions in farms, such as the type of soil and nutrients.

An additional objective is to collect and to analyse data from different sources.

Expected results:

An intelligent data service available for farmers, where they can download different kinds of field data and get automated analyses and visualisations. Farmers will be able to access data on soil and nutrient variations from these analyses.

Results so far/first lessons:

The field data has been collected from ESA and commercial satellites, Yara Nsensors, hcompinearvesters and from a drone. The first version of the data service has been created.

Who will benefit:

Farmers will be able to access a centralized service where they can download their own field data and get analyses of various parameters.

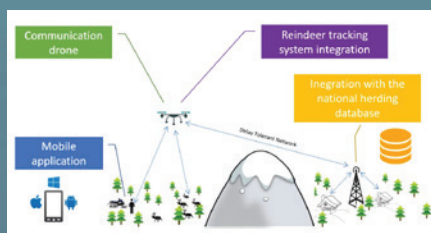




Supported by:



VATTENFALL



Start: 01/03/2017
End: 30/06/2020

Budget: 639.000 €

Operational Group:

Planning Tool for Reindeer Management Companies (NomaTrack)

Planeringsverktyg för rennärlingsföretag – teknikutveckling i renskötseln

Practical problem

Reindeer herding practices in Lapland (SE) take place in vast remote areas. Scarce mobile networks and mountainous terrains challenge daily communications and prevent adaptation of conventional GPS tracking. In order to reduce the reindeer herding costs, alternative ICT infrastructures are needed.

Partners

Type:

Reindeer herding economic association

Name:

Dálvvadis

Villages

Sirges Sami village, Tuorpon Sami village, Jåhkågasska Tjiellde Sami village, Udtja Sami village

Research institute

Luleå Technical University

Project

Objectives:

To develop a digital planning tool for reindeer herders that can be used in areas with or without access to mobile Internet. This is to reduce cost and optimize work when gathering reindeer during husbandry activities.

Expected results:

Successful combination of an off-the-shelf drone technology and a customized mobile app with a new communication architecture. This is to improve communication in remote grazing areas, to seamlessly integrate new and existing herd tracking solutions for real-time monitoring, and to allow reindeer herders to share relevant information from the grazing areas.

Results so far/first lessons:

The first prototype was developed and will be tested this fall (2017). Key challenges so far: altering national drone flying rules, challenging integration of Cloud-based tracking solutions, problems with ice formation on GPS collars, issues with collected GPS traces ownership and access.

Who will benefit:

Reindeer herders, cattle herders in remote areas, people living in communication-challenging areas.

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Supported by:



Start: 01/04/2016
End: 31/03/2019

Budget: 160 000 €

Operational Group:

Performance trialling of a dynamic, automated cherry-orchard cover system to protect against rain, hail and pests

Messa a punto di un sistema dinamico automatico di copertura anti pioggia, antigrandine e antinsetto per la copertura del ciliegio

Practical problem

The cracking of the fruit is the worst adversity of the cherry tree. Furthermore, much of the cherry blossom is also attacked by new alien bugs such as *Drosophila suzukii*, a small insect present in the areas of cultivation of northern Italy whose causing large product losses.

Partners

Type:

Research institutes

Name:

Università di Bologna; Centro Ricerche Produzioni Vegetali; Magif s.a.s.

Farmers organisations

Az. Agr. Cappi Graziella; Soc. Agr. Maseroli Annalita; Soc. Agr. Casa Claudia; Soc. Agr. Ripa di sotto

Project

Objectives:

The Project's primary goal is to devise an innovative, fully automated system providing integral protection of new and extant cherry orchards using cover sheets and netting that open and close automatically vis-à-vis impending weather conditions, plant health risks (cracking and *D. suzukii*).

Expected results:

The main result expected is the delivery of two automated prototypes of cover systems that confer the following benefits: effective defence against adversities both abiotic and biotic; to schedule harvest date even vis-à-vis rain events; saving of overhead time via faster system opening and closing; assurance of achieving higher quality crop yield even in seasons of frequent rainfall.

Results so far/first lessons:

The design and installation of the two automated prototypes of cover systems has been completed. The testing phase in order to verify their effective functioning has started during summer 2017. This testing phase will allow to carry out in the next two years (2018-2019) all the foreseen checks on the fields, sampling and laboratory analyses.

Who will benefit:

Fruit-growers and consumers in general.





Supported by:

visão europeia
Fundo Europeu
de Desenvolvimento Regional**ROMOVI**
ROBOT MODULAR E COOPERATIVO
PARA VINHAS DE ENCOSTAStart: January/2017
End: August/2019

Budget: 1.156.000 €

Colaborative Business R&TD Projects:

ROMOVI - Modular and cooperative robots for slope vineyards

ROMOVI - Robô Modular e cooperativo para vinhas de encosta

Practical problem

Steep slope viticulture presents challenges to mechanisation and robotisation due to the sharp inclination of its terrain. Namely, the harsh atmospheric conditions, the lack of space to manoeuvre, and the impediment of communications due to natural obstacles complicate navigation in these terrains.

Partners

Type:

Other company
Research/Teaching
Agri Association

Name:

TEKEVER AS
INESC TEC - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência
ADVID- Associação Desenvolvimento da Viticultura Duriense

Project

Objectives:

Research and develop a land robotic solution for slope vineyards that is able to autonomously perform logistic and monitoring tasks, combining modularity and versatility with robustness.

Expected results:

A stable mechanical platform, able to navigate without tipping over and to overcome obstacles;
The capability to determine the localization of the robot without GPS signal, and to delineate paths which are aware of the robot's center of mass and avoid.

Results so far/first lessons:

Going 6 months into the project, the ROMOVI consortium has agreed to focus on monitoring water stress in terraces with one row, through the use of optical sensors and placing probes in the ground. The operational and technical requirements, as well as the general architecture are defined. Currently the development activities are in their initial state.

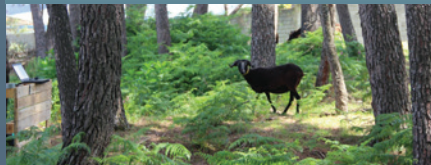
Who will benefit:

Winegrowers and winemakers.

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Supported by:



Start: October/2016
End: September/2018

Budget: 606.951 €

Colaborative Business R&TD Projects:

SheepIT: An IT based grazing control system

SheepIT - Sistema de controlo de pastagem baseado em tecnologias IT

Practical problem

Weeding wild vegetable species growing in vineyards and orchards farmland is a costly process, which needs to be repeated periodically, being typically done by mechanical and chemical methods; Mechanical methods comprehend high costs in terms of labor and their chemical counterparts are considered very aggressive for the cultures; Chemicals remain in the environment and may contaminate water lines, being harmful both to the environment in general and to the final consumer

Partners

Type:

Research/Teaching
Other Company

Name:

Technical Institute of Viseu (ESAV); Institute of Telecommunications (UA)
Ramos Pinto S.A.; Globaltronic S.A.

Project

Objectives:

Adopt the usage of animals for weed control, which is an old method that has been successfully tested in various regions, reducing the environmental impact and providing land fertilization;

Develop an IoT based system, able to control animal posture, limiting their ability to access branches and vine fruits, and to deploy virtual fences to control animal feeding areas.

Expected results:

An IoT enabled system that will allow the use of herds of sheep to make the weeding of vineyards safe.

Results so far/first lessons:

Production of alfa prototypes of the sheep posture collar;
First field trials of the equipment

Who will benefit:

Sheep owners who can monetise their herds for vineyard weeding;
Vineyard owners that will reduce weeding costs and improve their wine quality

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