Parallel Thematic Session
AGRICULTURE 4.0 AND RURAL DEVELOPMENT
Robotics / Mechanization

Organised by

Supported by

In partnership with

Official Sponsor

Premium Sponsors

Sponsors

Co-funded by
Control of invasive species Vespa velutina and losses minimization in beekeeping production and honey production ........................................... 5
FixPomo - Fixed spraying system to apply plant protection products ... 6
Identification of common wild oat and other weeds from drone images ........................................................................................................ 7
IntenSusVITI - Sustainable intensification of viticulture through mechanical pruning .................................................................................. 8
MIKÄ DATA - Agricultural business development with intelligent data analytics .......................................................................................... 9
NomaTrack – Planning tool for reindeer management companies .......... 10
Performance trialing of a dynamic, automated cherry-orchard cover system to protect crop against rain, hail and pests ......................... 11
ROMOVI - Modular and cooperative robots for slope vineyards .......... 12
SheepIT - An IT based grazing control system ....................................... 13
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: Universidade de Trás-os-Montes e Alto Douro (UTAD)
Agri Association: ApiMarão – Associação de Apicultores da Serra do Marão
Agri Association: APFMP – Associação de Produtores Florestais de Montemuro e Paiva
Other Association: Dolmen - Desenvolvimento Local e Regional, CRL;
Other Association: ADER-SOUZA – Associação de Desenvolvimento Rural das Terras do Sousa
Local Administration: Município de Amarante
Local Administration: 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 council's Civil Protection Office

Start: January 2018
End: August 2021
Budget: 295,000 €

Contact: José Aranha
E-mail: jaranha.utad@gmail.com
**Practical Problem**

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

**Partners**

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri Enterprise</td>
<td>Ecofrutas Lda</td>
</tr>
<tr>
<td>Research/Teaching</td>
<td>Escola Superior Agrária de Santarém (ESAS)</td>
</tr>
<tr>
<td>Other Association</td>
<td>Centro Operativo Tecnológico Hortofrutícola Nacional (COTHN)</td>
</tr>
<tr>
<td>Public/Local Authority</td>
<td>Direção Geral de Alimentação e Veterinária (DGAV)</td>
</tr>
</tbody>
</table>

**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.

**PRODER:**
FixPomo - Fixed spraying system to apply pesticides
FixPomo - Sistema fixo de pulverização para aplicação de produtos fitofarmaceuticos

**Start:** May/ 2015  
**End:** December/ 2017  
**Budget:** 110 000 €
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: Name:
Research institute: 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.

Start: 01/03/2017
End: 31/12/2019
Budget: 306,000 €
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

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research /Teaching</td>
<td>ISA - Instituto Superior de Agronomia</td>
</tr>
<tr>
<td>Agri Enterprise</td>
<td>ACA - Adega Cooperativa de Almeirim; Quinta do Gradil - Sociedade</td>
</tr>
<tr>
<td></td>
<td>Viticultura, SA; Quinta da Aroeira S.A.G., Lda.; Quinta de Lourosa-</td>
</tr>
<tr>
<td></td>
<td>Sociedade Agrícola, Lda.; José Maria da Fonseca Vinhos S.A.; Sociedade</td>
</tr>
<tr>
<td></td>
<td>Agro-Alimentar Da mascata, Lda.</td>
</tr>
<tr>
<td>Agri Association</td>
<td>AVIPE - Associação de Viticultores do Concelho de Palmela; ATEVA -</td>
</tr>
<tr>
<td></td>
<td>Associação Técnica dos Viticultores do Alentejo</td>
</tr>
</tbody>
</table>

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:

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.

Contact: Manuel Botelho
E-mail: mbotelho@isa.ulisboa.pt

Supported by:

Start: January/2017
End: December/2021
Budget: 482.000 €
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:
The European Agricultural Fund for Rural Development: Europe investing in rural areas

Contact: Petri Linna
E-mail: petri.linna@tut.fi

Supported by:
Operational Group: Planning Tool for Reindeer Management Companies (NomaTrack)
Planeringsverktyg för rennäringsföretag – 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: Name:
Reindeer herding economic association Dåvvadis
Villages
Sirges Sami village, Tuorpon Sami village, Jåhkågasska Tjelde 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.

Contact: Kerstin Kemlen
E-mail: kerstin.kemlen@telia.com

Contact: Samo Grasic
E-mail: samo@grasic.net
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 antipioggia, 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.

Type: Farmers organisations

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:
Programma di Sviluppo Rurale 2014-2020
L'Europa investe nella tua realtà

Contact: Daniele Missere
E-mail: ortofrutticola@crpv.it

Start: 01/04/2016
End: 31/03/2019
Budget: 160 000 €

AGRI INNOVATION SUMMIT 2017
More information www.ailisbon2017.com
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: Name:
Other company: TEKEVER AS
Research/Teaching: INESC TEC - Instituto de Engenharia de Sistemas e Computadores, Tecnologia e Ciência
Agri Association: 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.

Start: January/2017
End: August/2019
Budget: 1.156.000 €

Contact: Inês Castelão
E-mail: ines.castelao@tekever.com

Supported by:
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
Name: Technical Institute of Viseu (ESAV); Institute of Telecommunications (UA)
Other Company: 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

Contact: Sérgio Silva
E-mail: sergio.silva@globaltronic.pt

Supported by: