



D7.1.1 Demonstration Report

1st Year Progress

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Table of contents

Summary	5
1. Introduction.....	6
2. Demonstration planning and progress.....	7
2.1. Introduction	7
2.2. Planning.....	9
2.3. Progress.....	9
Appendix	10
Appendix 1: Summary of all Case Study dissemination activities	10
Appendix 2: Copies of dissemination documents	13
WIRE brochure.....	13

List of abbreviations

AGRINUPES	Integrated monitoring and control of water, nutrients and plant protection products towards a sustainable agricultural sector
UNG(s)	User Network Group(s)
BMP	Best Management Practices

List of tables

Table 1. Demonstration: Planning and Progress.....	9
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Summary

One of the objectives of AgriNuPes is to undertake demonstration and communication activities in all five case areas. This includes the exchange of experiences and of good practices among partners and stakeholders related to the developed NPK and plant protection products (PPP) biosensors.

Demonstration, being a communication activity, is done in the case study work packages (WP3, WP4, WP5 and WP6). Work Package 7 (Task 7.1) is focused on the coordination of the overall demonstration process, thus collecting data and accomplishing the overall reporting of demonstration activities, delivering summary reports of these activities as well as, of dissemination and external communication activities.

This public Demonstration Report describes the progress on WP7. It contains the collected minutes of User Network Groups (UNG) meetings and summaries of Demonstration Reports and related dissemination activities in the case studies selected. It is an evolving document with milestones at M12, M24 and M36.

Demonstration is expected to start in month 18, when working prototypes of sensors are expected to be available. The UNGs are being constituted, and the progress in the first year (M12) was in fact in terms of all the efforts that were done for setting up UNGs.

So far, all case study areas set up a national website to inform about the AgriNuPes activities (INESTEC, WUR, RISE, SUEN, and RITEC). Newsletters were made in 2 countries (NL, PT). In the Netherlands a first UNG meeting was organised and a preliminary UNG of 9 stakeholders was formed. Draft factsheets are available and can be used for informing the UNGs.

1. Introduction

The AgriNuPes general objective is to undertake demonstration and communication activities in all case study areas, including the exchange of experiences and of good practices among partners and stakeholders. The Work Package 7 (WP7) is focused on this objective. It is coordinated by WUR and involves three tasks: Demonstration (T7.1), Dissemination (T7.2) and Communication (T7.3).

Demonstration, being a communication activity (see D7.4) is done in the case studies (WP3, WP4, WP5 and WP6) and its outputs are described in detail in the deliverables of each one of these WPs. The T7.1 is actually focused on the coordination of the overall process of demonstration, collecting data, accomplishing the overall reporting of the activities and delivering summary reports of demonstration, dissemination and external communication activities.

This public Demonstration Report (T7.1, D7.1) describes the progress on the demonstration activities. It contains the collected minutes of User Network Groups (UNG) meetings and summaries of Demonstration Reports and of all related dissemination activities in the case study areas. It is an evolving document with milestones at M12, M24 and M36. Demonstration is expected to start on month 18 (as soon as working prototypes of sensors are available). The other two tasks (T7.2 and T7.3) take place over the duration of the project (M1-M36). Since the demonstration has not started yet, and the UNGs are being constituted, the progresses in the first year (M12) are limited. Nevertheless, it is worthwhile to report on the planning and the status of the demonstration and dissemination activities.

2. Demonstration planning and progress

2.1. Introduction

In all partners' case study areas, bi-annual UNG meetings will be organised for targeted stakeholders to inform about the progresses of the project and to get feedback from the end-users and potential resellers for the developed sensors and tools. At least once for every case study area, an info-day or seminar will be organised at the demonstration site aiming to get end-users feedback and for dissemination and exploitation purposes of the main project results. The minutes of these meetings will be shared among all partners. These info-days are open to a wide public as for instance for growers, advisory services and technical suppliers, during which they can visit the demo-facilities and attend workshops.

The targeted audiences for the case study areas are:

- **End-users:** These are the growers, advisory services and water management authorities which will be main target group of users of the monitoring equipment, sensors and tools. They will be interested in using the sensors to enhance their production, with less costs and environmental impact, (by minimizing the use of water, nutrients and PPPs), to improve the quality of their food products, to improve the image and reputation of their products for consumers each time more concerned with the sustainability of food production processes and to be able to comply with existing regulations. They can be reached for instance through the User Network Groups, or other networks.
- **Suppliers:** These are potential resellers of the sensors and tools to be developed. They want to know how sensors/tools work, their potential applications and which are the target markets.
- **National or European (financing) bodies:** These are in general Environmental, Agriculture and Public Health authorities interested in knowing the new and emerging monitoring technologies that can support the oversight and the enforcement of regulations with the final aim of reducing emissions.
- **Scientific community (SC):** All academic and research institutions in the field of agronomic, environmental sciences and engineering challenged in the evolution for more sustainable and smart agri-food production practices. The SC will be particular interested in knowing how sensors work, other potential applications as well as their effective contribution for reducing emissions and water consumption.

- **Public Audience:** These are all the other stakeholders interested in diversified aspects of sensors and tools and in their application on agricultural practices, as well as in their contribution towards a more smart and sustainable agriculture.

The case studies will use the following communication channels:

- **User Network Group (UNG) meetings:** All the partners from study case areas will organise two stakeholder consultation meetings per year to inform UNG about the progresses of the project and to get feedback from the end-users, regarding their needs and expectations. Minutes of these meetings (in both native and English languages) will be shared among all partners.
- **Info-days or Seminars:** local open meetings will be organised for dissemination and end-users feedback and for the exploitation of the results under demonstration. These meetings were planned to occur at least (preferably every year, but at least) once in each case study area. These local seminars will be for growers, advisory services and technical suppliers. Under guidance of the case study leader, end-users will be invited to visit the demo-facilities and attend workshops.
- **Website:** All five case studies will manage a website which will be used as privileged communication channel with the local communities in their native languages. All activities will be announced through this website and the newsletters will be also published there periodically.
- **Publications:** Partners will also disseminate project results through press releases in local/regional magazines.

Taking benefit of these communication channels, the case studies will use following communication tools:

- **Press Releases:** To attain a wide group of people. A press release about upcoming events (annual seminars) and achieved milestones will be issued on a national scale by all involved partners.
- **Newsletters:** general information will be published in a newsletter 2 times per year and per case study area. They will be published on-line on available channels and delivered to other networks such as growers' associations and local technological platforms.
- **Factsheets:** summary reports on the developed sensors, their working and application, data and benefits for the users, the expected results as well as expected costs and Best Management Practices (BMP) developed in WP3. Draft versions will be made available

at the beginning of the project, which will be updated in time, according to new insights and feedback from stakeholders.

2.2. Planning

The planning of the demonstration is organised according to the schedule presented in Table 1. (see also D7.4).

Table 1. Demonstration: Planning and Progress.

Month	What	Who	What	Done
M6	Partner websites available	All case study areas	website	PT, ES, NL, TR, SE
M6	Newsletters about AgriNuPes objectives in all case areas	All case study areas	news	NL, PT
M8	Organising first UNG-meeting (building the UNG)	All case study areas	UNG	NL
M14	Communicate to UNG the draft factsheets and BMP manual and get feedback for the sensor's design process	All case study areas	Factsheets, BMP	draft
M23	2 nd UNG-meeting and demonstration of first prototypes	All case study areas	UNG	
M25	Newsletters on websites, public deliverables available	All case study areas	news, website, reports, press release	
M35	3 rd UNG-meeting and demonstration of final prototypes	All case study areas	UNG, reports	
M36	Newsletters on websites, public deliverables available, press releases	All case areas	news, website, reports, press release	

2.3. Progress

In the first year all case study areas have already set-up a national website to inform about the AgriNuPes activities (INESTEC, WUR, RISE, SUEN, and RITEC). So far, newsletters were published in 2 countries (NL, PT). In the Netherlands a first UNG meeting was organised and a preliminary UNG of 9 stakeholders was formed (English, D7.2.1). Draft factsheet are available and can be used for informing the other UNGs (See Table 1). See Appendix for a list of all activities.

Appendix

Appendix 1: Summary of all Case Study dissemination activities

Websites:

- **User Network Group (PT):**
 - AgriNupes page at the Water JPI website (M1, INESC TEC, www.waterjpi.eu/index.php?option=com_content&view=article&id=545:agrisensus&catid=156:joint-calls).
 - INESC TEC website: <http://criis.inesctec.pt/index.php/criis-projects/agrisensus/>
- **User Network Group (NL):**
 - Dutch website at WUR online (M3, WUR, <https://www.wur.nl/en/newsarticle/Integrated-monitoring-and-control-of-water-nutrients-and-plant-protection-products-towards-a-sustainable-agricultural-sector.htm>).
- **User Network Group (ES):**
 - Spanish website at Ritec (<http://www.ritec.es/sistemas-riego-fertirrigacion/proyectos-de-investigacion.html>)
- **User Network Group (TR):**
 - Turkey website at SUEN online (<https://suen.gov.tr/faaliyetlerimiz/projeler/>).
- **User Network Group (SE):**
 - Swedish partner website at RISE (<https://www.sp.se/sv/units/risebiovet/fb/forskning/euprojekt/Sidor/default.aspx>).

User Network Groups:

- **User Network Group (PT)** not formed yet.
- **User Network Group (NL)** established (M7). Attending stakeholders: Hydrion BV (1), Hoogheemraadschap Delftland (2), Greenhouse Horticulture, Wageningen University & Research (2), LTO Glaskracht Nederland (2), MPS-ABC (1), Freelance journalist (1)
- **User Network Group (ES)** not formed yet.
- **User Network Group (TR)** not formed yet.
- **User Network Group (SE)** not formed yet.

User Network Group (UNG) meetings:

- **User Network Group (NL):**

- UNG meeting at the “Annual WATER-day” in Bleiswijk (NL), Oct 5th, 2017 (M7). Stakeholder consultation meeting to inform about the progress and to get feedback from the end-users. Presentation “AGRINuPeS: Sensoren voor meststoffen en gewasbeschermingsmiddelen” available at: www.glastuinbouwwaterproof.nl/onderzoeken/bo_20_003_059_agrinupes_sensoren_voor_meststoffen_en_gewasbeschermingsmiddelen/

Other case study activities:

- **User Network Group (PT):**

- Poster presentation in the Agri Innovation Summit 2017.
- Miguel G. Santos, Isabella Rocon, Ruth Pereira, Susana Carvalho, 2017. Caracterização de sistemas de produção, gestão da fertirrega e aplicação de produtos fitofarmacêuticos em culturas sem solo em Portugal: primeiros passos. In Congresso Luso-Brasileiro de horticultura (CLBHORT2017). Lisboa, Portugal, 1-4 Novembro 2017.
- Portuguese news at UP online (<https://noticias.up.pt/inesc-tec-e-fcup-querem-maior-eficiencia-no-uso-de-agua-na-agricultura/>, 19-12-2016)
- Portuguese news at REDE INOVAR (<http://pt.skanplatform.org/posts/1760> , 22-12-2016)
- Portuguese press release in a national newspaper website (<https://www.publico.pt/2017/01/05/tecnologia/noticia/sensores-portugueses-poupam-agua-na-producao-agricola-1757229>, 5-1-2017)
- Portuguese press release at Agronegocios.eu (<http://www.agronegocios.eu/noticias/novos-sensores-permitem-aumentar-eficiencia-do-uso-da-agua-na-producao-agricola/>, 7-1-2017)

- **User Network Group (NL):**

- AGRINUPES in the EIP Water Conference 2017: WIRE brochure (M6, WUR, see Appendix 2).
- News item “AGRINUPES – Sensoren voor nutriënten en gewasbeschermingsmiddelen” on website (M3, WUR,

www.wur.nl/nl/nieuws/AGRINUPES-Sensoren-voor-nutriënten-en-gewas-beschermingsmiddelen.htm).

- News letter “Europees project ontwikkelt nieuwe sensoren voor nutriënten en gewasbeschermingsmiddelen” to local Dutch Network (29-7-2018, M5, LTO-Groeiservice, www.glastuinbouwwaterproof.nl/nieuws/europees-project-ontwikkelt-nieuwe-sensoren-voor-nutriënten-en-gewasbeschermingsmiddelen/)
 - News item “Sensoren voor meststoffen en gewasbeschermingsmiddelen”, on website: www.glastuinbouwwaterproof.nl/nieuws/sensoren-voor-meststoffen-en-gewasbeschermingsmiddelen/ (27-12-2017, M9, LTO-groeiservice, Harry Stijger) Notification at Dutch funding organisation RVO (<https://www.rvo.nl/era-net-waterworks>)
 - <https://hortinext.nl/sensoren-voor-meststoffen-en-gewasbeschermingsmiddelen/> (Hortinext, 19-3-2018)
 - Dutch annual project report (BO-20-003-059, M10, WUR, In Dutch).
- **User Network Group (TR):**
Turkey website from EGE online at Research Gate Net (<https://www.researchgate.net/project/AGRINuPeS-INTEGRATED-MONITORING-AND-CONTROL-OF-WATER-NUTRIENTS-AND-PLANT-PROTECTION-PRODUCTS-TOWARDS-A-SUSTAINABLE-AGRICULTURAL-SECTOR>).

Appendix 2: Copies of dissemination documents

WIRE brochure

AGRINUPES: MONITORING AND CONTROL OF WATER, NUTRIENTS AND PESTICIDES



Promoter *Institute for Systems and Computer Engineering, Technology and Science (INESC TEC)*

Period *Since 2017 (until 2020)*

Location *Europe (Portugal, Spain, Turkey, Sweden, The Netherlands)*

Objective *Development of an effective integrated and sustainable monitoring and control system with innovative ion selective sensors for nutrients and bio-based sensing of pesticides for optimal water and nutrient supply and reuse, minimizing the effects on the environment.*



Target Audience *Farmers, Technicians, Policy/Decision Makers, Scientist/Researchers.*

Level *International (Europe), National, Regional*

Accessibility *Open days organised during 2018-2019 at several demo-sites in Porto (P), Murcia (ES), Konya (TR), Bleiswijk (NL). Contribution to Network User Groups.*

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Project description

For optimizing plants needs while minimizing the environmental impacts, sustainability and competitiveness of European agriculture are intrinsically related to the efficient use of water, fertilisers and plant protection products (PPP). Good Agricultural Practices - in the context of the circular economy- force growers to minimize their waste water and thus optimize the use of nitrogen and phosphorus based fertilizers and PPPs. Better management requires reliable decision-making systems (DSS) based on water quality feedback making use of cost-effective, robust, low-maintenance and accurate sensors for nutrients and pesticides. So far, available sensor technology does not meet the challenges for on-site monitoring. The project intends to develop such sensors and integrate them into fertigation equipment, with demonstration of their use for practical management purpose at several European demo-sites.

Results obtained so far

- R&D of an integrated and sustainable monitoring system with innovative ion selective sensors for nutrients (NPK) and bio-based sensing of pesticides (IMIDACLOPRID and PIRIMICARB); to be used for optimal water and nutrient supply and reuse, minimizing the effects on the environment (prototypes expected 2017-2018).
- An easy-to-use, robust and fault-tolerant fertigation controller, to meet both crop needs and grower yield/costs expectations (prototype expected 2017-2018).
- Validation and demonstration the applicability of developed technologies at four sites covering several types of crop production systems (recycled or cascaded water system) from greenhouses to open-field agriculture in various climatic regions (expected 2019-2020).
- Monitoring and Control Products available for the market (expected 2020 ...).

Success factors

The project builds on the extensive experience, competence and early work conducted on optical fibre-based sensors, biosensors, water policy models, plant nutrition, smart irrigation scheduling and robust control. It is implemented by a trans-disciplinary team of experts involving multi-actors. The demonstration sites will be open during 2018-2020 for visiting. Farmers, suppliers, scientists, water boards and policy makers are welcome to visit these demo-sites at open days. Relevant stakeholders may join the regional Network User Groups set-up around the demo-sites in order to be informed during the research and development phase of the technologies. Their input is valuable for the project in order to tune the systems to the end-user needs.

Performance indicators

The new sensors will lead to worldwide new markets for European water technology sector, thus strengthening the competitiveness and growth of SMEs and related companies. As a result, significant increase of water and fertilizer use efficiency is obtained in the agricultural/horticultural sector (expected < 50%), longer and economic reuse cycle for the drainage water is achieved, and pollution of surface and ground waters by fertilizers and PPP is prevented or significantly reduced.

Repeatability & Applicability

With the sensors, growers will have information about the input and output water quality, and can evidence-based decide on how and when to irrigate and fertigate, and on whether the costly task of cleaning is advisable before disposal. Governmental organizations (water authorities) may use sensors for checking water quality (pesticides) in ground and surface waters. Technology suppliers (re-sellers of equipment for agricultural practices) can acquire a license to sell the sensors and decision support systems world-wide.

Further references

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