



AGRINUPES

**Integrated Monitoring and Control of Water,
Nutrients and Plant Protection Products
Towards a Sustainable Agricultural Sector**



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Water JPI

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MOTIVATION

- Excessive application of fertilizers and Plant Protection Products (PPP) is still responsible for concentrations beyond guideline values in around one third of groundwater bodies in Europe
- Need of improving monitoring capacity to identify pollution hotspots and to develop effective action programmes
- How nutrient (NPK) and PPP concentrations (*organophosphates/neonicotinoids*) affect fertigation schedule/programs and filtering treatments?

OBJECTIVES AND ADHERENCE

Increasing the efficiency and resilience of water uses

Integrated feedback control (water/nutritive solution) with ion selective optical sensors (NPK) for precision fertigation

Monitoring and reducing soil and water pollution due to excessive fertilizers and PPP (biosensors)

Maximization of recirculation of drainage water before discharge (leaching)

CONSORTIUM DESCRIPTION

ACRONYM	COORDINATION	PARTNERS
AGRINUPES		    

PRINCIPAL INVESTIGATOR	INSTITUTION	COUNTRY
<u>José Boaventura-Cunha</u>	INESC TEC	Portugal
Susana M.P. Carvalho	FCUP	Portugal
Jos Balendonck	WUR	Netherlands
Ashhan Kerç	SUEN	Turkey
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Emine Guler	EGE-LS	Turkey
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Klara Löfkvist	RISE	Sweden



CONSORTIUM DESCRIPTION

INESC TEC



Main responsibilities:

- Project management
- Nutrient sensor development
- Fertigation controller (embedded software)

FCUP



Main responsibilities:

- Consultancy on nutrient sensor development
- Case study demonstrator

WUR



Main responsibilities:

- Dissemination
- Semi-practical scale evaluation for the nutrient sensors and biosensors

SUEN



Main responsibilities:

- Case study demonstrator
- Communication /training

EGE



Main responsibilities:

- Biosensors development

EGE-LS



Main responsibilities:

- Biosensors production

RITEC



Main responsibilities:

- Fertigation equipment design/development (hardware/sensor integration)
- Case study demonstrator

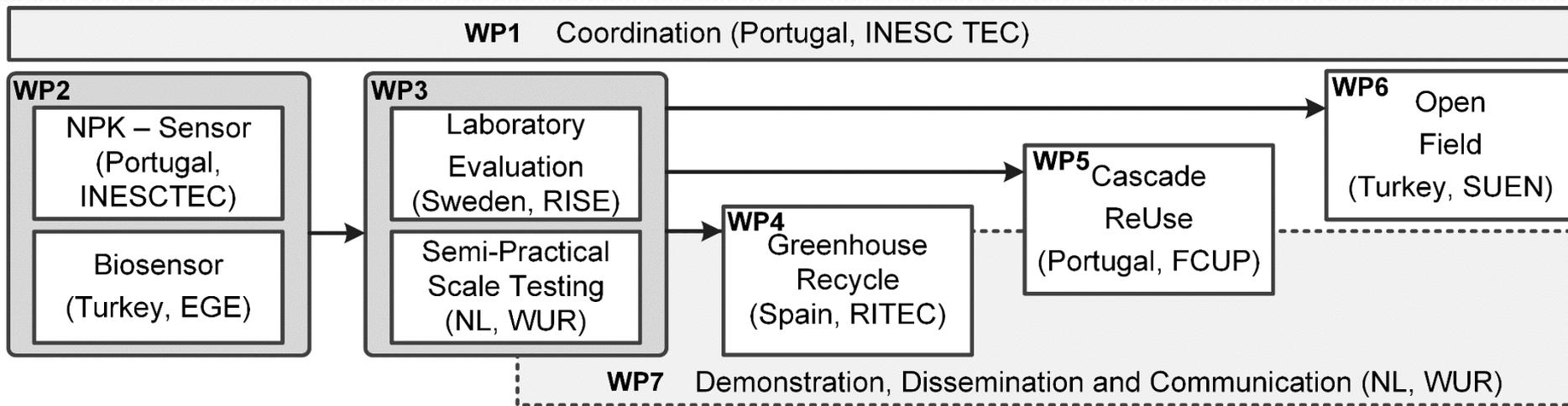
RISE



Main responsibilities:

- Laboratory evaluation for nutrient sensors and biosensors

WPs ORGANIZATION



WPI. COORDINATION (MGT)

WP leader: INESC TEC

Partners involved: ALL

OBJECTIVES

Assure the quality and efficiency of the project management (administrative/financial) at non-scientific level, establishing a link with the EC

MAIN TASKS

LEADER

T1.1: Periodic meetings organization

INESC TEC

T1.2: Management plan, quality plan and common procedures for deliverables

INESC TEC

T1.3: EC reporting

INESC TEC

T1.4: Control of administrative and financial aspects

INESC TEC

T1.5: Risk management

INESC TEC

WP2. SENSORS DEVELOPMENT

WP leader: EGE

Partners involved: INESC TEC, FCUP, EGE-LS, RITEC

OBJECTIVES

Development of new sensing systems for chemical and biological analytes, suitable for incorporation in advanced fertigation systems (biosensing devices for the on-site detection of PPPs)
Development of new optical fiber based for NPK real time determination of concentration

MAINTASKS

LEADER

T2.1: NPK-sensors

INESC TEC

T2.2: Biosensor development

EGE

WP3. LABORATORY EVALUATION + SEMI-PRACTICAL SCALE TESTING

WP leader: RISE

Partners involved: INESC TEC, FCUP, WUR, SUEN, EGE, RITEC

OBJECTIVES

Test and validate the nutrient and PPP sensors under laboratory and semi-practical scale conditions typical for horticulture production

MAIN TASKS	LEADER
T3.1: Defining testing methods, target waters and best management practices	WUR
T3.2: Setting up laboratory environment	RISE
T3.3: Testing and validation of the sensors under laboratory conditions	RISE
T3.4: Testing and validation of the sensors under (semi-)practical scale conditions	WUR
T3.5: Demonstration of sensors in (semi-)practice	WUR

WP4. GREENHOUSE RECYCLE

WP leader: RITEC

Partners involved: INESC TEC, FCUP

OBJECTIVES

Improvement of fertigation equipment for automatic preparation of nutritive solution, to be demonstrated in closed systems in Spain

Development of new nutrient unit for fertigation to integrate and manage the new data of ion concentration related to NPK chemical elements

MAIN TASKS

LEADER

T4.1: Robust fertigation controller for nutrient solution and water flow

INESC TEC

T4.2: Development of nutrient unit (fertirrigation)

RITEC

T4.3: Demonstration in greenhouses by using recycling techniques

RITEC

WP5. CASCADE REUSE

WP leader: FCUP

Partners involved: INESC TEC, EGE, EGE-LS, RITEC

OBJECTIVES

Perform a field test, validation and demonstration of NPK sensors and biosensors in a semi-closed system in Portugal

MAIN TASKS	LEADER
T5.1: General characterization of the 'CRUs'	FCUP
T5.2: Monitoring the impact of 'CRUs' on the irrigation water quality	FCUP
T5.3: Monitoring the impact of 'CRUs' on the soil	FCUP
T5.4: Monitoring the impact of 'CRUs' at plant level	FCUP
T5.5: Evaluate the performance of sensors in a 'CRUs' and field demonstration	FCUP

WP6. OPEN FIELD STUDY

WP leader: SUEN

Partners involved: INESC TEC, EGE, EGE-LS

OBJECTIVES

Test and facilitate NPK and biosensors application in open field (Konya Basin – Turkey) with the active involvement of local farmers into monitoring practices/processes.

MAIN TASKS	LEADER
T6.1: Determining the basin characteristics for field application	SUEN
T6.2: SWOT analysis of relevant EU legislation and developing policy guideline	SUEN
T6.3: Coordination of field application of both sensors in Konya Basin	EGE

WP7. DEMONSTRATION, DISSEMINATION, AND COMMUNICATION

WP leader: WUR

Partners involved: ALL

OBJECTIVES

Undertake demonstration and communication activities in all case areas, including the exchange of experiences of good practices among partners and stakeholders.

MAIN TASKS	LEADER
T7.1: Coordination of demonstration	WUR
T7.2: Dissemination	WUR
T7.3: External communication	INESC TEC

DEMONSTRATIONS



EXPECTED IMPACT OF THE PROJECT

- 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

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“Due to legal reasons, AGRINuPeS replaced the original acronym with the agreement of the CSC, the WaterWorks2015 Coordinator and the EC.”