

AGRINUPES: MONITORING AND CONTROL OF WATER, NUTRIENTS AND PESTICIDES

Promoter	<i>Institute for Systems and Computer Engineering, Technology and Science (INESC TEC)</i>
Period	<i>Since 2017 (until 2020)</i>
Location	<i>Europe (Portugal, Spain, Turkey, Sweden, The Netherlands)</i>
Objective	<i>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.</i>
Target Audience	<i>Farmers, Technicians, Policy/Decision Makers, Scientist/Researchers.</i>
Level	<i>International (Europe), National, Regional</i>
Accessibility	<i>Open days organised during 2018-2019 at several demo-sites in Porto (P), Murcia (ES), Konya (TR), Bleiswijk (NL). Contribution to Network User Groups.</i>
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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

The project “Integrated monitoring and control of water, nutrients and plant protection products towards a sustainable agricultural sector” is funded by: ERA-NET / Co-fund WaterWorks2015.

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