RESPONSIBLE REDUCTION OF NITRATES IN THE COMPREHENSIVE WATER CYCLE

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“REDUCIR LA CONCENTRACIÓN DE NITRATOS EN EL CICLO INTEGRAL DEL AGUA"

Entidad coordinadora:

CONSORCI DE LA RIBERA

Entidades asociadas:

UNIVERSITÀ DEGLI STUDI DI GENOVA

LA UNIÓ

Inqubator Leeuwarden

global omnium

VNIVERSITAT DE VALÈNCIA

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

DIPUTACIÓ DE VALÈNCIA

Colze a colze amb els Ajuntaments

«Responsible reduction of nitrates in the comprehensive water cycle – LIFE LIBERNITRATE»

PROJECT LOCATION: La RIBERA region (València – SPAIN)

BUDGET INFO:

Total amount: 2,354,292 €

% EC Co-funding: 1,412,573 €

DURATION: Start: 01/10/2017 - End: 30/09/2020

PROJECT'S IMPLEMENTORS:

Coordinating Beneficiary: Consorci de la Ribera

Associated Beneficiary(ies): UPVLC, Aguas de Valencia SA, DIVAL, Stichting Incubator, UNIGE, UNIO, UVEG.

OBJECTIVES & SCOPE:

AIM to reduce the concentration of Nitrates in the comprehensive water cycle by using an integrated & innovative approach based on the use of an adsorption bed made of active silica obtained from controlled burning of rice straw ashes.

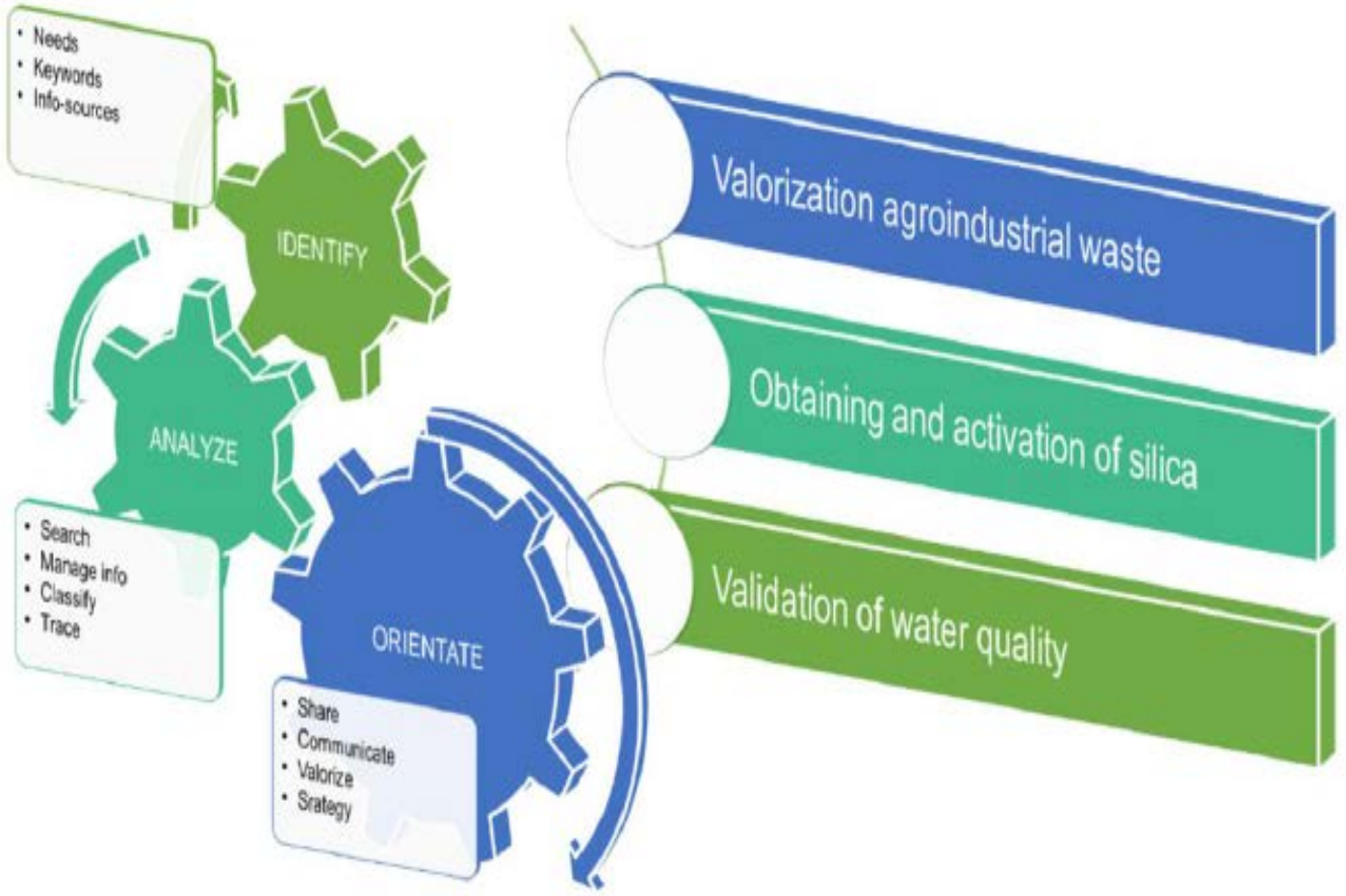
MAIN OBJECTIVES:

1. **To validate a prototype to produce silica.**
2. **To validate prototype of preparation of active silica beds.**
3. **To implement an awareness procedure for farmers to promote nitrates reduction in origin.**
4. **To incardinate the project in the general policies of the EU and promote specific lines in Operational Programmes.**

EXPECTED IMPACTS

Indicator	Project end	Beyond p.e
Waste reduction (rice straw)	3.9 t/y	18.5 t/y
Improved water quality	9,584 m^3/y	9,154,200 m^3/y
	<45 ppm	-30 %
Energy consumption reduction	1.1956 kWh/m^3	-99.63 %
Employment	4 (D) + 3 (I)	67 (D) + 82 (I)
Replication/ transfer	2 + 2	137

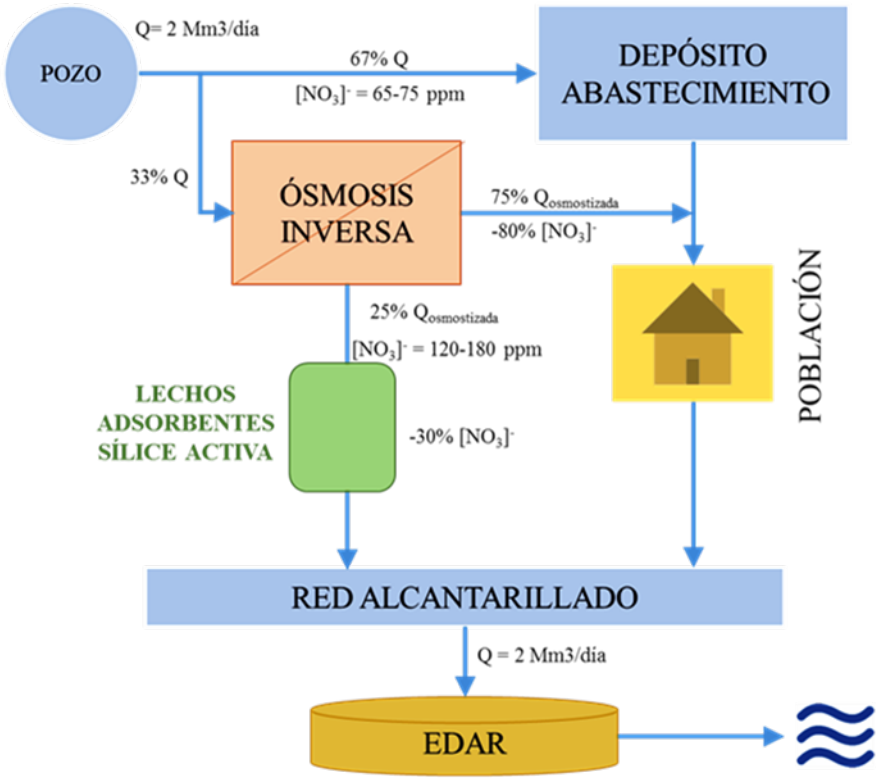
Action A1: Definition of the state of the art and the technical basis of the technological innovation.



A 2.1. ESTABLISHMENT OF INDICATORS AND PROCEDURES FOR MEASURING THE ENVIRONMENTAL IMPACT

Objective: Measuring the environmental impact.

Activities done:

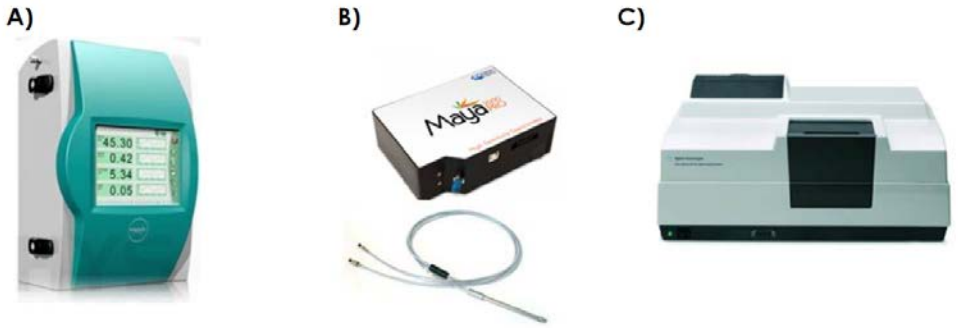


- The selection of the methods for measuring parameters (ammonium, phosphate and nitrate) in water matrices was carried out.
- Analysis of the several water matrices bearing in mind the proposed scheme 1 of the project,
- Ecological and chemistry state evaluation and priority and specific contaminants selection and determination have been realized..

Pilar Campíns Falcó
UVEG's Coordinator

A 2.1. ESTABLISHMENT OF INDICATORS AND PROCEDURES FOR MEASURING THE ENVIRONMENTAL IMPACT

Objective: Measuring the environmental impact.
Outputs done*:



- The **selection of the methods for parameters** (ammonium, phosphate, nitrate) in water matrices was carried out. Sensors developed by MINTOTA-UVEG were used for ammonium and phosphate determinations. Absorbance measurement at 220 nm was selected for nitrate determination.

- **Validation of the nitrate on-line** measurements has been performed by using an optical probe and an analyser. Similar and suitable figures of merit were achieved for both of them. UVEG.

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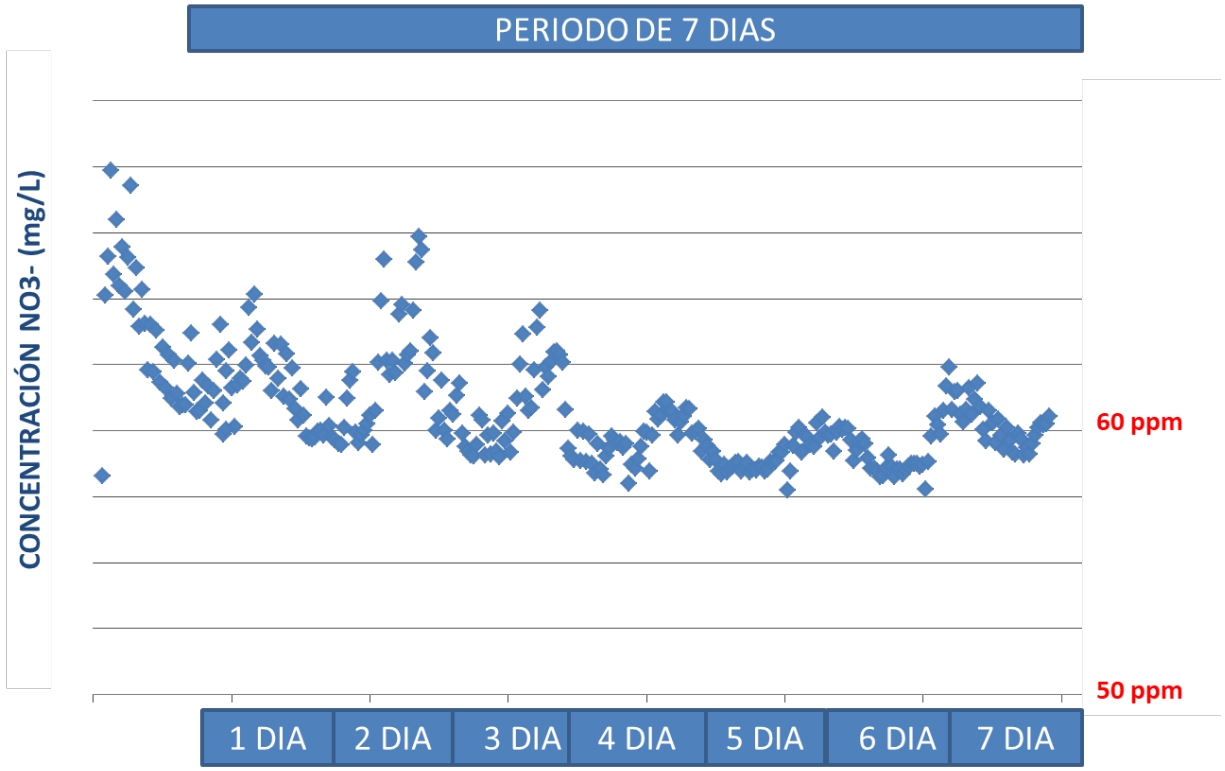
Objective: Measuring the environmental impact.

Outputs done*:

- Validation of the nitrate on-line measurements



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A 2.1. ESTABLISHMENT OF INDICATORS AND PROCEDURES FOR MEASURING THE ENVIRONMENTAL IMPACT

Objective: Measuring the environmental impact.
Outputs done*:

- Analysis of the several water matrices bearing in mind the proposed scheme 1 of the project, ecological and chemistry state evaluation and priority and specific contaminants selection and determination have been realized. UVEG-AVSA.
- The **concentrations of NO_3^- indicate that the levels of concentration found exceed the allowed value of 50 ppm, both for the incoming and reject water of the osmosis plant. The plant is efficient** and allows reducing the concentration of nitrates up to 25 ppm (good / moderate state). UVEG-AVSA.
- The **incoming water** would have a ***very good / good state in relation to ammonium***, ***deficient / bad for nitrate and good / very good in relation to phosphate***. ***The situation worsens markedly for the reject water, the last two parameters reflecting a poor / bad state***. The supply water after osmosis treatment considering the nitrate presents a good / moderate state (RD 817/2015). UVEG
- The ***results for priority and specific contaminants are in accordance with the water quality established by the WFD for this type of compounds***. UVEG

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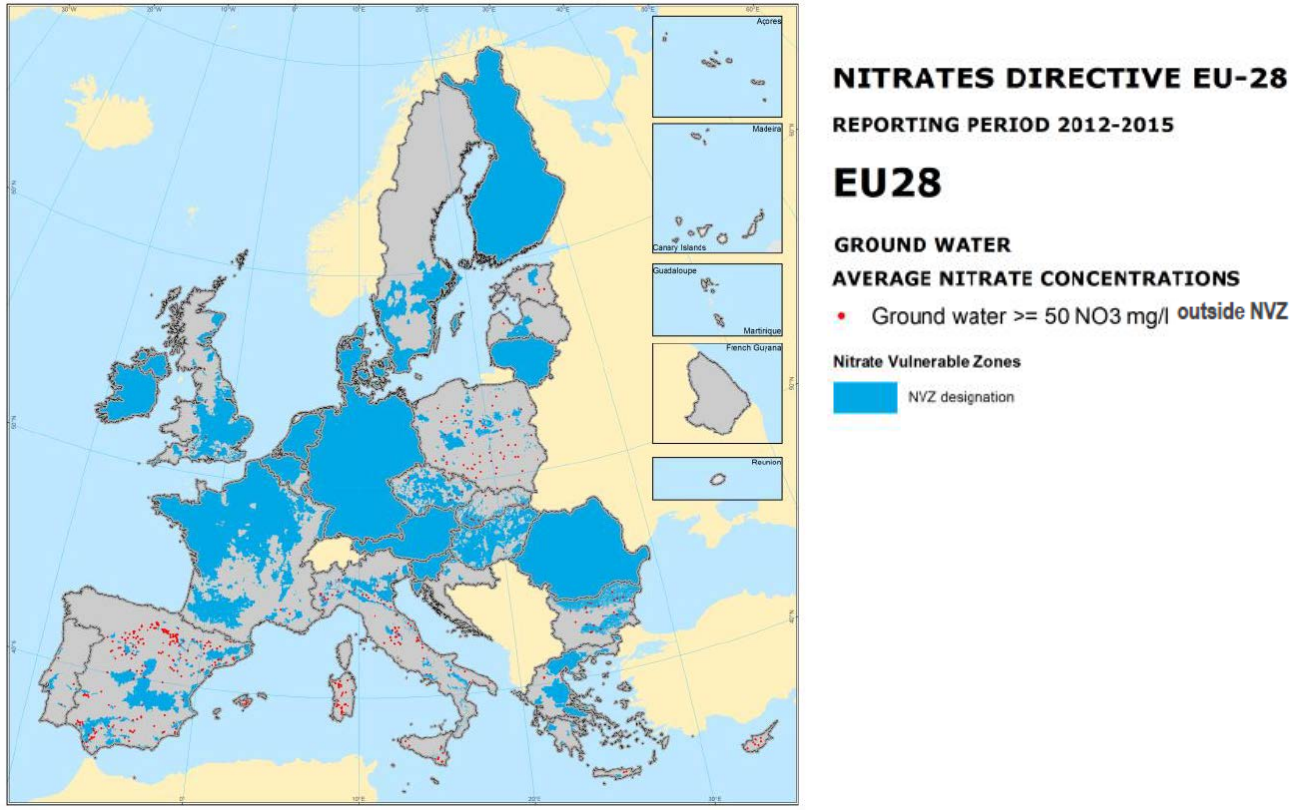
A 2.2. ESTABLISHMENT OF INDICATORS AND PROCEDURES FOR MEASURING THE SOCIO-ECONOMIC IMPACT

Objective: Measuring the socio-economic impact.
Outputs done*:



Council Directive 91/676/EEC
Brussels, 4.5.2018 COM(2018) 257 final

- The following **socio-economic impact indicators** have been chosen: Replicates; Transfers to other sectors; Reduction of costs per unit of production and operation; Profit and repayment time (pay-back); Workers, direct and indirect and Beneficiaries. UVEG
- The ***number of geographical areas that, due to their characteristics and water needs,*** may favour the implementation of the proposed technology will be used as an indicator. A classification will be established in which the priority of the different zones can be identified. UVEG-AVSA.

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A 2.2. ESTABLISHMENT OF INDICATORS AND PROCEDURES FOR MEASURING THE SOCIO-ECONOMIC IMPACT

Objective: Measuring the socio-economic impact.

Outputs done*:

- The territorial variable will be considered in order to quantify the existence of possible agglomeration economies. ***The existence of associations of municipalities*** to which the implementation of the project could be offered with a ***unit cost*** lower than that of an isolated user will be taken into account. UVEG
- ***Changes in the tariff structure*** (tranches) will be studied more than a linear increase in the water tariff. In the areas where there is a risk of regulatory noncompliance, an ***indicator relating to the cost of not acting through a contractual scenario*** will also be included. UVEG-AVSA
- The number of direct positions will be counted and the number of indirect positions related to the execution of the project will be estimated. UVEG
- ***Indicators related to the effects on health derived from the consumption of water with excess nitrates will be used and other ones related to the consequences of non-actuation***. UVEG
- The impact of the website and social networks will be measured through the registration of visits and interaction with citizens through the threads of information on the networks. UVEG.

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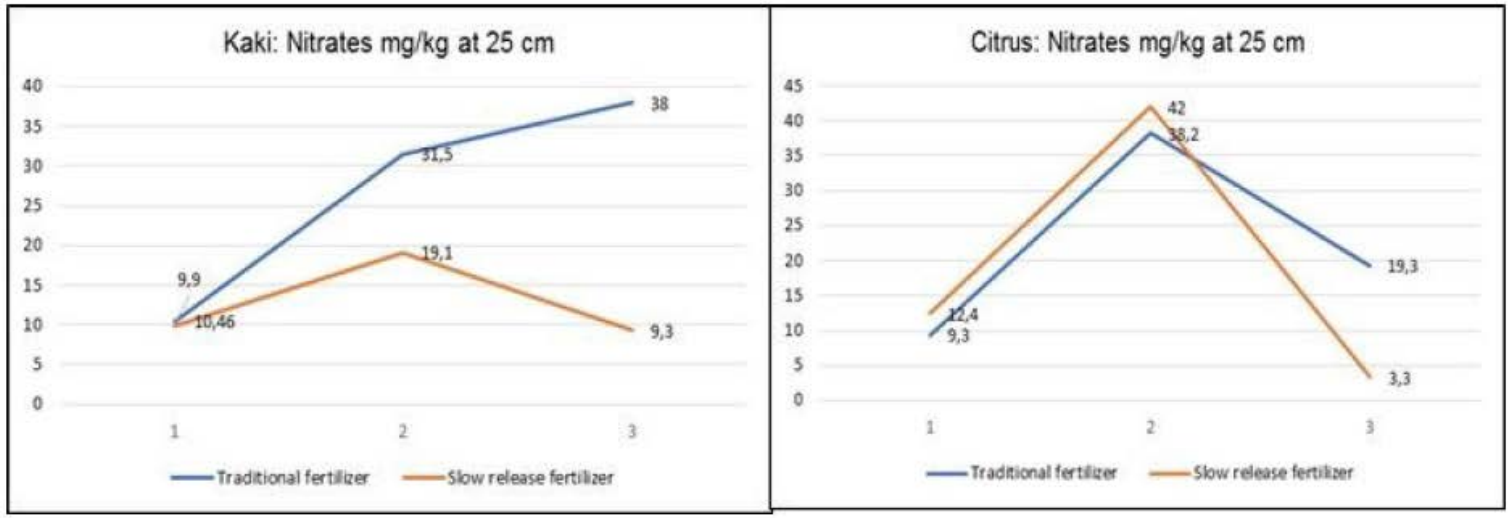
Action A3: Development of procedures for corporative social responsibility, green public purchase and permits for the territorial implementation

Crop	Municipality	Plot size	Location
Rice	Sueca	1,165 Ha	39° 15´ 0.22´´ N, 0° 18´ 37.16´´ W

Crop	Municipality	Plot size	Location
Persimmon	Alberic	0,4 Ha	39º 5´ 35.58´´ N. 0º 31´ 53.87´´ W
Citrus	Alberic	0,4 Ha	39º 5´ 30.92´´ N. 0º 31´ 56.71´´ W



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Action B2: Technological demonstration: material recovery of agricultural waste for the obtaining of active silica.

Sub-action B2.1: Two tons of rice straw was collected and stored in a dry warehouse in Vall d'Uixò (Valencia) by UNIO (October 2018). The straw has been moved to Alginet (January 2019) and stored under adequate conditions.

Anuncio de licitación

Número de Expediente **06/2018**
Publicado en la Plataforma de Contratación del Sector Público el 07-08-2018 a las 09:13 horas.

Plataforma de Contratación del Sector Público

Contrato de suministro e instalación de un prototipo de valorizador para la combustión controlada de la paja de arroz, con la finalidad de producir cenizas ricas en sílice en el marco del proyecto Life Libernitrate

- Valor estimado del contrato 80.000 EUR.
- Importe 96.800 EUR.
- Importe (sin impuestos) 80.000 EUR.
- Plazo de Ejecución
  - Del 01/10/2018 al 31/01/2019
- Tipo de Contrato Suministros
- Subtipo Adquisición
- Clasificación CPV
  - 43000000 - Maquinaria para la minería y la explotación de canteras y equipo de construcción.
  - 16000000 - Maquinaria agrícola.
  - 42160000 - Instalaciones de calderas.
  - 42320000 - Incineradores de residuos.
  - 44621200 - Calderas.
  - 51510000 - Servicios de instalación de maquinaria y equipos de uso general.

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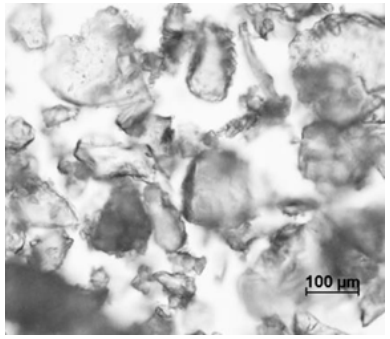
Action B2: Technological demonstration: material recovery of agricultural waste for the obtaining of active silica.

- 0.5 kg of silica have been obtained and are being transformed to active silica (efficiency = 95%) by UVEG (January 2019). Upon completion, 8.5 kg of activated silica will be available for Action B3.



DEMONSTRATION CHARACTER OF THE PROJECT- Prototype adsorbent beds, from **TRL 4 (patent UNIGE-UPV-UVEG) to TRL 7**.

OBJECTIVE : To validate prototype of preparation of active silica beds

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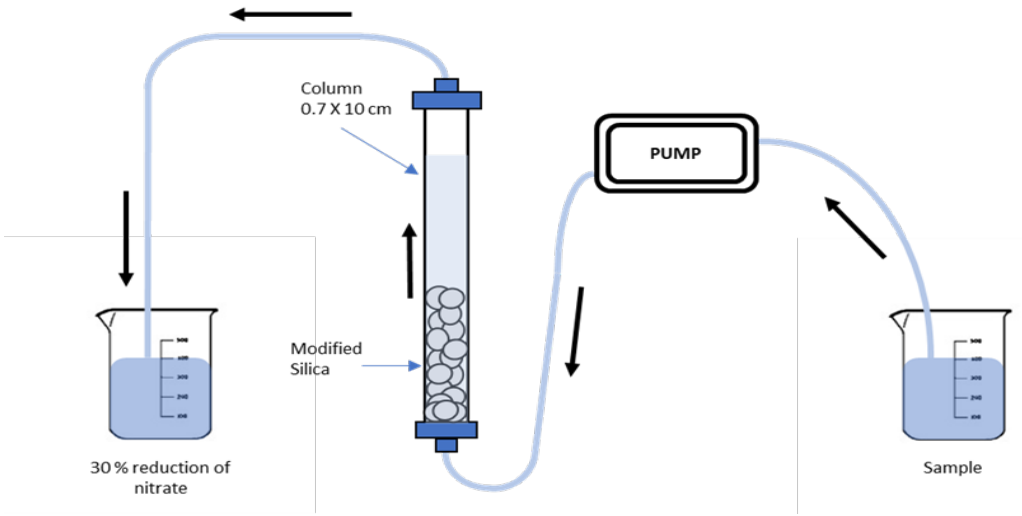
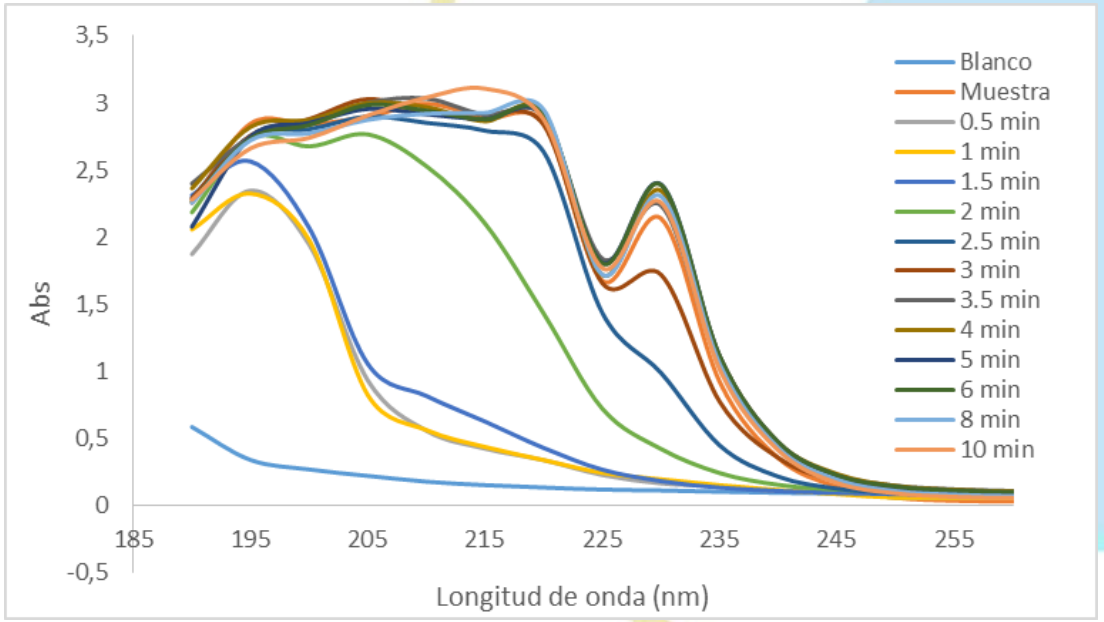
Action B3: Demonstration. Nitrate removal through beds of active silica.

A partir de la velocidad lineal de operación, recomendada técnicamente para el lecho de sílice activa a escala real (entre 76 dm/h y 152 dm/h), se establecen el volumen del lecho y el caudal de flujo del agua. La Figura muestra el montaje diseñado para operar a 76 dm/h, siendo las dimensiones del lecho las indicades en la figura y el caudal de flujo de agua 0,6 L/h.





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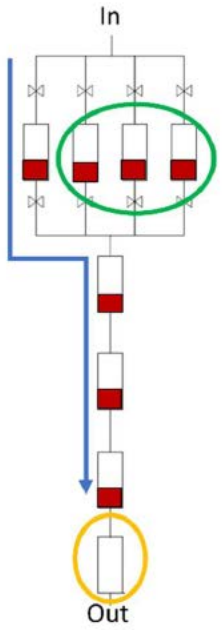
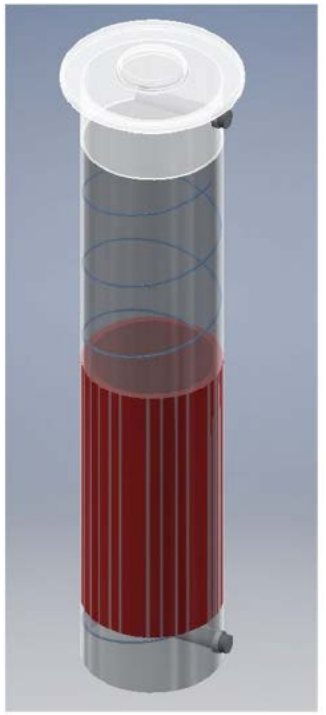
Action B3: Demonstration. Nitrate removal through beds of active silica.

- Activated silica
- 4 beds in series
- 1st bed is interchangeable
- 4 filters in header
- 3 beds for substitution / regeneration.
- 1 filter to collect possible leaks of silica.
- Total 7 beds





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