First application and market introduction of combined wastewater treatment and reuse technology for agricultural purposes

RichWater technology

The RichWater system is based on a low-cost and energy efficient MBR treatment, a module for mixing the optimal fertigation water connected to the up-to-date irrigation technology and an advanced monitoring /control module including soil sensors to guarantee demand-driven and pathogen-free fertigation. Implementing the system in the agricultural production process results in a more eco-friendly use of water resources, cost savings for freshwater and fertilizer and the possibility for commercial food producer to adjust the fertigation unit for individual needs using a mixture of fresh and treated water.

A low energy MBR has been designed for the wastewater treatment module in a way that the contained nutrients (mainly nitrogen and phosphorus) remain after the treatment whilst pathogens are removed. The mixing station mixes the appropriate proportion of freshwater and the treated wastewater coming from the MBR, which is then fed into the fertigation module. The appropriate mixing level is defined by monitoring the level of nutrient content in the soil via sensors. The control unit automatically adjusts the mixture inside the mixing module via valves according to the crop's demand. The objective is to overcome main barriers identified to reach the market: to reduce energy consumption, to increase automation, to improve and simplify end-user interface, etc. and adapt the technology to intensive agriculture production. The result is a commercial system thoroughly demonstrated and tested in its operational environment.

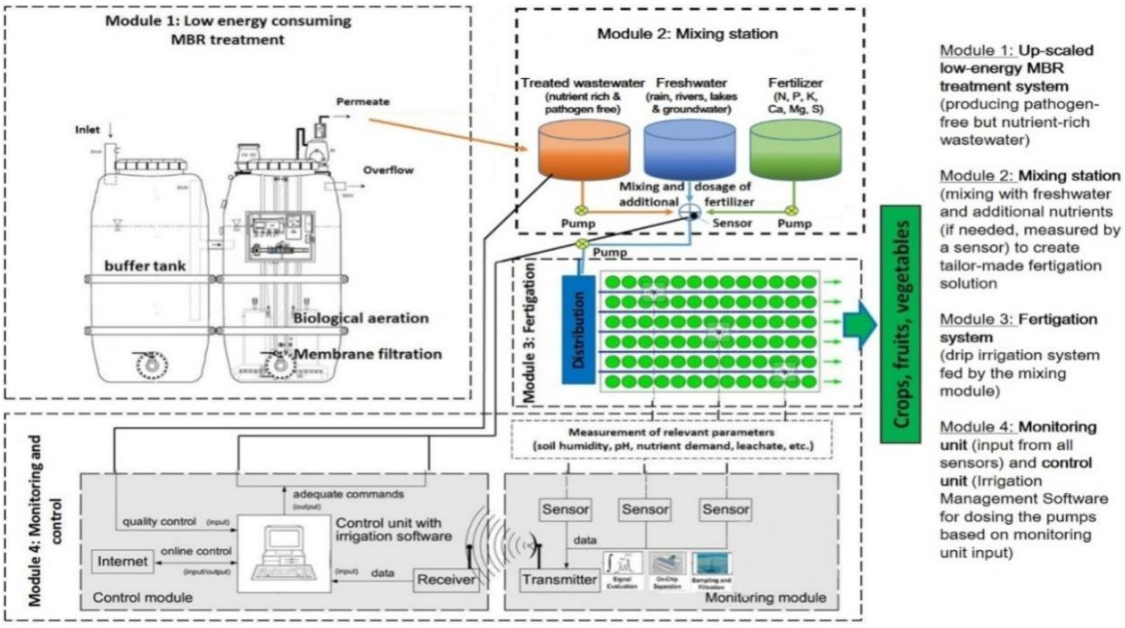


Figure 1: RichWater modular approach

Consortium and network – multiactor approach

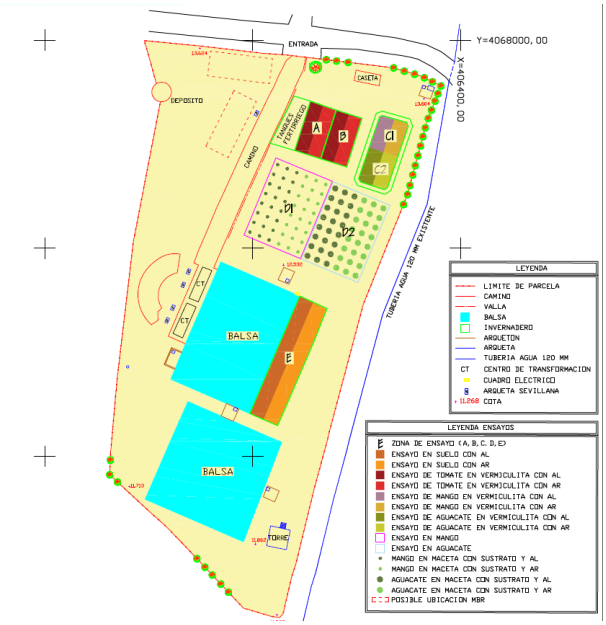
A highly professional and complementary consortium has been brought together for RichWater project. The 5 RichWater partners (3 SME's and two Applied Research Centres) from three different countries across Europe (Austria, Germany, and Spain) bring their own expertise for the design and construction of the different components of RichWater system: BIOAZUL for the MBR module, CSIC-IHSM for the fertigation module, TTZ for the mixing unit, PESSL for the monitoring module and the provision of soil sensors, and ISITEC for the control module. Each of these technology providers has successfully developed several innovative technologies in his area of expertise – waste water treatment, irrigation, sensor technology, automation and control.

Operational group AXARQUIA SOSTENIBLE

There has been an intense communication with local and regional actors. In particular, an agreement with local actors have been signed in the region of La Axarquia (Malaga) where the demo-site is located. These contacts have crystalised in the creation of an operational group within the EIP-Agri called "AXARQUIA Sostenible" with key players in the region. The actors involved are: the association of Municipalities of La Axarquía, the city council of Algarrobo, the Community of Irrigators of Algarrobo, AXARAGUA as operator of the wastewater treatment plant, and the Spanish Association of Tropical Crops. Other companies and organizations have been already involved in the last months. The four components of the quadruple helix ensure the real commitment of all actors involved in decision making

Test site: a living lab on water reuse

RichWater prototype is installed in the municipality of Algarrobo (Malaga province) in Southern Spain. The following figure represents the test site and the different plantation sectors that have been planed for the demonstration phase. Tomatoes, mangos and avocados are planted and irrigated with both reclaimed water produced by RichWater technology and local water. There will be a total of 14 irrigation sectors: 7 irrigated with local water (test site) and 7 irrigated with reclaimed water (reference site).



There is a strong interest in the region to have access to scientific results on the cultivation of avocados and mangos, however the demonstration phase has only one year of duration and there's not enough time for the plant to give fruits. Tests are done with the leaves and roots of the mangos and avocados. Results on fruits are only available for tomatoes. Further research will be developed by the operational group.

Figure 2: Plan of the test site

PESSL and CSIC-IHSM have selected the appropriate sensors for each parameter that needs to be measured (soil sensors and weather stations), and also have given recommendations on the most appropriate sensors to be used in plants according with the singularities of tomato, avocado and mango crops.

Figure 3: Mango crops irrigated with RichWater effluent

The installations are running from August 2017 and will be available for visits. RichWater organizes visits for farmers, authorities, scientific community, wastewater operators, etc.

Figure 4: MBR unit of RichWater technology