

GOALS of UCLM partner

To identify and fulfill the current and future skills needs in the **European sustainable agriculture sector**, focusing on the **management of natural resources** taking into account the potential influence of **climate change**, and favoring the change towards a more ecological and circular economy

1

The improvement of the **response capacity of the conventional and vocational education & training systems to the necessities of the labor market** in order to promote the economic development and innovation, helping to improve the competitiveness of the sector

2

To strengthen the **knowledge and practice exchange** on the management of natural resources in agriculture **between training institutions and the labor market**

3

To promote the **professional mobility in the agriculture sector** favoring the cross-border certification.

Actions/strategy proposed for UCLM partner

As a first approach, which can be modified according to the feedback received from other partners, we think that...

...actions to be carried out have to be focused on **good agricultural practices for the management of natural resources**, with special attention to **water and energy**, promoting the use of **new technologies**. To meet this goal, the following strategies are proposed:

1

To **improve the design & operation of the irrigations systems** at farm level, mainly for **pressurized irrigation**, in order to achieve an agriculture more resilient to climate change, which is of a great interest for countries with water scarcity, such as those of the Mediterranean Basin.

2

Treatment and reclaiming of wastewater as a key aspect of the **sustainability** of the European production system, which must be compatible with socio-economic development.

3

Reuse of reclaimed water in agriculture as one of the ways to face the water scarcity in regions such as the Mediterranean, helping to stabilize the rural population and the socio-economics viability of agriculture.

Strategy

1

- ① The **determination of the crops water requirements with the highest possible accuracy level**, including the application of regulated deficit irrigation (RDI) techniques, as well as helping farmers to be able to implement in their farms a optimized irrigation scheduling that maximizes agronomic (yield) and economic (gross margin) productivity of rainfed and irrigated lands minimizing the environmental impact. Tools and models can be used for saving water and selecting the proper crop pattern at the farm level
- ② The **design and management of irrigation systems** optimization, seeking to **reduce water** consumption (improving irrigation efficiency) and the associated **energy** (water extraction from aquifers, desalination, purification and application with pressurized irrigation systems (sprinkling and drip irrigation), using well designed, managed and maintained irrigation systems to achieve high irrigation uniformity and application efficiency.
- ③ Improve the training, information, knowledge transfer and advice of farmers and technicians, so that they are able **to apply the technologies, models and tools of DSS already available to make reality the improvement of water productivity.**
- ④ To use **Web-GIS platforms to transfer and share information and technologies with end users** in real time, within a feedback process that exploits the possibilities offered today by ICT (Information and Communication Technologies) and the remote sensing at different resolutions for crop status determination, combined with models and tools for decision support systems (DSS)

Strategy

2

① To improve knowledge and awareness of farmers and technicians regarding agriculture sustainability with respect to the use of water, throughout **Life Cycle Assessment** tools, paying special attention to **water and carbon footprints**. Help to evaluate the impacts of the farm activity on the receiving water bodies

② **Characterization of water** samples obtained from conventional and alternative sources (desalination, reclaimed wastewater, etc.) for its use in irrigation, including knowledge about the practical meaning of key parameters and the **understanding** of physic, chemical and biological **analysis reports**, in order to allow farmers and technicians to **fix criteria of application** based on salinity, infiltration and toxicity associated to chlorides, sodium or boron.

③ **Equipment and operation procedures** needed to modify the quality of water in order to meet the irrigation standards for each type of crop, including not only **brackish water desalination** and **softening of water with high non-carbonate hardness**, but also other **novel technologies** for the irrigation of highly-added value crops which need for higher water quality standards. In addition, attention will be paid to describe procedures to allow the optimum performance of irrigation systems by the appropriate **management of reservoir waters**.

④ Apply the new vision of the **circular economy to valorize**, for farm use, stabilized sludge and other **byproducts obtained in the conditioning of water and in the treatment & reclaiming of wastewater**. In addition, it is aimed to include in this higher-level sustainability approach, the optimized use of green energies for water treatment with the information about the **energy storage systems needed for the optimization of the use of wind and solar PV energy**: conventional batteries, flow batteries and other future technologies

Strategy

3

① Technology required for the **treatment of urban wastewater up to the required reclaiming standards**, in order to allow its use in the irrigation of crops with different characteristics, meeting the legal regulations (in countries with such regulations) or, at least, reaching criteria which warrant its safe use, paying special attention to **disinfection technologies**, because of their great associated **impact on health**. In addition, it will be described what could be the required technology to face the reclaiming of industrial wastewater, in particular to valorize the **various effluents from agri-food and livestock industries**

② **Recommendations of application of the reclaimed wastewater** according to its treatment level and **type of crops** based on experimental tests



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