

Reclaimed Water Reuse Potential in Agricultural Irrigation for Europe

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Abstract

As in other parts of the world, in Europe water resources are increasingly coming under pressure. The agricultural sector is extremely vulnerable to climate change, and in the same time it is also the largest water user and a major polluter of water. As consequence, water stress and insufficient water quality are leading to the limited capacity to meet crop water needs, compromising also food supply and security. The use of “non-conventional” water resources is essential to overcome the irrigation water shortage as well as to prevent the pollution of available freshwater. In this context, reclaimed water has been recognized as a valuable water resource that can be used to reduce climate change’s effects and to ensure the security and sustainability of agricultural supply. In particular, the use of reclaimed water for agricultural irrigation might help to meet crop water needs and recover nutrients (e.g., nitrogen and phosphorous) from wastewater, reuse them for crop production and therefore reduce the use of fertilizers. However, wastewater needs to be properly treated before being used for agricultural irrigation. Not by chance, the new regulation EU 2020/741 sets out minimum water quality requirements to ensure safe water reuse. In detail, the regulation EU 2020/741 identifies four classes of reclaimed water quality (from A to D) in relation to the intended agricultural use and irrigation method. Despite its beneficial effects, the reuse of reclaimed water in agricultural irrigation is still not a common practice in Europe and it is deployed considerably below its actual potential. Therefore, the aim of this research was to assess the potential of reclaimed water reuse in agricultural irrigation at the European scale. A spatial analysis was performed by using Geographic Information Systems (GIS) and considering the data on available water resources (e.g., freshwater, reclaimed water) and crops distribution within the EU-27 Member States. In detail, a tailored methodology was developed by following four different phases aimed to:

1. assess the current pressure exerted by agricultural irrigation on available freshwater;
2. evaluate the amount of available reclaimed water and its capacity to satisfy crop water

needs;

3. analyse the possibility of treating all the produced/collected wastewater to increase the current amount of reclaimed water;
4. classify crops in water quality classes in accordance with the new regulation EU 2020/741.

The research outcomes showed that, among the EU-27 Member States, 9 are already experiencing low water stress and 1 high water stress. Therefore, reclaimed water might be used to satisfy crop water needs in different European countries and water availability increased in the case all the collected wastewater is treated and later reused in agricultural irrigation. The most spread crops in Europe can be irrigated with water quality classes "B" and "C", reducing the level of treatment needed and associated costs. Furthermore, the use of reclaimed water might make the EU food system more sustainable and resilient. However, the adoption of additional precautionary measures (e.g., selection of the most appropriate irrigation method) is mandatory, while protecting public health and the environment.

Keywords: reclaimed water, treated wastewater, water reuse, agricultural irrigation, EU 2020/741 regulation, GIS

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