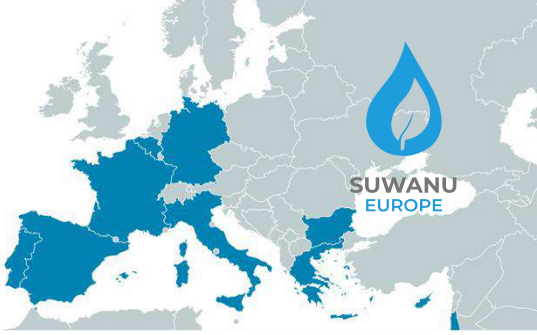
Sustainable **Water treatment** and
Agricultural reuse options in Europe

Info-package 1
Farmers/Irrigators

Fact Sheet 1.3 – **Irrigation equipment adapted to the use of reclaimed water (e.g. drippers).**



Implications of using reclaimed water to obtain labels such as global gap | Effects of reclaimed water on crop quality and yield | **Irrigation equipment adapted to the use of reclaimed water (e.g. drippers)** | Decision support systems to monitor irrigation patterns and fertilization needs | Using reclaimed water in organic farming

SUWANU EUROPE is a H2020 project aiming to promote the effective exchange of knowledge, experience and skills among practitioners and relevant actors on the use of reclaimed water in agriculture. This factsheet is part of a total of 5 factsheets in Info-package 1 aimed at famers and irrigators, that describe irrigation methods and equipment adapted to the use of recovered water.

1. INTRODUCTION

The increase in the demand for water resources has made necessary to increase the efficiency of its use (Brito&Andrade, 2010), with the alternative of using lower quality water in the agriculture. For this, drip irrigation is the most adequate method due to the possibility of obtaining high application efficiency (Vale *et al.,* 2013; Rowan et al., 2013). For Silva *et al*. (2012) the changes that the effluents can cause in the system are little known and clogging being the main factor to be considered. (Chinchilla, S; *et al,* 2018).

There can be no definitive answer as to which type of irrigation system is most suitable for use with reclaimed water as there are many site specific variables. However, it is possible to rank the three main irrigation systems against the key criteria related to irrigation with reclaimed water. The main areas of assessment for irrigation systems are: water quality parameters, probability of minimizing environmental problems and adequacy to efficient and economical agricultural production. (Christen. E, *et al*, 2006)

Generally drip irrigation can be used with grades of water recovered from 1 to 2 levels lower than other irrigation methods. If buried drip is used, then the risks are further reduced depending on the water source, there are several risks of clogging, precipitation and corrosion that affect the operation and longevity of an irrigation system. (Christen, E, *et al*, 2006)

2. DRIP IRRIGATION

Drip irrigation is a technology that can save water, energy and increase costs. However, for dripping to be successful, agronomic, engineering and economic measures must be taken. The precipitation of carbonates can contribute to the problem of clogging in this type of irrigation. The organic matter present in the treated wastewater, increases the growth of biofilms in the irrigation equipment, also contributing to its clogging. (ERSAR, 2010)

Drip irrigation is particularly suitable for the reuse of wastewater, as it minimizes health risks for farmers and product consumers due to contact with wastewater. The performance of drip irrigation systems using wastewater is mainly limited by the clogging of emitters, and this discourages farmers from introducing it (Capra&Scicolone, 2004).

A study by Chinchilla, S, *et al,* in 2018, reveals that the quality of effluents and their influence on clogging were identified as the main cause of the reduction in the quality of the irrigation process over time.




3. DRIP TYPES

Surface drip
Irrigation method located at low pressure, by means of drippers close to the plant.

Subsurface drip
Underground irrigation method, in which water is distributed through buried pipes, offering greater sanitary protection.

4. EXAMPLES OF DRIPPERS


G1


G2


G3

G1 - Non-self-compensating dripper, cylindrical, internal and with tortuous maze

G2 - Non-self-compensating dripper, flat, internal and with tortuous maze

G3 - Cylindrical, self-compensating dripper, internal, with tortuous labyrinth and large secondary filter.

A study about the flow of drippers with different irrigation times, applying swine wastewater and water supply, concluded that the combination of drippers G1 and G3 with the proportions of irrigation time 1h and 4h minimized the clogging process, reductions in flow values were 16 and 8%, respectively after 160 hours of operation of the irrigation units. (Batista, R, *et al*, 2014)

Also a study carried out on Drip Irrigation Assessment Using Wastewater, revealed that vortex emitters are more sensitive to clogging than labyrinth emitters. (Chinchilla, S, *et al,* 2018)

The relative sensitivity of emitters to clogging depends on many aspects. Generally large passages and high emitter flow rates are associated with less potential for clogging, to 1.3mm (0.05") hole will reduce the effects on economic returns if the system starts to clog 50% compared to 0.8mm (0.03") (Burt&Styles 1994). The design, installation and management of the system contribute to clogging. A good filtration system with sound maintenance should minimize the risk of clogging in most situations. (Christen. E, et al, 2006)

The National Irrigation Competence Center in Portugal (COTR), in the projects in which they participate with the same theme, does not use specific equipment. However, they consider it essential to oversize the filtration system, as well as the use of drippers with higher flow rates to prevent clogging. In the REUSE project, which they are currently developing, they intend to test specific equipment, such as different types of drippers.

3. EQUIPMENT ADAPTED TO IRRIGATION WITH TREATED WASTEWATER*

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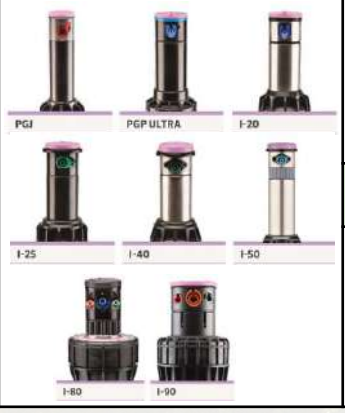			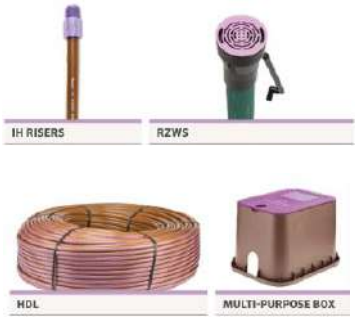
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*HUNTER® INDUSTRIES (www.hunterindustries.com)

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