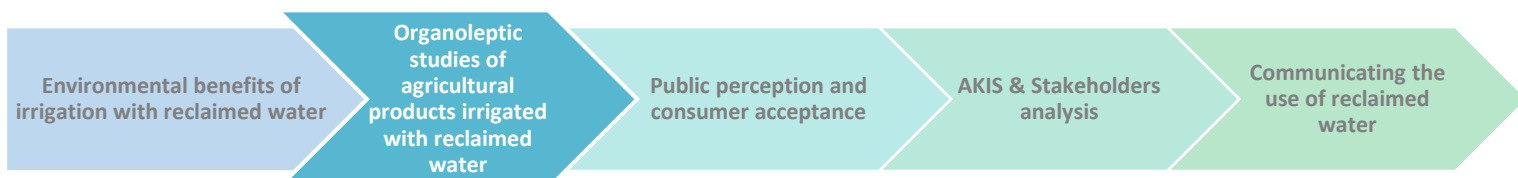




Info-package 5

Consumers and General Public

Fact Sheet 5.2 – Organoleptic studies of agricultural products irrigated with reclaimed water.



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 5 aimed at consumers and general public, that describe important aspect of consumer perception of agricultural product that are irrigated with reclaimed water.

1. Introduction:

Consumers are very sensitive to anything related to food, especially what they give to their children. This is also one of the reasons why you are wary of the food put on the table. When choosing one or another agricultural product, despite the trademark, one relies on his or her own perceptions – sight, smell, taste, touch. These perceptions are known as the organoleptic properties of the agricultural product concerned and are particular senses for each person. The use of reclaimed water (RW) for irrigation in agriculture is part of the measures to adapt to climate change, water scarcity and drought. Some of the consumers are worried about the influence of irrigation with RW on the organoleptic properties of the agricultural product. To avoid any doubt about existence of additional changes in organoleptic properties among other reasons, European Parliament and the Council accepted the EC proposition concerning minimum requirements for water reuse, where the quality standards for irrigation water in relation to the corresponding class and type of crops are defined [1]. This Factsheet summarizes some of the findings known so far about the organoleptic studies of agricultural products irrigated with RW.

2. Irrigation of olive trees:

Different studies have been conducted to investigate the effect of irrigation with RW on organoleptic properties of olives and olive oil. In one of the studies with olive trees [2] comparing products from rainfed trees and irrigated with RW no significant differences were found in the fruity attribute within treatments. In addition, the bitter and pungent attributes were more pronounced in olive oil obtained from rainfed trees as compared to that obtained from irrigated trees (RW or fresh water), suggesting relation with higher water quantities used for the irrigations. No pathogenic microorganisms nor heavy metals were detected in the oil samples tested. In that sense, no negative characteristics were found in oil obtained from the irrigated with fresh water, reclaimed water or rainfed trees and they all were all classified as *extra virgin grade*.



Although the EU regulations do not require analysis of pigmentation of olives, the color is one of the basic attributes for determination of olive oil characteristics. There are contradictory results in terms of chlorophyll, carotenoid, polyphenol levels and the free acidity, as consumers associate them with product quality. In some cases the irrigation with RW resulted in higher fruit yield, but oil yield was not increased [3,4].

The use of appropriate management practices may exhibit RW use potential to support olive oil production and to decrease the water stress produced by the scarcity and droughts.

3. Irrigation of vineyards:

Several studies confirmed that vinery RW use for irrigation of vineyards had minimal or none impact on the winemaking, while the grapes may show lower concentrations of total phenolics, which in the finished wines would not be expected to lead to quality differences. The impact of RW on grapes or even wine could also be influenced by many factors such as the type of source of RW (Table 1), elemental content, soil type and structure, cultivar, rootstock and many others.

The researchers recommended more strict wastewater (WW) treatment for the irrigation of young grapevines as an alternative water source secured protection of environment, plant health and fruit quality [5].



Table 1: Positive or negative effect of irrigation with secondary or tertiary treated RW on some characteristics, in comparison with tap-water.

	Secondary treated WW	Tertiary treated WW
Fruit color	X	✓
Plant growth	✓	✓
Pathogens	X	✓
Heavy metals	✓	✓

4. Irrigation of other crops:

In general, there is little evidence about the effect of RW irrigation on the organoleptic quality of vegetables. Most of the papers discussed the effect of RW on nutrient content, presence or absence of toxic elements or pathogens. In some studies we can only draw indirect conclusions about the appearance or color of vegetables as a consequences of the authors' results about the size of the fruit or the amount of yield from a crop. In some cases, is suggested that high salinity of RW (above 2 dS/m) may lead to enhance acidity flavor of tomato fruits [6].

Although the feasibility of using RW is demonstrated it has to be performed with appropriate management, because of the evidences of decrease in fruit load, fruit size, yield and water productivity of citrus [7,8], that may conduct to changes in taste and visual perceptions.

The organoleptic properties are not included in the adopted "Proposal for a Regulation of the European Parliament and of the Council on minimum requirements for water reuse" [1] as a parameter that should be observed. Nevertheless, they are very important in order to present the agricultural product on the market and should be taken into account to ensure sustainability of product yields and quality.

Reference/further readings

[1] Regulation of the EU Parliament and of the Council on minimum requirements for water reuse, 2018; [2] Ayoub et al. 2013 J Agric Sci Technol A 3: 105-112; [3] Romero-Trigueros et al. 2019 Front Plant Sci 10: 1243; [4] Bedbabis et al. 2015 Agric Water Manag 160: 14-21; [5] Petousi et al. 2019 Sci Total Environ 658: 485-492; [6] Cuertero J & Fernández-Muñoz R, 1998 Sci Horticult 78: 83-125; [7] Nicolás et al. 2016 Agric Water Manag 166: 1-8; [8] Romero-Trigueros et al. 2020 J Sci Food Agric 100: 1350-1357.

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