Water Re-Use

Sustainable waste water reuse technologies for irrigated land in NIS and southern European states

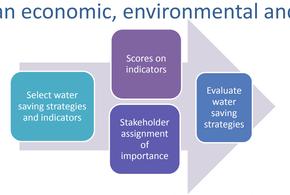
Using a simple decision support system to evaluate water saving strategies in Alicante, Spain

Simone Verzandvoort[a], Fuensanta García Orenes[b], Jorge Mataix Solera[b], Alicia Morugán Coronado[b], Erik van den Elsen[a] and Demie Moore[a]

[a] Alterra, Wageningen UR, The Netherlands [b] Department of Agrochemistry and Environment, University Miguel Hernández, Spain

Objectives

The objective of this study was to use a simple decision support system to evaluate the performance of water saving strategies for vine-growing areas in Alicante, Spain from an economic, environmental and socio-cultural point of view.



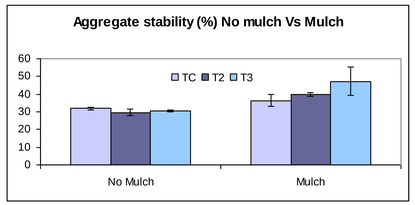
Method

Water saving strategies were selected with the aim to:

1. Prevent water loss due to evaporation and reduced infiltration as a result of soil sealing ⇨ straw mulch 0.5 kg/m^2
2. Investigate the use of waste water as a non-conventional water resource in irrigation to save fresh water ⇨ fresh water (control) and waste water from secondary (WW2) and tertiary treatment (WW3).

Economic and environmental indicators were calculated from measurements in a field experiment of the water saving strategies.
Socio-cultural indicators were obtained from a survey among stakeholder groups.


Experimental field in vineyard with mulch
Picture: UMH ©

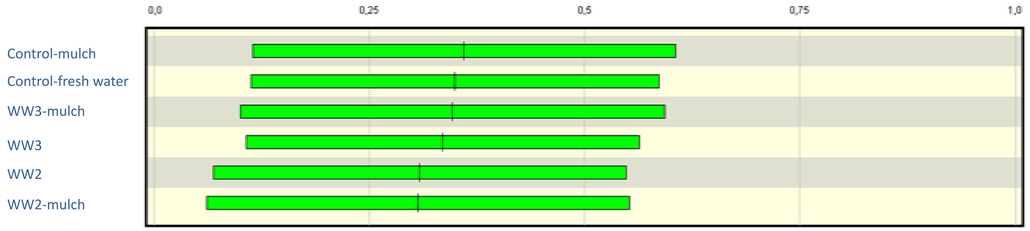


Source: UMH ©

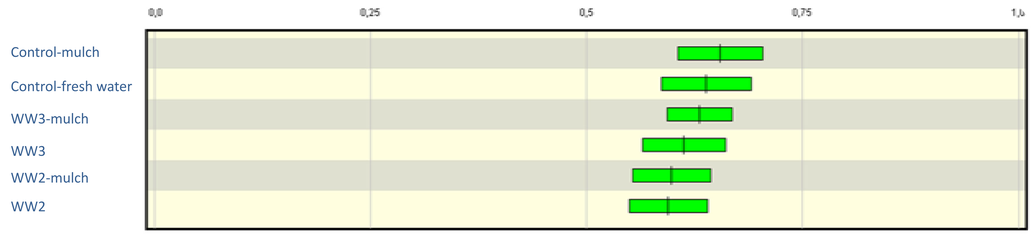
Results

- Water saving strategies differed only slightly in their performance with regard to the selected economic, environmental and socio-economic criteria.
- The strategy using fresh water and mulch obtained the highest overall performance score.
- Including information on indicators expressing water use efficiency and costs is likely to increase the performance of irrigation with waste water.
- The use of mulch improved the performance of strategies using fresh and waste water with tertiary treatment.

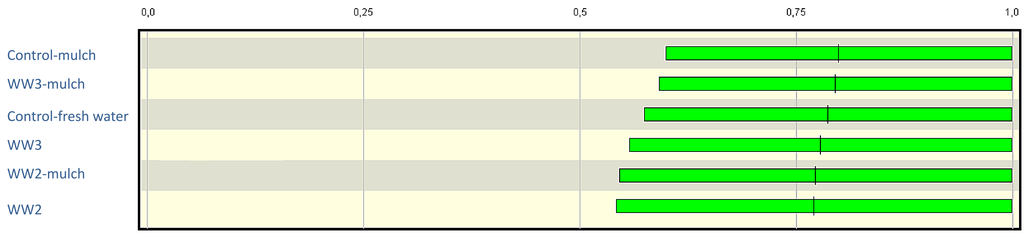
Farmer organization

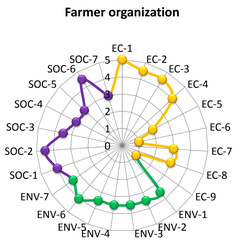


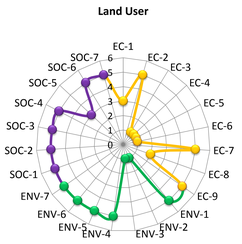
Land user

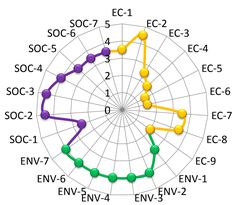


Public water management enterprise









Stakeholder assignment of importance to indicators

Stakeholder consultation

Stakeholders assigned importance to economic, environmental and socio-cultural indicators for the introduction of water saving strategies in the region.

Stakeholder groups included farmer organizations, land users, public management water enterprises, industry and educators (not shown here).

Most importance was assigned to socio-cultural indicators.

Economic indicators	
EC-1	Crop yield in treated area
EC-2	Farm Gross Margin
EC-3	Irrigation use efficiency
EC-4	Water use efficiency
EC-5	Total Available Water
EC-6	Green water use efficiency
EC-7	Establishment costs
EC-8	maintenance costs
EC-9	subsidy (or production aid)

Environmental indicators	
ENV-1	Soil water repellency
ENV-2	Soil structural stability
ENV-3	Bulk density
ENV-4	Heavy metal content
ENV-5	soil alkalinity
ENV-6	soil salinity
ENV-7	Soil organic matter content

Socio-cultural indicators	
SOC-1	Legal restrictions
SOC-2	Education and training of farmers
SOC-3	Acceptability of using waste water for irrigation
SOC-4	Historical adoption of new technologies
SOC-5	Likelihood of adoption of new technologies from Water Reuse
SOC-6	Incentives required to change behavior
SOC-7	Farmer health and safety