



Project No.: **FP6-517620**

Project acronym: **WEMED**

Project: **Evaluation of the Water use Efficiency indicators in the MEDiterranean region**

Instrument: **Specific Support Action**

## **PUBLISHABLE EXECUTIVE SUMMARY**

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We think that the WEMED project has been very successful. All the objectives, both general and particular, have been achieved in time, with high quality deliverables, as it is possible to verify in the annexes. As last activity we are preparing project proposals, at European level (in particular we are preparing an Interreg MED project) and at local country level.

In extreme synthesis, the conclusions of the project for improving the Water Use Efficiency in the Mediterranean countries, can be summarized as future research lines, i.e.:

1. Improving type of distribution systems and timing of irrigation adjusted to the needs of crops using intelligent systems based on (controlled) water stress and demand prediction; tertiary treated municipal waste water needs being included.
2. Study sustainability and implement a water basin framework to regulate overall productivity in the Mediterranean for irrigated and rainfed agriculture alike. Integrated approach (ecology and economy of water/nutrients/salt) to develop indicators for WUE and the whole hydrological cycle applying models at different scales, considering the real costs and sustainability.
3. Improve water use efficiency based on water consumption by the crop using modern irrigation methods which result in reduced water losses; more experiments are needed with respect to different agro-climatic zones.
4. Introduce new modelling tools and information technologies (e.g., GIS, crop growth models, water distribution models), develop drought resistant crops (e.g. fruit trees). Instate research and knowledge transfer in rural areas, improve capacity building for regional cooperation, and develop participatory systems.
5. Overall, it was accepted that global change and increasing human demands would make water more valuable and that we need:
  - Improve estimates for the actual demand, regional estimates and evaluation of crop coefficients to allow precise quantification in space and time.
  - Consider whole system with all (alternative) products with different types of irrigation (rainfed, deficit irrigation, supplemental irrigation, partial root drying) and the resources available.
  - Install a participatory system based on fees which reflect the real value of water and the profit of the respective product.
6. It is needed to adopt a multidisciplinary approach for crop improvement, combining the expertise of breeders, biotechnologists and molecular biologists, physiologists and bioinformatics.
7. Genomics-assisted breeding, which imply to move from QTLs to genes.
8. Surface Evaporation
  - There remains considerable scope to manipulate and reduce the surface evaporation component of evaporation through management interventions.
  - More than twenty years after its introduction, there appears to be no practical advance on the Ritchie (1983) equation. Serious attention should be given to:
    - experimental and
    - theoretical methods of estimating surface evaporation from vegetation with incomplete and complete cover and different architecture.
9. Transpiration Efficiency
  - The normalising, unifying influence of atmospheric demand provides a strong incentive for:
    - appropriate management practices that optimise crop growth against the seasonal variation in atmospheric demand
    - better theoretical and experimental methods of calculating and measuring the atmospheric demand throughout the growing season.
  - Correction for  $ET_0$  allows the grouping of different species onto a common efficiency. This provides management and experimental incentives to focus on:
    - increasing the abscissa i.e. transpirational fraction to maximise biomass and/or

- the characteristics of the biomass in terms of nutritional, commercial or communal value.
10. It is necessary to develop correct and, above all, univocal definition of water productivity (WP) and water use efficiency (WUE) and to study the links between them. Possible definition to take into account could be:
- Biomass/actual evapotranspiration (ET)
  - Yield/ET
  - Incomes /used water by the crop (WU)
  - Value/ET
  - Yield/ irrigation (IWU)
  - Value/IWU
11. Methods and models are necessary to up-scale the WUE and the WP from field to
- Farm
  - Institutional scale
  - Sub-national scale
  - Country

Discussion it is still necessary for defining the Reference point (i.e. potential production, ....). Possible indicators to be analysed in detail for the Mediterranean region should be

Farm level

- Total yield / total water (crop systems including fallow or set-aside, and rain-fed crops)

Association of farmers (water users associations) level

- Water volume in the dams (or reservoirs) / served area
- *Irrigated surfaces (in ha) / volume of allocated water*

Ecosystem (with water having a multifunctional role) level

- Aggregated WUE (benefit / water used)  
(using remote sensing + models)

12. Research is necessary to individuate indexes, as a composite of more than one indicator, for a more complex evaluation of WP and WUE in the Mediterranean region.