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Growth dynamic of three different white willow clones used in a zero-discharge wastewater treatment system in the sub-Mediterranean region – an early evaluation

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ABSTRACT

An evapotranspirative willow system (EWS) is a zero-discharge wastewater treatment system in which all influent water is used for growing willows and evaporation. Willow clones used in EWS may significantly affect the performance of EWS; therefore, the clones with high biomass production and resilience to permanent flooding, increased nutrient concentrations, and salinity must be selected. In the presented study, a 27 m² pilot EWS was set up in November 2015, enabling the testing of three different willow clones of *Salix alba* (L.): indigenous white willow 'V 160' (*S. alba*) and two of its hybrids: 'V 052' (*S. alba* var. *calva* × *S. alba*) and 'V 093' (*S. alba* × *S. alba* var. *vitellina*) × *S. alba*. The stem height, diameter, and number of shoots per stump were measured weekly in the first year of growth on site, along with the water quality parameters and water levels in the test beds. There were no statistically significant differences in stem height and stem diameter between the three tested clones at the end of the vegetation season; however, the indigenous clone indicated better adaptability to conditions in EWS but somewhat lower biomass production in comparison with the hybrids. For all clones, the willows growing in the EWS outgrew the control willows, showing the positive effects of high water availability and wastewater on willow growth. Investigations in the following vegetation season will further evaluate the water demand and the biomass yield, estimate the efficiency of nutrient transfer from wastewater to wood biomass, and define the differences for the selected clones.

Keywords: Closed material loop; Wastewater reuse; Evapotranspiration; Willows; On-site wastewater treatment

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