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Potential of Waste Water Use for *Jatropha* Cultivation in Arid Environments

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Abstract

Water is relevant for all socio-economic development and for maintaining healthy ecosystems. As population increases and development calls for increased allocations of groundwater and surface water for domestic, agriculture and industrial sectors, pressure on water resources intensifies, leading to tensions, conflicts among users, and excessive pressure on the environment. Additionally, energy demand scenarios show an increase over time that leads decision makers to look for renewable energy sources. Indeed, imbalances between availability and demand, the degradation of groundwater and surface water quality, competition and conflicts contribute to water scarcity. Scarcity often occurs in the arid and semiarid regions affected by droughts and wide climate variability. This induces countries to use sewage effluent after a certain level of treatment resulting generally in nutrient rich treated sewage effluent (TSE). *Jatropha* has been introduced as an option for energy supply since it is claimed to be drought resistant and can grow on marginal sites. In order to evaluate the suitability of *jatropha* cultivation in a combined plant production / effluent treatment system, considering both the advantage of using available resources (water and nutrients) and also the fact that salinity issues may arise, *jatropha* water requirements were calculated using CROPWAT 8.0. Concentrating on a case study of Southern Morocco, the crop evapo-transpiration (ET_c) during the growing period (February - August) was 768 mm. Additionally, the gross irrigation requirements ranged from 868 to 1,329 mm. Moreover, the corresponding nutrient input from the effluent irrigation was 84–129 kg ha⁻¹ for N, 24–37 kg ha⁻¹ for P, and 169–259 kg ha⁻¹ for K, respectively. The average soil salinity in the root-zone was between 2 dS m⁻¹ and > 9 dS m⁻¹ depending on the leaching fraction. Since *Jatropha* has been reported to be salt sensitive, the use of waste water while controlling soil salinity has to be reconsidered even if the nutrient and water supply can be satisfied.

Keywords: Bioenergy, fertiliser, Morocco, salinity, waste water