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Potential of Milk Thistle for Biomass Production in Semiarid Regions

R. Keshavarz Afshar1, A.M.R. Chaichi6, A. Allipour5, M. Ansari Jovini6, M. Dashtaki3 and M. Hashemi4

Abstract

Water shortage is the major constraint for biomass production in semiarid regions. Biomass production of milk thistle [Silybum marianum (L.) Gaertn.] and energy balance of the crop under different irrigation regimes (full and deficit irrigation) and soil organic amending treatments (poultry manure [PM] and vermicompost [VC]) was evaluated in a two-year field experiment. Biomass yield reduced by 10 and 22% under moderate (I10) and severe deficit (I0) irrigation, respectively. Under deficit irrigation, the contribution of leaves and heads to the final biomass reduced in favor of the stalk. Regardless of the irrigation regime, application of soil amendments improved biomass yield. Total energy input used for milk thistle production was 9829 MJ ha⁻¹, in which 68% was related to nonrenewable energy sources. Diesel fuel (51%) had the biggest share of energy used for milk thistle production, followed by irrigation water and machinery. Energy input in I10 and I0 was 7 and 15% less than full irrigation (I100). Net energy obtained from milk thistle was 116,688 MJ ha⁻¹ with energy efficiency (energy output energy input ratio) of 12.8. Taking into account that milk thistle is an annual crop with low energy input requirements, it seems that milk thistle has a considerable potential for biomass production using I10 in regions with limited irrigation water availability.

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