Impact of deficit irrigation on a young Argan (Argania spinosa (L.) Skeels) plants: physiological and biochemical behavior

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The argan tree (Argania spinosa (L.) Skeels) is endemic to Southwestern Morocco. Argan forest is growing exclusively in the dry lowlands and is particularly fragile to climate change. In addition, UNESCO declared the argan forest as a Biosphere Reserve in 1998. However, the limited availability of water in Mediterranean ecosystems and the future scarcity of water resources lead to the reduction of water use for irrigation in arid and semi-arid regions. In this context, the objective of this study was to evaluate the physiological and biochemical behavior of young argan plants subjected to different irrigation deficit regimes (D1= 15 L; D2= 10 L and D3= 5 L). The study was done on young argan plants during three consecutive summers (2017-2019). Several physiological and biochemical variables were evaluated. The study showed significant results. Indeed, the irrigation regime influenced very significantly the leaf water status, pigment contents, osmolytes accumulation, oxidative damage and antioxidant enzymes activity. The D3 (5L) irrigation regime recorded the lowest leaf water potential, stomatal conductance, relative leaf water content, total chlorophyll and carotenoid content, free proline, soluble sugars, hydrogen peroxide, malonyldialdehyde and antioxidant enzyme accumulation (SOD, POD and PPO) values compared to the other two irrigation treatments (D1 and D2). Although our results revealed changes in water status, physiological and biochemical processes in argan seedlings, the 10 and 15 L irrigation regimes resulted in less stressed seedlings. Thus, in a context of limited availability of water resources, we can recommend the irrigation regime D2 (10 L) to forest managers for better water management.