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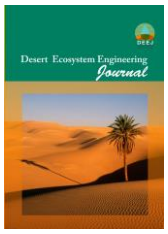

Comparison of the Preliminary Effect of Micro-Catchment Rainwater Harvesting Systems on the Photosynthetic Activities of Almond Seedlings

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Extended Abstract

Introduction: Water deficit is one of the most important stress factors affecting plant growth and production in the worldwide, as due to series drought stress photosynthetic activities are negatively affected. Subsequently, a reduction will happen in the growth of leaves and plants, stomatal conductance and agricultural products. Accordingly, major concern exists in countries like Iran where water scarcity and poor water management in combination with increased population and water consumption endanger food security. Therefore, exploring ways to increase agricultural and horticultural products along with optimizing the use of water is essential. The aim of this paper is a) to examine the effects of Rain Water Harvesting (RWH) systems on photosynthetic activities of Almond seedlings and b) determination of the most effective treatment of the RWHs which has the most positive effect on photosynthetic parameters.

Material and Methods: The current research was conducted in a randomized complete block design with three replications to assess the impact of RWH systems under five treatments viz. control (A), eliminated of vegetation and pebble with a gravel filter (B), eliminated of vegetation and pebble without any gravel filter (C), insulated some portion by plastic with a gravel filter (D) and insulated some portion by plastic without any gravel filter (E) on activity of photosynthetic parameters in Almond seeding. RWH systems were designed in 8, 5, and 0.5 meters for the length, width, and depth respectively. The gravel filter with 10 and 30 cm in diameter and depth was devised to facilitate runoff infiltration in the root region. Four photosynthetic factors viz. Photosynthetic rate per unit leaf area, stomatal conductance, transpiration rate, and substomatal CO_2 adsorption were measured after 9 and 22 days after a rainfall event in 2011.

Results: The obtained results showed that the RWH systems had a positive effect on two photosynthetic parameters included photosynthesis and transpiration. In General, in addition of the positive effect of the RWH

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systems, the E, B and C treatments could increase the activity of photosynthetic parameters versus the A treatment which exhibited the least activity of the parameters in Almond seedlings.

Discussion and Conclusion: Nevertheless, for more details and answers to issues such as selecting the treatment with best efficiency, the effect of the gravel filter in RWH systems efficiency, the long-term effects of the RWH systems on the growing of fruit seedlings and their establishment, designing the RWH systems based on the rainfall intervals and the water use of the seedlings to collect enough water in each system to avoid drought stress for seedlings require comprehensive studies at least in a period of 10 years. Ultimately, the results of aforesaid comprehensive studies lead managerial and necessary plans to overcome the problems of water deficit and responding to the rapid growth of world population and consequently their agriculture production needs.

Keywords: Drought Stress, Gharecharian Research Station, Productive Trees, Water Conservation, Zanjan City.