

Energy yield evaluation of a rainwater harvesting system using a novel agrophotovoltaics design

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ABSTRACT

The aim of this study was to assess an agrivoltaic prototype design integrated with rainwater harvesting, installed at the Khemis Miliana demo site in Algeria. Agrivoltaics combines land-use for food and electricity production. Photovoltaic (PV) modules surfaces can be utilized as water catchment canopies to harvest rainwater for crop irrigation and/or drinking water. In the current investigation, light distribution under the PV modules was assessed, as well as the energy yield and applications of electricity produced, and rainwater harvesting potential. The design of the rainwater harvesting agrivoltaic system in a V-shape design was assessed and the energy yield was modeled and simulated. The energy yield assessment was performed to predict the performance of the V-shape design, as well as determining the best installation parameters and system layout. Agrivoltaic systems have great economic potential by allowing for electricity production and crop growth on the same land area. This would be a significant development in the sustainable development of society.

Keywords: Agrivoltaic; Energy yield assessment; Irradiance simulation; Photovoltaic system; Crop yield; Water consumption

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