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Development of Drying System for Dew Collection to Supplement Minimum Water Required for Grazing Plants in Arid Regions

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Abstract : Passive dew harvesting and rainwater collection requires a very small financial investment meanwhile they can exploit a free and clean source of water in rural or remote areas. Dew condensation on greenhouse dryer cladding and assorted other surfaces was frequently noticed. Accordingly, this study was performed in order to measure the quantity of condensation in the arid regions. Dew was measured by using three different kinds of collectors which were glass of flat plate solar collector, tempered glass of photovoltaic (PV) and double sloped (25°) acrylic plexiglas of greenhouse dryer. The total amount of dew collection for three different types of collectors was measured during December 2013 to March 2014 in Alahsa, Saudi Arabia. Meteorological data were collected for one year. The condensate dew drops were collected naturally (before scraping) and by scraping once and twice. Dew began to condense most likely between 12:00 am and 6:30 am and its intensity reached the peak at about 45 min before sunrise. The cumulative dew yield on double-sloped test roof was varying with wind speed and direction. Results indicated that, wiping twice gave more dew yield compared to wiping once or collection by gravity. Dew and rain pH were neutral (close to 7) and the total mineralization was considerable. The ions concentration agrees with the World Health Organization recommendations for potable water. Using existing drying system for dew and rain harvesting cold provide a potable water source for arid region.

Keywords : PV module, flat plate solar collector, greenhouse, drying system, dew collection, water vapor, rainwater harvesting
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