Innovation in Irrigation: ‘Ultra-Low Energy Drip Irrigation for MENA Countries’

Update: 3 Jan - December 2017

Moving from water scarce to water adaptive means making an incremental shift in the Middle East North Africa Region (MENA) in technological and social innovations. Particularly in Jordan, water scarcity places an increasing amount of stress on the balancing act to manage water provisions to the increasing population as well as to the agricultural, energy, industry and development sectors.

If improved benchmarks for water-use efficiency go unfound or unimplemented, Jordan’s agricultural sector, its farmers and groundwater stocks are to face even tougher challenges as water demand is anticipated to increase amid population growth and climate consequences.

The initiative Ultra-Low Energy Drip Irrigation for MENA Countries (U-LEDIMC), which started September 20, 2016, and ended September 19, 2019, is funded by United States Agency for International Development (USAID). It aims to make improvements to the way farmers irrigate their fields by closing the gap between the absence of applicable technology and the general know-how of designing adaptive irrigation networks by providing an irrigation innovation that will enable farmers to provide uniform distribution of water to their fields with low-pressure flow.

By introducing a prototype emitter, designed by Massachusetts’s Institute of Technology’s GEAR Lab, this project is paying the way for drip irrigation systems to run on low-cost, solar-energy solutions.

Methods for Irrigation and Agriculture (MIRRA) and Massachusetts Institute of Technology (MIT) has been working with three farms (Mafraq –groundwater, Jordan Valley (Shahabee) –surface water- and Ramtha –treated wastewater) to conduct its prototype testing for the ultra-low energy drip emitters.

Al-Ramtha Research Station

Al-Ramtha Station was a site of particular significance. Although there were no crops being cultivated at the site, the ultra-low pressure drip irrigation system was run with treated wastewater. The importance of agriculture reliance on treated wastewater is a challenge to the experiment and to the entire agricultural sector in Jordan. Treated wastewater is of interest to this project as it represents a unique set of challenges and opportunities. This water source entails an increased risk of clogging in the emitters. However, the use of treated wastewater in Jordanian agriculture is expected to increase as a way to offset the growing water demand in other sectors. Although the treated wastewater did in fact cause some issues - sparing the growth of weeds while irrigation events and timing were reduced to stave their growth - the prototype emitters proved their ability to reach the project’s desired outcome: maintaining uniform distribution of water throughout the system according to international recognized standards. As a result, the ultra-low pressure drip emitters at the Ramtha farm have shown the agricultural community that there’s no need to avoid more effective and efficient means of delivering water to crops for fear of clogging. These emitters can play a role in mitigating treated waste water with irrigation systems in Jordan.

Al-Ramtha - Treated Waste Water

Figure 1: The result of distribution uniformity test (DU) at 0.5 bars

Figure 2: The result of distribution uniformity test (DU) at 1 bar