

Adopting Hydroponic and Wicking Agro Food Production Models in Palestine

By Nader Hrimat and Munif Doudin

Numerous factors affect food security in Palestine, including a prevalence of drought conditions due to climate change, scarce water resources, low productivity, limited access to open space, urban-area growth, and the unavailability of agricultural lands, especially in urban areas where the population increases rapidly and demands on food increase proportionately. In addition, as unemployment and poverty rates increase, so does the number of families who are food insecure. These challenging conditions have created a need to innovate and introduce a new food-production system that is feasible, environmentally sound, and easily manageable; one that optimises the utilisation of scarce natural resources in an effective and sustainable approach. The Applied Research Institute-Jerusalem (ARIJ) has developed an innovative plant-production system that can produce more crops, increase cropping seasons in limited areas, and ensure the easy management of the production system. ARIJ aims to create a system that fits urban, rural, and Bedouin areas, especially those areas that are remote and vulnerable.

Accordingly, researchers at ARIJ explored the adoption of simplified hydroponic and wicking systems in Palestine as well as their potential for success. Funding was secured from Polish Aid in partnership with the Polish Center for International Aid to adopt the hydroponic and wicking systems in Palestine, through using available local materials to guarantee the sustainability and functionality of installed units.

Hydroponics is a method of growing plants using mineral nutrient solutions, in water, without soil. The plants are grown with their roots in the mineral nutrient solution using an inert medium such as gravel or special holding containers. This

usually results in the creation of clean and hygienic plants and products. The wicking-bed system is a plant-growing technique in which water wicks up from an underground water reservoir to the root of the planted crops. The growing bed is filled with a medium such as gravel or compost.

The ARIJ team has developed suitable designs for hydroponics and wicking-bed systems that are conducive to conditions in Palestine. This work was accomplished by ARIJ's engineers under the supervision of an Irish expert, Mr. Christopher Somerville, who has many years of experience in developing such urban agriculture models in the Gaza Strip and Jordan as well as in other countries.

Since March 2012, ARIJ has developed 22 hydroponics and 52 wicking-bed systems in remote areas of the Bethlehem and Hebron governorates. Educational models were also established at Al-Arroub Agricultural School in order to train students in these new technologies.

Each hydroponic unit contains 4 beds with a total area of 4 m², with the capacity to plant 200 seedlings per season (3

to 4 seasons per year). That means that 600 to 800 plants can be grown to produce 450 to 600 kilograms of food per year. In other words, the hydroponic unit can produce food with a market value of US\$400 to US\$550 per year. Another type of system replaces the pots with pipes. Both systems have the same capacity. Many crops can be planted in the hydroponic unit, including lettuce, cauliflower, cabbage, cucumbers,

strawberries, tomatoes, and sage. The project beneficiaries were provided with the required training to take care of and manage these units, which are usually composed of water pumps, a pumping regulator, and various fittings, including pipes and other simple equipment. ARIJ has provided training, technical support, and follow-up services to the beneficiary families.



Hydroponic unit with beds planted with lettuce.



Hydroponic unit with pipes, planted with lettuce and strawberries.



Wicking-bed system, planted with lettuce.

The wicking system is simpler than the hydroponic since it functions without an electrical pump and is easy to manage. Thus even families with limited knowhow can manage this system. Furthermore, the wicking system includes worms that can digest organic kitchen waste into compost to create fertilizer. Many crops can be planted in the wicking system to produce the same number of vegetables as the hydroponic unit. Each wicking bed unit is composed of four separate units that can be replanted three to four times a year, yielding the same production capacity as the hydroponic system.

Both hydroponics and wicking systems are fit for urbanised and rural areas as well as for areas of water scarcity. These systems manage to reduce the consumption of irrigation water by 50 percent. In addition, the systems are safe, natural, and conducive to family participation in planting and caring for the growing plants. Furthermore, this technology contributes to greening the environment with food crops and assists in enhancing food security at the household level. There is also potential for transforming these pilot units into a means of income generation. Such an approach will help people to adapt to climate change and crop-cost inflation as well as survive natural crises, thus contributing to improving food security and enhancing people's access to better food as issues such as water scarcity and land availability in Palestine are addressed.

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