



## Water Shortages Drive Switch from Irrigation to Hydroponics



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## Introduction

**Dwindling water resources have persuaded the government of Saudi Arabia to shut down the domestic production of low-value irrigated crops. However, the Kingdom is developing as a producer of high-value food crops using sophisticated hydroponic technologies.**

## Water Restrictions

The Middle East and North Africa (MENA) region is home to around 5 percent of the world's population but has only 1 percent of the world's renewable water resources. It also has the highest per capita rates of freshwater extraction, exploiting more than 75 percent of its renewable water resources, due to the lower absolute amount quantity of water available in the region.



Government policy is supportive of the domestic production of high-value crops, particularly fruit and vegetables such as tomatoes, cucumbers, citrus fruit and bananas.

## Government Strategies

Governments in the region have been adopting strategies for balancing their scarce resource and growing demand for fresh water.

The government of Saudi Arabia has developed desalination plants to provide drinking water to its population. Other governments have developed sophisticated water storage facilities to manage water for current and future use.

Much of this water is used for food production. The Middle Eastern countries – Bahrain, Egypt, Jordan, Kuwait, Lebanon, Oman, Qatar, KSA and the UAE – comprise 367 million hectares, or less than three percent of the world's total land area.

However, the greater part of the area is desert, of which only a very small portion is suitable for agriculture. The region relies heavily upon irrigation for agricultural production.

- Saudi Arabia has turned away from low value irrigation crops due to water scarcity. Hydroponic technologies are replacing them
- The government has had to take on various strategies to balance limited fresh water supply with demand. These include the use of desalination plants, and sophisticated water storage
- Because so much of the region is desert terrain, irrigation is important, and agriculture takes up a huge proportion of available water from Saudi aquifers
- KSA has eliminated the domestic production of water-intensive crops such as wheat, a commodity in which the country was once self-sufficient.
- Government policy aims to replace low-value crops, such as hay, wheat and barley, with imported commodities, purchased on world markets.
- However, policy is also supportive of the domestic production of high-value crops, particularly fruit and vegetables such as tomatoes, cucumbers, citrus fruit and bananas.
- Hydroponics are set to resolve the scarcity problem to an extent. It consumes 70–90 percent less water than conventional soil-based agriculture, and allows for the recycling and re-use of water.

## Saudi Agriculture

Despite contributing just over 2 percent to the country's GDP, the Saudi agricultural sector uses more than 85 percent of the total water available. The Kingdom is the world's third-largest consumer of water, with daily per capita consumption of almost 250 litres. Agricultural production has always been dependent upon the dwindling water resources of the Saudi aquifers. As a result, Saudi Arabia has chosen to eliminate the domestic production of water-intensive crops such as wheat, a commodity in which the country was once self-sufficient.



**Figure 1: Select Countries – Area of Irrigated Land**

Country	Land Area (1,000 Ha)	Water (km2)	Irrigated Land (km2)
Bahrain	70	0	40
Egypt	99,545	6,000	34,220
Jordan	8,824	540	750
Kuwait	1,782	0	130
Lebanon	1,023	170	1,040
Oman	30,950	0	720
Qatar	1,159	0	130
KSA	214,969	0	16,200
UAE	8,360	0	760

Source: Blominvest

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### Leading Technology

Hydroponics will be a key technology for developing the horticultural sector across MENA. This is a method used to grow plants using mineral nutrient solutions, without soil. In our experience, the technique is very useful for growing plants in regions with unfavourable climatic conditions or with significantly limited arable land, such as the Middle East. It consumes 70–90 percent less water than conventional soil-based agriculture, as hydroponics allows for the recycling and re-use of water.

Hydroponics has the potential to become a leading

technology, because of its potential for high output and efficiency.

“ Because of the very significant capital investment required, it is best suited to high-value fruit and vegetable crops

We also find that these projects are best suited to large-scale corporate projects, because of the requirement for scale. Several governments in the Middle East are at different stages in terms of the implementation of this technique. Oman has an estimated 80 greenhouse projects throughout the country and the government of the UAE is extending loans for hydroponic projects to farmers through the Khalifa Fund for Enterprise Development, an Abu Dhabi government organization that helps develop the Emirate’s businesses. Bahrain is building its first hydroponic “garden,” which would demonstrate best practice for the technique.



Initially, Saudi investors adopted a wait-and-see approach to hydroponic farming, until the government clearly formulated its future water policy. However, in the first half of 2014, Pegasus Agri-Tech announced plans to build a 20,000-metre square hydroponic farming facility, to produce lettuce, tomatoes, basil, thyme and rocket.



## Expert in this Insight

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### Conclusion

Low-value irrigation crops have become a thing of the past in Saudi Arabia as the kingdom champions hydroponics and high value crops as a means of meeting the challenge of feeding its population, despite a severe freshwater scarcity.

Hydroponics 70–90 percent less water than conventional soil-based agriculture and allows for the recycling and re-use of water.



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