

# Protected Agriculture in the State of Qatar

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## Abstract

Protected agriculture was introduced to Qatar in 1976 in cooperation with FAO. By 1995, the area of greenhouses was about 64.3 hectares.

In 1979, a research station was started for protected-agriculture (PA) activities and it was modernized in 1984. The on-going research activities in the Horticultural and Greenhouse Experimental Station in Ottoria is organized under four major research programs: (1) development and/or adaptation of new growing systems and techniques with emphasis on soilless culture; (2) greenhouse management—to improve the efficiency of the greenhouse cooling system, to assess various shading systems and materials, to utilize solar power for irrigation and water desalination, and to assess the design and performance of different irrigation systems and materials; (3) crop management—influence of different spacing and plant densities on yield and quality of cucumber, and irrigation, nutrition and pest and disease control; (4) crop and cultivar responses and performance under local conditions. Lack of information, high costs and low returns are blamed for the slow growth of PA in Qatar. Training of technical PA personnel and development of low-cost, efficient greenhouses are considered the most important needs. Farmers also need specific advice in PA.

## Introduction

The peninsula of the State of Qatar is located on the east coast of the Arabian Peninsula; it has an area of about 11,340 square kilometers and a population of about half a million people. The weather is very hot in summer and mild in winter, with an average annual precipitation of 84 mm. Groundwater is the only source for irrigation, with the exception of a few farms which are using treated sewage effluent (TSE) for producing fodder crops only. Drip, sprinkler and flood irrigation systems are used in those farms. Oil and natural gas are the main sources of national income.

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## Protected Agriculture

Protected agriculture was started in Qatar in 1976 when the Department of Agricultural Affairs, in cooperation with FAO, erected plastic houses in the North Research Station. This was followed in 1979 and 1984 by several plastic and fiberglass houses introduced by the Department of Agricultural and Water Research. In 1982, the Industrial Development Technical Center started a 3-ha project which became the basis for the Arab Qatari Agricultural Production Company. In 1985, the Agricultural Development Department distributed and erected 32 plastic houses in selected private farms.

In the third quarter of 1995, some data were collected regarding protected agriculture in the country, as follows.

The total area covered by greenhouses was about 64.3 ha—about 1.7% of total area of registered farms.

The covering materials used were PE (polyethylene), fiberglass and glass. Galvanized pipes were the main structure components used in PE houses, while galvanized posts were used in other types of greenhouses.

Aluminum strips were used to cover the cropping area of the green-whole. Drip irrigation was used in all greenhouses except for a few where sprinkler or flood systems were used. Hydroponics were used in some areas.

Cooling system: The pad-and-fan system was the only means used for cooling greenhouses in Qatar. Both glasshouses and fiberglass houses were fully equipped with cooling systems, while only 4% of plastic tunnels were cooled.

Growing system: Direct planting in soil, 54.7 ha (85.6%); sand bags, 9.1 ha (14.2%); water culture, 0.1 ha (0.2%).

Crops: The most common crop grown in the greenhouses was cucumber followed by tomato. Cut flowers and other vegetables were also cultivated.

## Research Facilities

Research in protected agriculture is conducted in the Horticultural & Greenhouse Experimental Station in Othoria, under the Department of Agricultural and Water Research, Ministry of Municipal Affairs and Agriculture. The research station is located in the middle of Qatar, some 35 km east of Doha.

The Horticultural & Greenhouse Experimental Station in Othoria was established in 1979 with 12 plastic houses (2160 m<sup>2</sup>). In 1984, a modern fiberglass house with computer control was erected. The total area of this well-equipped unit was 1102 m<sup>2</sup> and consisted of 6 compartments. The unit was furnished with control room, central computer, laboratory, stand-by generators and nutrient film technique (NFT) controlling equipment. The station in Othoria was recently expanded to include an additional 12 plastic houses with cooling systems.

## Research Activities

The ongoing research activities at the Horticultural & Greenhouse Experimental Station are organized within four major research programs.

1. Development and/or adaptation of new growing systems and techniques with emphasis on soilless culture

Development of the tube culture technique for the production of cucumber, tomato, pepper and sweet melon.

Continuous production technique for cucumber in nutrient solution culture.

Adaptation and development of a high-density cropping system for strawberry (pyramid culture).

Influence of solution concentration and temperature on yield and quality of crops.

Comparison between yield and quality of crops grown in different systems (tube culture, sandbags, sand beds and soil beds).

Economic considerations of different systems in relation to capital cost, running cost and output per unit area, labor and water.

*Pyramid culture system for the production of strawberries, Othoria (Qatar)*



2. Greenhouse management

Improvement of the efficiency of the greenhouse cooling system.

Assessment of various shading systems and materials.  
Utilization of solar power for irrigation and water desalination.  
Assessment of design and performance of different irrigation systems and materials.

3. Crop management

Influence of different plant spacing and density on yield and quality of cucumber.

Irrigation, nutrition and pest and disease control programs.

4. Response and performance of crops and cultivars under local conditions

Production and quality of cut flowers (rose, carnation, and bird of paradise) in different growing systems.



*Research with cut-flower Bird of Paradise, Roses and Carnations in different soilless culture techniques at Otteria Research Station, Qatar*



Assessment of banana production in cooled fiberglass houses.

Performance test for new cultivars of cucumber, tomato, pepper, eggplant, lettuce, melon, squash and strawberry under local conditions.

### **Expected results and findings**

The expected outputs of the research programs can be summarized as follows.

1. Develop an adaptable soilless production system that can offer the following:
  - major saving in production cost by increasing the output per unit of area, labor and water
  - produce an early and high-quality yield
  - overcome problems associated with soil and sand cropping systems
  - better working environment.
2. Determine the optimum plant density and spacing.
3. Identify the most suitable and productive cultivars under local conditions.
4. Establish standard programs for irrigation, fertilization, and pest and disease control.
5. Identify the most suitable shading systems and material for the greenhouses.
6. Improve the efficiency of the cooling system.
7. Assess and demonstrate modern irrigation systems, new material and equipment.
8. Provide growers with a wider choice of high-value crops.

### **Problems and Needs**

Although protected-agriculture activities were started in Qatar a long time ago, the expansion of this industry only occurred in the last few years. The lack of knowledge, high cost and low return from the agricultural activities, beside other factors, are the main reasons for the slow growth of this important industry.

There are many needs, but training of qualified and active personnel is the most important. Development of low-cost and high-efficiency types of greenhouses suitable to this area is also very important. The small-holder farmers require support to find the right way to maximize their income and to improve efficiency.