

AGRICULTURE IN UNITED ARAB EMIRATES

Matthew N. O. Sadiku

*Department of Electrical & Computer Engineering, Prairie View A&M University,
Prairie View, TX USA*

Uwakwe C. Chukwu

Department of Engineering Technology, South Carolina State University, Orangeburg, SC, USA

Janet O. Sadiku

Juliana King University, Houston, TX, USA

Annotation. The United Arab Emirates is located in the Middle East, on the Western Asian continent, and shares borders with Saudi Arabia and Oman. It has rapidly grown into a strong, thriving economy. The federation's economy is dominated by the petroleum produced primarily in the Abu Dhabi emirate. The rapid growth in the UAE population alerted the government to look for alternatives to increase food supplies other than from imports. This increase is due to open market policy that enabled several companies around the World to open new branches to their businesses in the UAE . The federal government was viewed as providing a healthy business environment that resulted from government's transparency and business legislation. This paper focuses on the practice of agriculture the United Arab Emirates (UAE).

Key word: agriculture, farming, United Arab Emirates, traditional agriculture.

INTRODUCTION

UAE is located in an arid zone, where the desert accounts for more than three quarters of its total area. The map of UAE is in Figure 1 [1]. As evident in the map, UAE is located in the Middle East, bordering the Gulf of Oman and the Persian Gulf, between Oman and Saudi Arabia. Its land size is 83,600 sq km and its population in 2023 is 9,973,449, which are predominantly (76%) Muslims. The UAE is a constitutional federation of seven emirates: Abu Dhabi, Dubai, Sharjah, Ras al-Khaimah, Ajman, Umm al-Quwain, and Fujairah. Languages spoken in UAE include Arabic (official), English, Hindi, Malayalam, Urdu, Pashto, Tagalog, and Persian. Only about one-ninth of the emirates' residents are citizens. The remainder are foreign workers and their dependents. In 1971, six of the Trucial states - Abu Dhabi, 'Ajman, Al Fujayrah, Sharjah, Dubayy, and Umm al Qaywayn - merged to form the United Arab Emirates (UAE) and are referred to as emirates, with the city of Abu Dhabi serving as the capital [2]. The expansive cityscape of Dubai is illustrated in Figure 2 [3]. The wealthiest emirate is Abu Dhabi, with one of the largest concentrations of the world's proven oil reserves and contributing significantly to the national budget. With high per capita food consumption, the United Arab Emirates is the most promising agriculture market in the Gulf Cooperation Council (GCC) region.

UAE's environment is characterized by low rainfall, high temperatures, lack of natural waterways, and poor soil. Nearly the entire country is desert. Agriculture is an old activity in the United Arab Emirates. Agriculture contributes only a small fraction of GDP and employs less than one-tenth of the workforce. Today, there are more than 30,000 farms in the UAE. About 24% of cultivated

land is used to grow vegetables, 30% fruit, 10% feed crops, and 36% for other uses [4]. The combination of limited arable land, low soil fertility, scarce water resources, and extreme temperatures makes open field cultivation highly challenging across the Arabian Peninsula. The most productive region in UAE is Ra's al-Khaimah, which receives underground water supplies and enjoys the most plentiful rainfall [5]. One of the major crops grown in the UAE is the date palm shown in Figure 3 [6]. Other crops grown include tomatoes, cabbage, eggplant, cauliflower, squash, bougainvillea, tropical hibiscus, eggplant, mangoes, citrus fruits, etc.

The cultural traditions of the United Arab Emirates are rooted in Islam and resonate with the wider Arab world. In several ways, change is apparent in the federation's cultural life. Changes in attitudes toward marriage and the employment of women lead the region. A grand mosque in Abu Dhabi is shown in Figure 4 [7], a place of Muslim worship. No trip to the United Arab Emirates is complete without a visit to the Sheikh Zayed Grand Mosque in Abu Dhabi.

BRIEF HISTORY OF UAE AGRICULTURE

From the beginning, agriculture has been one of the most popular activities of the Emirati people. Historically the region now comprising the emirates has been influenced by Persian culture owing to its close proximity to Iran, and its porous maritime borders.

In the 18th century, Portugal and the Netherlands extended their holdings in the region but retreated with the growth of British naval power there. This was followed by a series of truces with Britain in the 19th century; the emirates united to form the Trucial States. In 1971, six of the Trucial states - Abu Dhabi, 'Ajman, Al Fujayrah, Sharjah, Dubayy, and Umm al Qaywayn - merged to form the United Arab Emirates (UAE). The states gained autonomy following World War II (1939–45). The agriculture sector developed rapidly since 1971, despite problems due to the scarcity of water resources and arable land, soil salinity, difficult environmental conditions, high production costs, agricultural pests and post-harvest losses. Between 1979 and 1985, agricultural production increased sixfold. Agriculture in the United Arab Emirates, including fishing, was a minor part of the UAE economy in the early 1990s.

Oil was discovered in Abu Dhabi in 1958, and the government of that emirate owns a controlling interest in all oil-producing companies in the federation. The regime of Ruhollah Khomeini in Iran and the subsequent Iran-Iraq War (1980–88) created problems for the United Arab Emirates. The rapid development of agriculture in the UAE was seen during the 1980s when the country started using up to 30% of its food requirements. The booming economy of the United Arab Emirates was slowed by the onset of the global financial crisis of 2007–08. In 2008–09, the confluence of falling oil prices, collapsing real estate prices, and the international banking crisis hit the UAE especially hard. The country had to diversify its economy to avoid complete dependence on oil [8].

MODERN AGRICULTURE

While obstacles such as scarcity of water resources, severe environmental conditions, and soil salinity have affected agricultural development, the UAE has found innovative ways to circumvent these challenges. Its modern service infrastructure, particularly its seaports and airports, enabled the UAE to build an international reputation for its cities, most notably Dubai, as dynamic and forward looking. The government has made concerted efforts to use new techniques to increase productivity of its farm crops in the country. Seasonal differences between the Northern and Southern Hemispheres enable the UAE to import food, especially vegetables, fruits and cereals, throughout the year. India and Pakistan are the primary Asian countries supplying UAE markets with vegetable products [9].

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Agriculture in UAE is technology dependent and mainly grows vegetables and fruits. It has become an economic activity that relies on the use of the latest technologies. It is tapping latest technology to grow crops locally as part of the food security strategy. The produce included citrus, mangoes, tomatoes, potatoes, celery, lettuce, peppers, cucumbers, melons, and fodder crops. The major vegetable crops supplying nearly all the UAE's needs during the season are eggplant, tomatoes, cabbage, cauliflower, and squash. There are millions of date palms in the UAE and the country is responsible for 6% of the world's date production. Besides dates, the major fruit crops are mangoes and citrus [10].

Over the years, both federal and emirate governments provide incentives to farmers, in efforts to increase production. The government of the UAE is prioritizing the production of fruits and vegetables. It is investing in the agricultural sector to increase self-sufficiency. For example, the government offers a 50 percent subsidies on fertilizers, seeds, and pesticides, and also provides loans for machinery and technical assistance. The government has also offered support for start-ups to launch their business.

Ministry of Climate Change and Environment (MoCCaE) has a search engine which indicates the nations approved to import live animals from. The ministry has put a priority on increasing the use of hydroponic technology among farmers, which relies on nutrient-rich water to grow plants with the use of little or no soil. Abu Dhabi Agriculture & Food Safety Authority is the local authority in charge of agriculture, food safety, food security, and biosecurity in the Emirate of Abu Dhabi [11].

In December 2013, the Agricultural Investment Fund was launched to support and finance the use of modern farming techniques, including hydroponics in greenhouses. The aim of the Fund, which will spend about Dh20 million per year until 2017, is to achieve sustainability and food security. It also aims to encourage farmers to introduce modern agricultural techniques [12].

BENEFITS

The nation aims to practice sustainable agriculture to improve the efficiency of its farms, in line with the UN Sustainable Development Goals. Food that is certified to be organic will bear a logo letting consumers easily distinguish them. Dubai's rebounding tourist sector may enhance demand for food goods, supporting both domestic production and cereal imports. Other benefits of UAE agriculture include the following [11,13].

- *Climate-Smart Agriculture:* UAE promotes climate-smart agriculture and the food production, in line with the global trends. The objective of climate-smart agriculture is to increase productivity and economic return from farming, while adapting to climate change and reducing greenhouse gas emissions.
- *Sustainable Agriculture:* The UAE is developing sustainable and integrated food security systems that employ latest technologies to innovate solutions to the challenges of securing food sources. Some of the practices under sustainable agriculture include vertical farming, hydroponics, organic farming, and controlled environment agriculture. The government is working on an ambitious plan to achieve agricultural sustainability.
- *Organic Farming:* In a time of rising population and climate change, organic farming has been hailed as an answer to yield healthier produce. Organic farming practices have been adopted as part of sustainable agriculture in the UAE. Farmers in Abu Dhabi have already been encouraged to shift towards organic farming and 75 farms have made the transition. There are currently more than 50 organic vegetable farms in the UAE. Established in 2016, Emirates BioFarm (EBF) is the largest organic farm in the UAE. EBF communicates their message of

sustainability and educates the public about the impact of agricultural practices and dietary choices on the environment. An organic farm in UAE is shown in Figure 5 [14].

- *Vertical Farming*: This farming method is a revolutionary approach to agriculture that allows crops to be grown in vertically stacked layers. In vertical farming, products are free of pesticides and herbicides, with year-round consistent production with environmentally sustainable methodologies. The Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) is investigating the viability of various smart farming techniques, including vertical farms that can produce five to 10 times the yields of traditional agriculture, and drip irrigation techniques to improve water efficiency. A typical vertical farming in UAE is shown in Figure 6 [15].
- *Agricultural Tour*: There has been a substantial budgetary allocation for tourism. On agriculture tour of Emirates, one will meet the newest techniques and the love of the camel milk and the date. One will experience large market for organic fruits and vegetables.
- *Hydroponics*: Hydroponics technology, which relies on nutrient-rich and less-quantity water to grow plants with the use of little or no soil, is emerging in the nation. Hydroponics in greenhouses is considered an economical alternative to traditional crops in open fields to grow crops of economic value and good qualities as it produces the largest quantity and with a better quality in less space and better economically feasible character for most crops.
- *Women Farmers*: Unlike modern-day gender-neutral professionals like doctors, engineers, or journalists, farmers are still considered predominantly male. The UAE was among the first Arab countries to recognize the role of women in several sectors, specifically the agriculture sector. Defying gender stereotypes and enabled by technology and innovation, a growing band of women are consciously cultivating sustainability on the agri-scape. Building women's capabilities is a key driver to stand up to climate change, ensure food security and, overall, improve countries' economy [16]. Figure 7 shows some female farmers in UAE [17].

CHALLENGES

The climate is hot and humid along the coast. Because of the desert climate, vegetation is scanty and largely limited to the low shrubs that offer forage to nomadic herds. Other challenges of UAE agriculture include the following [18]:

- *Food Security*: This has become an issue for the UAE. With the population of the UAE approaching 10 million, increasing local food production is proving to be quite challenging for the country's development narrative, especially when agriculture accounts for only 3 per cent of the GDP. The country considers food security to be essential to the security and well-being of its citizens and residents. In 2018, the United Arab Emirates launched its National Food Security Policy to increase production by 30-40% in 10 years. In June 2022, the Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) launched a program to establish a gene bank that will help provide innovative solutions to future food security challenges and enhance the food security system of the UAE.
- *Water Usage*: Although two-third of the earth is covered by water, the human generation is now thinking about drinking water shortage in future. Former UN Secretary-General Kofi Annan said, "Access to safe water is a basic human need, and therefore a fundamental human right." The UAE has no perennial streams nor any regularly occurring bodies of surface water. Huge efforts were made to preserve water resources, with emphasis on promoting the adoption and installation of modern irrigation systems to replace flood irrigation method, which wastes large amounts of water. Hydroponics is emerging in the country since the process requires less

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quantity of water and no land or soil. By integrating the way farms operate in Abu Dhabi, the Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) hopes to improve water usage in the emirate and reduce reliance on its finite supply of groundwater. Recently, agriculture in the UAE has made a shift towards modern irrigation systems to replace the traditional flood irrigation, to reduce water consumption.

- *Climate Change:* Climate change continues to impact longstanding agricultural practices in every country and a strong global commitment is necessary to face the challenges of climate change head-on. Global warming is expected to lead to less rainfall, fiercer droughts, higher sea levels and more storms in the UAE over the next 70 years. It is no surprise that the Middle East became an early epicentre for the concentration of climate-related risks. Climate change poses a complex threat to UAE in the long-term and will likely impact food production. Notwithstanding the climatic challenges, technology enables one to grow anything anywhere.

CONCLUSION

Local farming is now an integral part of the UAE's future vision. As a result, there is a huge growth in farms adapting all kind of farming methods: vertical, horizontal, greenhouses alongside aquaculture and hydroponics. UAE is striving to achieve and sustain the highest levels of national food security. This is causing a transformation across the nation's agricultural sector. In recent years, the United Arab Emirates has taken steps to become more self-sufficient in their food supplies, limiting its dependence on imports. Since 2015, capacity development work has involved the advanced training of 2,037 male and 70 female students through short-term group training. The UAE will need to improve its agricultural productivity in the coming decades to meet food demand by the growing population. More information about agriculture in UAE can be found in the books in [19-22].

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ABOUT THE AUTHORS

Matthew N.O. Sadiku is a professor emeritus in the Department of Electrical and Computer Engineering at Prairie View A&M University, Prairie View, Texas. He is the author of several books and papers. His areas of research interest include computational electromagnetics, computer networks, and marriage counseling. He is a life fellow of IEEE.

Uwakwe C. Chukwu is an associate professor in the Department of Industrial & Electrical Engineering Technology of South Carolina State University. He has published several books and papers. His research interests are power systems, smart grid, V2G, energy scavenging, renewable energies, and microgrids.

Janet O. Sadiku holds bachelor degree in Nursing Science in 1980 at the University of Ife, now known as Obafemi Awolowo University, Nigeria and Master's degree from Juliana King University, Houston, TX in December 2022. She has worked as a nurse, educator, and church minister in Nigeria, United Kingdom, Canada, and United States. She is a co-author of some papers and books.



Figure 1 The map of UAE [1].



Figure 2 The expansive cityscape of Dubai [3].



Figure 3 Date palm in UAE [6].



Figure 4 A grand mosque in Abu Dhabi [7].



Figure 5 An organic farm in UAE [14].



Figure 6 A typical vertical farming in UAE [15].



Figure 7 Some female farmers in UAE [17].