Project Brief

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ICBA
AGRICULTURE FOR TOMORROW

Developing National Policy to Utilize Treated Sewage Effluent and Biosolids in Controlled Environment Agriculture in United Arab Emirates

Completed

Duration

December 2021 - December 2022

Beneficiaries

UAE's residents and citizens

Objectives

Through the development and application of the UAE's national policy on the utilization of treated sewage effluent (TSE) and biosolids in controlled environment agriculture (CEA), the project will:

- enhance the safe usage of treated wastewater in agricultural and food production in CEA;
- minimize the risks of treated wastewater use to public health and the environment;
- maximize the economic benefits of treated wastewater usage in food production in CEA

SDGs

Countries

UAE

Funders

Ministry of Presidential Affairs through the Ministry of Climate Change and Environment, United Arab Emirates

Funding

100,000 USD

Controlled environment agriculture remains a viable option for crop production under local conditions in the UAE.

Background

Ensuring **food, water, and energy security** is among the top national strategic priorities for the Government of the UAE. UAE's economic and political stability, and its geographic location with high accessibility to trade centers and markets have created a stable environment for food security. However, the country faces significant challenges with food production, which is an integral part of food security and is constrained in arid countries such as the UAE by freshwater scarcity. This necessitates the development of solutions that can increase production despite harsh environmental conditions.

Controlled environment agriculture (CEA) has emerged as a viable option for crop production in the UAE. It involves creating artificial conditions within a protected area to provide the optimal environment to grow plants. This type of agriculture could potentially become a key solution to food security in the UAE and countries with similar agroclimatic conditions. However, large-scale adoption of CEA demands solutions that can reduce energy and water use to ensure the cost efficiency of this sector.

Treated sewage effluent (TSE) is proven to be a reliable water supply source particularly in countries facing water scarcity. TSE is a renewable and growing source of water, **with 735 million cubic meters produced annually in the UAE,** of which about 544 million cubic meters are used mainly for landscaping and greening in the main cities, while the remainder is lost by discharge to the sea or desert (Federal Competitiveness and Statistics Authority, 2019). The TSE supply can help bridge the gap of freshwater supply and reduce the use of fertilizers as it is rich in nutrients that are needed for plant growth. As such, the use of TSE in CEA could potentially increase agricultural productivity and economic return for farmers while reducing environmental pollution.

The use of treated sewage effluent for controlled environment agriculture has potential for increasing agricultural productivity and economic return for farmers.

Treated sewage effluent (TSE) is a proven alternative to fresh water, especially in countries facing water scarcity.

Activities

The project team conducted a review and documentation of the **state-of-the-art technologies** applied for TSE use in agriculture and especially in CEA systems. It analyzed individual aspects of advanced technologies of TSE and highlighted the crucial parameters that are expected to shift TSE use in CEA into a sustainable innovative concept. Thereafter, TSE technology in CEA systems was tested at ICBA. The project team conducted a crop yield analysis and studied the impact of TSE use on crops in CEA. Considering the types of crops, the type of CEA and wastewater technologies, analysis explored cost-effective and appropriate technologies and viable crop types under the CEA conditions, with the aim to identify and recommend incentives to enhance TSE use and profitability in CEA. Through field surveys, the team evaluated the willingness and social perceptions (concerns/doubts) expressed by the public about using TSE in food production, particularly in CEA systems, and highlighted the need for capacity development of farmers and extension workers in the UAE.

Finally, a review of federal and emirate-level standards and guidelines for safe use of TSE and biosolids in agricultural and food production in CEA was conducted. The results of evaluating technologies for using TSE in CEA and the trials and surveys were used to recommend policies needed to expand the use of TSE in CEA.

Outcomes

The project developed a policy document on the utilization of TSE and biosolids in CEA in order to enhance food and nutrition security in the UAE. The economic component of the study provided a comprehensive economic analysis of treated wastewater reuse in agriculture with a particular focus on CEA. The expected impacts of the project are:

- Improved food and nutrition security in the UAE and marginal regions in the long term;
- Improved farmer livelihoods because of economic benefits of using TSE;
- Increased healthy and safe food production by using consolidated standards and guidelines specifically for use of TSE in CEA;
- Reduced pollution risk to the environment.

Future Directions

The project assessed the use of TSE as an alternative water resource in CEA in the UAE. The study resulted in a policy document that presented an optimal and safe use of TSE in CEA as well as an economic analysis to determine the benefits to farmers.

ICBA is committed to working with decision-makers and other stakeholders to advise on the implementation of the roadmap activities listed in the policy document.

ICBA is willing to further support the Government of the UAE in achieving food and nutrition security in the country by testing and promoting innovative technologies that are both environmentally sustainable and profitable for local farmers.

About ICBA

The International Center for Biosaline Agriculture (ICBA) is a unique applied agricultural research center in the world with a focus on marginal areas where an estimated 1.7 billion people live. It identifies, tests and introduces resource-efficient, climate-smart crops and technologies that are best suited to different regions affected by salinity, water scarcity and drought. Through its work, ICBA helps to improve food security and livelihoods for some of the poorest rural communities around the world.