

Reclamation of Degraded Agricultural Lands in the United Arab Emirates



Periodic salinity monitoring and management in agricultural farms is necessary for optimum crop production.

Thematic Area: Assessment of Natural Resources in Marginal Environments

Purpose: Survey agricultural farms and diagnose salinity problems to improve farm capacity for crop production

Geographic Scope: Abu Dhabi Emirate

Timeline: 2013 - 2014

Funding/Partner Agency: Abu Dhabi Food Control Authority (ADFCA)

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Marginal and saline environments such as the United Arab Emirates (UAE) suffer from poor vegetative cover; strong wind; dry, non-cohesive sandy soils; and hyper-arid conditions. Consequently, precious farmland in Abu Dhabi emirate has become subjected to various land degradation stresses caused by wind erosion, salinization, waterlogging and contamination. This is forcing farmers to leave their farms. Of the 24,394 farms in Abu Dhabi emirate, around 8,000 have been abandoned or are nearly abandoned. An intervention is called for to rehabilitate and reclaim lost farmland in the emirate.

To improve the agricultural production of these farms, it is essential to generate scientific information to understand the salinity development processes, establish the cause-effect relationship and develop appropriate methods of constraint/stress alleviation, soil restoration and quality enhancement. Hence the International Center for Biosaline Agriculture (ICBA) in partnership with the Abu Dhabi Food Control Authority (ADFCA) launched in 2013 "Reclamation of Degraded Agricultural Lands through Integrated Approach to Enhance Resource Capacity" project that aims to assess soil and water salinity problems in the emirate of Abu Dhabi in order to improve farm capacity for crop production.

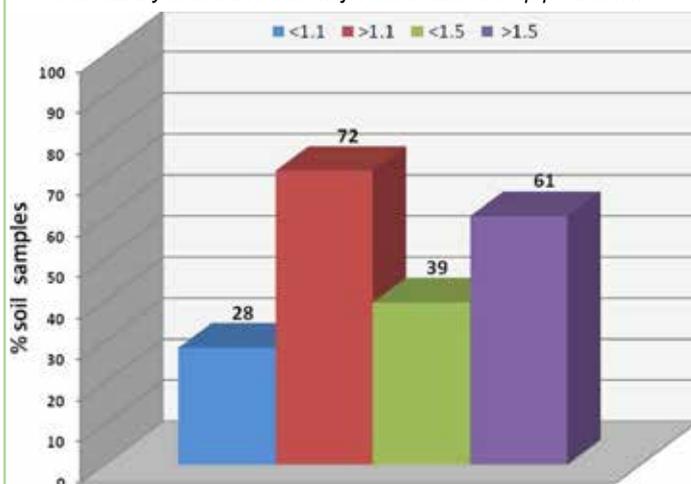
Activities and Outcomes

In order for farmers to be able to improve their agricultural production, they need to be able to assess farm salinity prior to crop selection. Then, based on salinity level, they can reduce salinity content through leaching. Where possible, it is advisable to adopt appropriate tillage practices (soil bed preparation, mulching) to avoid salinity buildup in the root zone. When good and marginal quality waters are available, the marginal quality of water can be improved by blending both waters in certain ratios depending on the water salinity target.

Another option is cyclic use, that is, to use good quality water at germination and at the initial growing stage and switch to marginal quality water when the plant is strong enough to tolerate salinity. Regular monitoring of root zone salinity is desired to assure ECe threshold level of crop does not increase.

Through the proper characterization of farms, better soil management is possible. The project surveyed 181 agriculture farms in the Abu Dhabi emirate to diagnose the specific salinity

Soil salinity is observed as major constraint to crop production



The ECe/ECw (>1.1 & >1.5) scenarios indicate poor salinity management in 72% and 61% farms respectively.

problem and develop a management plan to enhance farm capacity for crop production.

Soil samples were collected from the root zone and analyzed for salinity of the soil saturation extract (ECe), and pH of soil saturated paste (pHs). Of the 188 samples, 157 (84%) samples were diagnosed as saline (ECe > 4 dS m⁻¹), distributed into different classes, 19.7% as slightly saline (ECe 4-8 dS m⁻¹), 28.2% as moderately saline (ECe 8-16 dS m⁻¹), and 36% as strongly saline (ECe >16 dS m⁻¹).

A total of 165 water samples were also collected from the water wells from the respective farms to determine the salinity and sodicity levels. Results showed that over 70% of water samples fall under the highly saline category which is probably the cause behind this trend of land abandonment.

Soil salinity management in the farms was assessed using two scenarios; scenario 1 (ECe/ECw >1.1), scenario 2 (ECe/ECw >1.5), where ECe is EC of soil saturation extract and ECw is EC of irrigation water. The assessment shows over 72% and 61% farms have poorly managed root zone salinity based on scenario 1 and 2 respectively. If left unchecked, it can cause significant decrease in crop yield.

Therefore immediate actions are required to handle salinity issues to avoid further abandonment of agricultural farms.

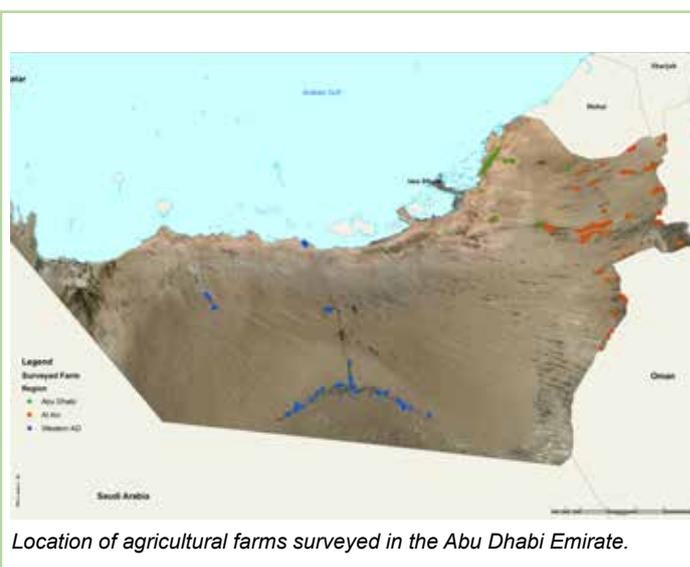
In the end, 10 farms (5 in Al Ain and 5 in Abu Dhabi) were identified and proposed to Abu Dhabi Food Control Authority. ADFCA is negotiating with Abu Dhabi Farmer's Services Centre (ADFSC) to select the two farms where reclamation plans will be implemented. ICBA will provide ADFCA with technical support to implement the reclamation plan.

Future Directions

One farm of those identified in each region will be selected, representing the larger farming area in Abu Dhabi emirate for the implementation of an integrated reclamation plan (physical, chemical, biological, hydrological) to improve farm capacity for sustainable crop production.

“The world is losing 2,000 hectares of farm soil daily due to salinity. This requires urgent attention to feed a steadily increasing population”

Based on the alarming situation of farm salinity, it is recommended that the government should take action to introduce pilot scale mobile laboratories in different agricultural regions to allow farmers easy access where they can analyze soil and water samples at least for salinity status. It is also recommended to conduct salinity assessment at the national scale and select benchmark sites for long term salinity monitoring. The Environment Agency - Abu Dhabi (EAD) has taken the initiative (of which ICBA will serve on the technical committee) in this regard and will be implementing groundwater well inventory and salinity mapping of all agricultural farms in the emirate. This will provide baseline information and help to design a national strategy to combat salinity in the UAE.



Location of agricultural farms surveyed in the Abu Dhabi Emirate.