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AGRICULTURE FOR TOMORROW

ICBA Newsletter | Vol 15 | Issue 02 | August 2014
www.biosaline.org

Innovations for sustainability and food security in arid and semiarid lands

10-12 September, 2014
Samarkand
Uzbekistan

2nd International Conference on Arid Land Studies (ICAL2)

The second International Conference on Arid Land Studies (ICAL2) will be held from September 10-12, 2014 in Samarkand, Uzbekistan. This conference builds on the outcomes from International Forum on Desert Technology X and First International Conference on Arid Land Studies (ICAL1), sponsored by the Japanese Association for Arid Land Studies (JAALS).

The Ministry of Higher and Secondary Education of the Republic of Uzbekistan and Ministry of Agriculture and Water Resources of the Republic of Uzbekistan and Ecological Movement of Uzbekistan are collaborating with the International Center for Biosaline Agriculture (ICBA) in organizing ICAL2 on "Innovations for Sustainability and Food Security in Arid and Semiarid Lands".

Detailed information about the conference program, templates for abstracts/manuscripts/posters, and announcements of organizing committee are on the web-page:

www.cac-program.org/events/ical

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Word from ICBA Director General

Within the spirit of continuing the implementation of ICBA strategy 2013-2023 it is very important for ICBA to secure a stable funding base and expand its program of research-for-development. We are very proud that both the Government of the UAE and the Islamic Development Bank (IDB) – our two major core donors – have recommitted their support to ICBA for the next five years. This will enable us to continue implementing the Strategy and delivering on our Mission. We highly value our strategic partnership with IDB and the Government of the UAE through the Ministry of Water and Environment and the Environment Agency – Abu Dhabi.

In our endeavor to be a partner of choice, ICBA continues to develop its capabilities striving to meet best international standards to support our partnership driven initiatives. One such endeavor is the implementation of a new financial and administrative system that will improve on the monitoring and reporting of ICBA's performance.

ICBA continues to develop projects with new and existing partners, targeting a variety of donors. Our ambition is to be part of the solution to poverty and yield-gap in Africa, namely in marginal environments. To that end we are initiating discussion with different partners that have long lasting experience in Africa and are initiating specific actions in East and West Africa.

ICBA Board of Directors for 2014-2017 has enriched with new members coming from Regional and International Organizations. This injection of expertise and skills to the ICBA Board of Directors includes internationally renowned scientists and leaders in areas of agriculture, finance and international development. This rich mix of knowledge within the Board of Directors will help ICBA strengthen its management, programming, and international presence.

I wish you an enjoyable reading through the rest of this issue of Biosalinty News.

Sincerely yours,

Ismahane Elouafi

Cover page image: IDB and the UAE Government renew ICBA support agreement Photo credits: IDB

In this issue...

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Success story for crop's salinity tolerance: unraveling the molecular mechanisms

Barley experiment at ICBA greenhouse

High soil salinity results in crop decline and constitutes a major constraint for agriculture, particularly affecting arid and semi-arid areas (James et al., 2012). Irrigation, when not well practiced leaves soils with high salinity. In addition, intrusion of seawater into coastal fresh water reservoirs, and erratic weather patterns, which seem to increase and which add drought years, compound the effects of increasing soil salinity. The problem of plants cultivated in soils with high salinity is the concentration of toxic ions in the root zone, which affects water uptake and transpiration causing ionic and electric imbalances, less growth, delayed development, and may lead to senescence and plant death. The abundance of sodium ions is the most deleterious as it is toxic in the cytosol and competes with potassium ions which are essential for plant's functioning and are compatible with protein structure, even at high concentration.

Plant tolerance to salinity constraint involves complex and integrated responses, at the cell, metabolic, and even anatomic levels; the relative contribution of which is dependent on the specific species. However, for every species, it involves the ability of the plant to maintain efficient root potassium (K^+) uptake in presence of high sodium (Na^+) concentrations, and to balance the net Na^+ uptake by the roots and its translocation and accumulation in leaves, since young leaves and photosynthetic tissues are very sensitive to salt stress (Munns and Tester, 2008; Benderradji et al., 2011).

For screening barley core collection for salinity tolerance, 10 barley lines (5 tolerant and 5 sensitive) were selected to carry out characterization of the stress response by measuring several physiological and molecular parameters. The experiment was conducted at ICBA and designed to study the plant growth in hydroponics system (1/2 strength of Hoagland's solution) under greenhouse conditions with three replicates for each treatment. Salt treatments (0, 7, and 15 dS/m) were applied at the 3 leaf stage and were maintained till the end of the plant cycle. Leaf, leaf sheath, and root samples were harvested after one week of exposure to salt stress from the hydroponically cultured barley plants for Na^+ and K^+ analysis and for RNA (ribonucleic acid) extraction.

Results obtained for Na^+ and K^+ analysis using the Inductive Coupled Plasma (ICP) emission spectrometry procedure reflected the retained Na^+ at the leaf sheath compartment for the tolerant lines of barley, while the sensitive ones leaked Na^+ to the

Figure 1: *Effect of salt stress on plant growth on hydroponic culture under greenhouse conditions. The sensitive barely line shows biomass reduction, chlorosis and senescence due to sodium accumulation in leaf tissues.*

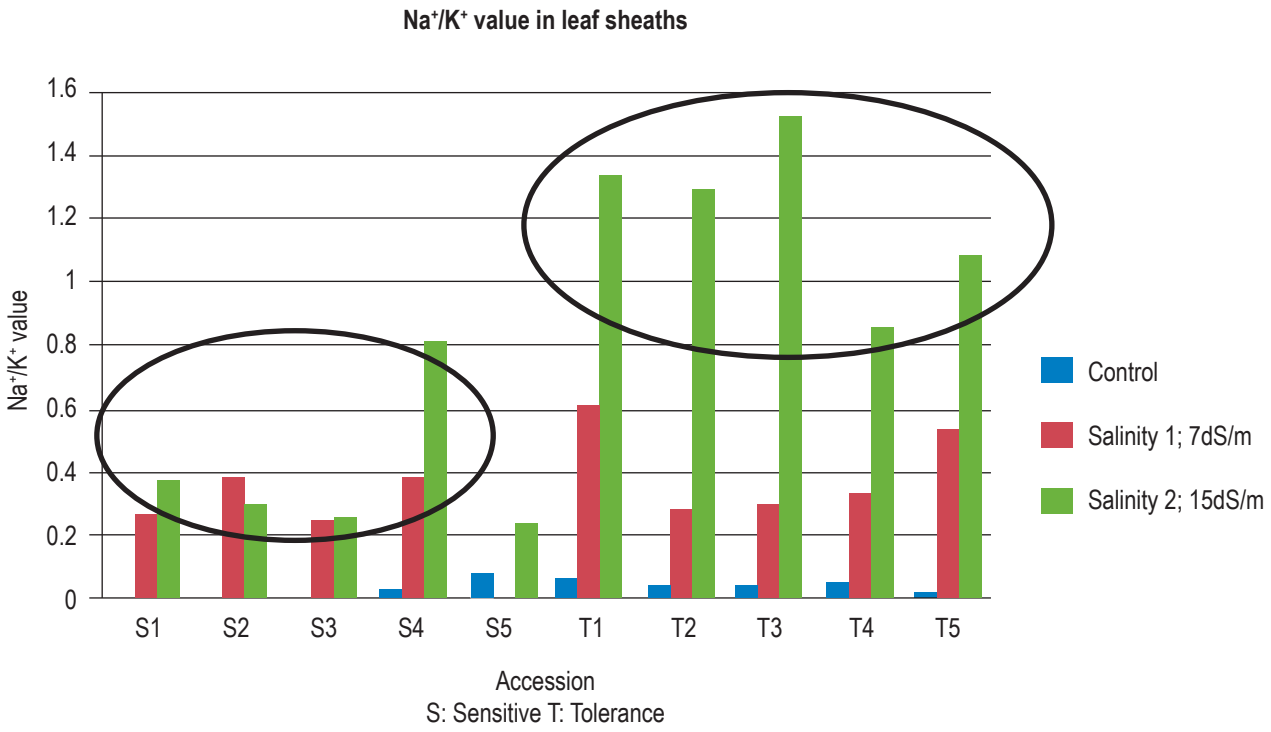

Figure 2: *Sodium and potassium accumulation in leaf sheaths of the tolerant and sensitive barley lines. The tolerant lines retained and accumulated more sodium than the sensitive ones.*

upper shoots showing symptoms of toxicity and senescence (Figure 1). Roots from sensitive and tolerant barley lines retained and accumulated Na^+ to a similar concentration, indicating no difference in the uptake of Na^+ from the nutritive solution. Accumulation of Na^+ were noticed in the tolerant lines irrigated with 15 dS/m, while the sensitive lines exhibited severe reduction of biomass, and leaves showed chlorosis and senescence, and therefore accumulated less Na^+ due to damage of the photosynthetic tissues. In leaf sheaths, the tolerant barley lines retained and accumulated more Na^+ than the sensitive ones when the plants were watered with high salinity (15 dS/m). The sensitive lines didn't retain Na^+ and leaked Na^+ to the upper shoots (Figure 2).

It is hypothesized that Na^+ accumulation in leaf sheaths identified in durum wheat is an efficient way to protect cells from Na^+ injury and plays a crucial role in plant tolerance to salinity (Munns et al., 2012). To confirm the same hypothesis in barley, we studied the expression pattern of one candidate gene associated with Quantitative Trait Loci (QTL *Nax2*), controlling the unloading of Na^+ to the xylem and in the control of root-to-shoot Na^+ transfer. High expression level of a salt tolerant gene HKT1;5 was observed in leaf sheaths of the tolerant varieties, while moderate expression was observed in sensitive varieties and the control non stressed variety. These preliminary results suggest that HKT1;5 gene might be involved in Na^+/K^+ transport through the plasma membrane in the leaf sheath with a more active role in the tolerant varieties.

The next step is to clone the favorable allele of HKT1;5 gene with its native promoter from the tolerant barley variety and initiate genetic engineering to over-express this gene in salt sensitive barley variety and demonstrate its role in producing good yield in salt affected environment.

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Salicornia bigelovii: a promising halophytic species for salinized coastal regions

Globally, soil salinity constitutes a growing problem that contributes to land degradation with approximately 7% of the earth's land surface having salt-affected soils. The process of increasing the concentration of total dissolved salts in soil and water is known as salinization. It can be caused either by natural processes such as mineral weathering and gradual seawater intrusion or by artificial processes such as irrigation. On a global scale, it has been estimated that every minute 3 ha of currently arable land becomes unproductive due to salinization. It has been quantified that about 100 mha of land have become saline due to poor irrigation management which equals to approximately 11% of irrigated areas worldwide. Soil salinization has severely affected the agricultural production in over half of the world's countries. Countries which are characterized by disproportionately high areas of saline land are Australia, Pakistan, Bangladesh, Thailand, and several countries in Central Asia. Many projects have been implemented in these countries for the rehabilitation of saline and degraded lands. Cultivation of these lands could contribute to the increase in food production to feed a growing world population, which is expected to reach 9.1 billion people by 2050 and hence global food production will need to increase by up to 70% by this time to match this growth. Scientific or technical advances that allow crop growth in saline soils could contribute to the urgently increasing food needs.

Biosaline agriculture is an effective method of reducing the impact of salinity in salt-affected lands. Glycophytes (salt-sensitive) are the majority of crops used in modern agriculture and cannot withstand salinity even at low concentrations. Breeding for salt-tolerant crops is the conventional method for developing salt resistant varieties. However, breeding traditional crops for salinity tolerance is a time-consuming, labor intensive and complicated process at plant and cellular level. Halophytes, on the other hand, constitute of plants that thrive when

Screening S. bigelovii *genotypes at ICBA research station in Dubai*

grown in hostile saline conditions, where other traditional crops cannot survive. The use of halophytes for biosaline agriculture is a promising solution, since the plants already possess the most important and difficult trait of salt tolerance, through different mechanisms. However, wild halophytes need to be domesticated and improved, so that they can be converted into viable and high yielding crops.

Salicornia bigelovii (dwarf glasswort) is a halophyte that belongs to the family Chenopodiaceae, a well-known family for its salt-tolerant species. Dwarf glasswort is an annual leafless, fast-growing, succulent halophyte with increasing scientific and social recognition as a crop due to its high salt-tolerance and multiple uses. The leaf tips of the halophyte can be consumed by human either fresh or as pickled vegetable. The fresh (green) biomass can also be used in mixture with other forages for livestock feed. *S. bigelovii* seeds have high concentrations of good quality oil (≈30%) and low salt content (<3%), characteristics that make it promising as an oilseed halophytic crop especially for biofuel purposes. Seedcake can also be used as animal feed due to its high protein contents (≈45%). *S. bigelovii* has also been proposed as a halophytic species of good commercial value for integrated aqua-agriculture systems (IAAS), since it can be grown with aquaculture effluents that serve as a source of nutrients and water for irrigation.

The International Centre for Biosaline Agriculture (ICBA) has been conducting experiments on *S. bigelovii* for the last three years at ICBA research station in Dubai, in collaborative projects with King Abdullah University of Science and Technology (KAUST), Saudi Arabia and Masdar Institute (MI) of Science & Technology, Abu Dhabi. The projects have been targeted to assess the adaptability of dwarf glasswort in United Arab Emirates (UAE) conditions and to optimize the management practices for its cultivation, trying to explore its economic potential to be grown as oilseed, fodder or vegetable crop. More than 45 different *S. bigelovii* genotypes have been screened for a large set of growth parameters under groundwater (≈20 dS/m) and seawater (≈55 dS/m) irrigation treatment.

Preliminary results indicate the potential of growing Salicornia under the conditions in Gulf Cooperation Council countries and particularly in the UAE, both for biomass and seed production. These halophytic populations constitute a valuable plant genetic material to be tested further for potential breeding programs. The next step is to move from small scale research screening to commercial/semi-commercial scale production trials that ICBA plans. Testing different irrigation systems can provide information on the irrigation

Photo credits: Mohammed Shahid, ICBA

Salicornia bigelovii *grown in ICBA research station using high salinity water*

efficiency for the crop. The ultimate aim would be to select salt-tolerant genotypes with desirable morphological and phenological traits adapted to UAE conditions, for seawater irrigation farming. Given the proper *S. bigelovii* germplasm, in combination with suitable agronomic practices, it seems that such halophytic plantations could be economically viable for biofuel, particularly aviation, as well as for biomass both as vegetable and residual fodder for livestock.

Selected Publications

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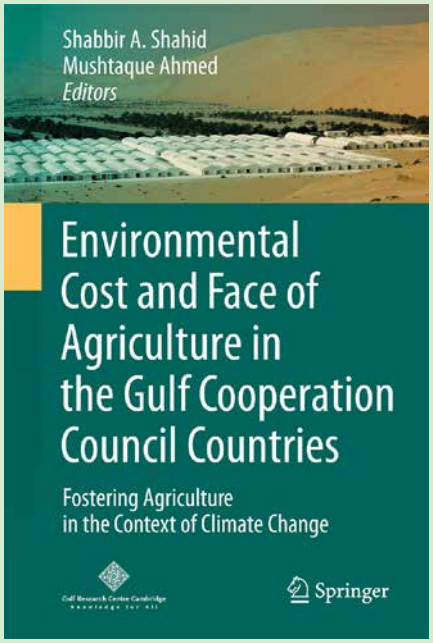
Environmental cost and face of agriculture in the GCC countries - fostering agriculture in the context of climate change

New Publication

The recent release of the book "Environmental cost and face of agriculture in the Gulf Cooperation Council (GCC) countries - fostering agriculture in the context of climate change" edited by Shabbir A Shahid and Mushtaque Ahmed relates how the 2008 global food crisis and the sudden increase in commodity prices brought the issues of food security and sustainability of food production to the forefront in the Gulf region.

The book arises from a meeting held in July 2012 hosted by the Gulf Research Center in Cambridge. ICBA together with Sultan Qaboos University in Oman held an Agriculture Workshop at the meeting, which attracted participants from Australia, Bahrain, India, Kuwait, Oman, Saudi Arabia, Turkey, UAE, UK, and Morocco. This volume is the result of the workshop and covers topics such as, prospects of agriculture in a changing climate, potential of climate smart agriculture, protected agriculture, intensification of local agriculture production, food security, improved water use efficiency, challenges in using treated wastewater, investment in foreign agriculture, and agricultural research and development. The recommendations of the workshop have set the scene for future agriculture opportunities in the GCC countries to sustain food and nutritional security.



The vital role of earth observation satellites for monitoring water resources and agriculture in the MENA region

Determining changes in water resources, especially those beneath the ground is difficult and results in decision-making based on limited evidence. Earth observation satellites can help with in some areas of natural resource management as they are designed to observe different parts of the land surface, atmosphere, biosphere, and oceans of the globe. One of satellite observation mission that could prove really helpful in managing water resources is the Gravity Recovery and Climate Experiment (GRACE) system. This satellite based sensing system measures orbital variations caused by changes in Earth's gravity field, which are directly related to changes in terrestrial water storage (TWS) in vertical columns, integrated from the earth's surface down through the base of the water table. GRACE provides data on TWS anomalies that are not available to hydrologists by any other practical mean. It gives hydrologists the ability to close the terrestrial water storage budget by providing a quantitative estimate of the total integrated water mass variations over time and over large-scale hydrological and hydro-geological applications at spatial resolutions of at least 150,000 km^2 with a precision approaching 1.5 cm of water equivalent thickness.

While most satellite remote sensing missions use radars or radiometers to measure various wavelengths of light which are reflected or emitted from Earth, GRACE does not look down. Instead, water storage changes are achieved by using a microwave ranging system that continuously measures changes in distance between the twin satellites in the polar orbit at 500 km altitude spaced at approximately 220 km. The satellite orientation is measured using twin

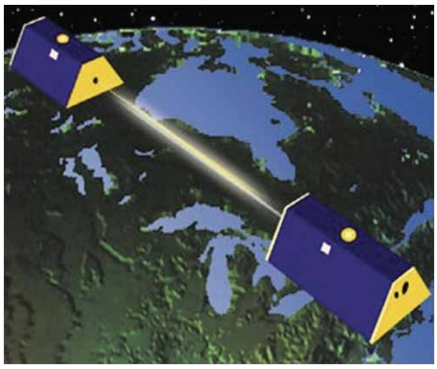


Figure 1 *The GRACE satellite system which measures distance between twin satellites with changes attributed to variations in different gravitational pull on them (source www.NASA.gov)*

star cameras and position reading derived from a GPS receiver (see Figure 1). The spatial and temporal variations in the earth's gravity field affect the orbits of the twin satellites. These differences are observed as changes in the distance between the two spacecrafts reflecting in the time-of-flight of the microwave signals transmitted and received between the two spacecrafts. The changes in time of flights are continuously measured by tracking the phase of the microwave signals that are ingested into a massive regression equation to churn out monthly level-2 gravity field solutions. The effects of atmospheric and oceanic circulations are removed using numerical model analyses. The level-2 products can be converted to water mass anomalies (deviations from the series mean) using averaging kernels which have been defined for the regions of interest.

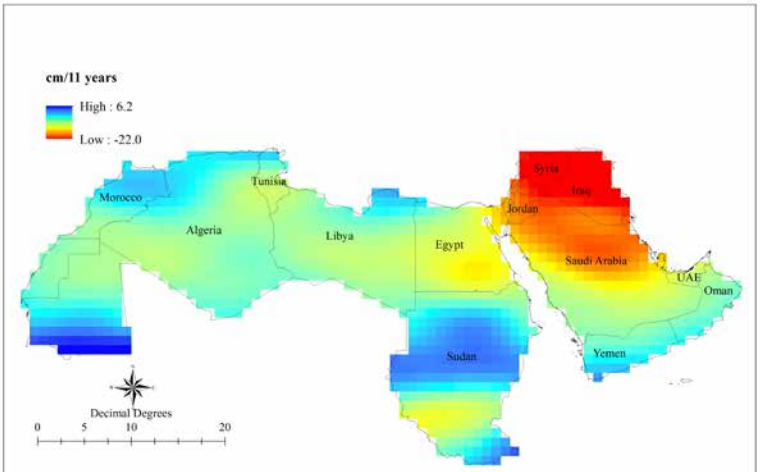


Figure 2 *Map of terrestrial water storage change over the MENA region (2003-2014)*

Results for the MENA region give important insight. GRACE terrestrial water storage anomalies were calculated and applied over the MENA region from January 2003 to January 2014. Variations relative to average values were then plotted and mapped (See Figures 2 and 3). Linear trend shows a decline in water storage at an average rate of -2.57 cm year^{-1}. Whilst this does not sound much especially when compared to individual well measurements, this value refers to the average over a very large area which highlights of how much water has been lost. There were some positive trends as the map shows, in Mauritania, Morocco and Sudan. The highest declines derived from the GRACE imagery are in the Levant, Egypt, Saudi Arabia, and across the confined aquifers in North Africa. The average total water storage changes per year for the study period are -0.59 cm, -1.94 cm, and -0.04 cm in the Arab Peninsula, Levant, and North Africa, respectively (Figure 4) that are equivalent to 207.8 km^3, 160.1 km^3, and 39.3 km^3 during the study period. These volumetric values are huge and represent in many cases major depletion of non-renewable resources to predict water scarcity problems in the region.

Another area of related remote sensing activity at ICBA has focused on deriving up-to-date values for irrigation in the MENA region, as this is an important factor affecting the water balance in the region. Few countries in the region have up-to-date assessments of their areas under irrigation and so water use. Accurate geospatial information on the extent of irrigated land is required to improve our understanding of agricultural water use, local land surface processes, conservation or depletion of water resources, and components of the hydrologic budget. A new MENA irrigation map has been developed to identify irrigated agriculture at 250 m using MODIS (Moderate Resolution Imaging Spectroradiometer) datasets. MODIS is considered a key instrument aboard the Terra and Aqua satellites viewing the entire Earth surface every 1 to 2 days, acquiring data in 36 spectral bands. With these, two

bands are imaged at a nominal resolution of 250 m at nadir, with five bands at 500 m, and the remaining 29 bands at 1 km.

The global MODIS Normalized Difference Vegetation Index (MOD13Q1) is designed to provide consistent temporal and spatial vegetation conditions. It is provided every 16 days as a gridded level-3 product in Sinusoidal projection. Data acquired in 2012 have been obtained from the Land Processes Distributed Active Archive Center (LP DAAC) covering the 32 tiles extending over the whole MENA region. Seven hundred and thirty six 16-day composite period images are downloaded and stacked using a specialist form of computer library commands to create a 23-band multi-temporal image. Training sites are delineated using Google Earth and medium resolution Landsat images, and categorized into irrigated and non-irrigated sites. Image classification is performed using the Support Vector Machine where classified tiles are then arranged in mosaic form as shown in Figure 3.

The new irrigation map has many uses including updating policy makers on irrigation extents in the region and in their countries. It is also a vital input to any subsequent water and crop modeling. This helps modelers derive more accurate representations of water use and so the resource balances in any area. It is also important input to climate adaptation planning as irrigation, crop possibilities and future water availability can be modeled with this information.

The ultimate aim is that ICBA becomes a knowledge hub to provide data and analysis of climate change, availability of water, and agriculture, using the tools developed through the Modeling and Monitoring Agriculture and Water Resources Development Pogram in ICBA.

Written and submitted by Adla Khalaf

ICBA, Dubai, UAE

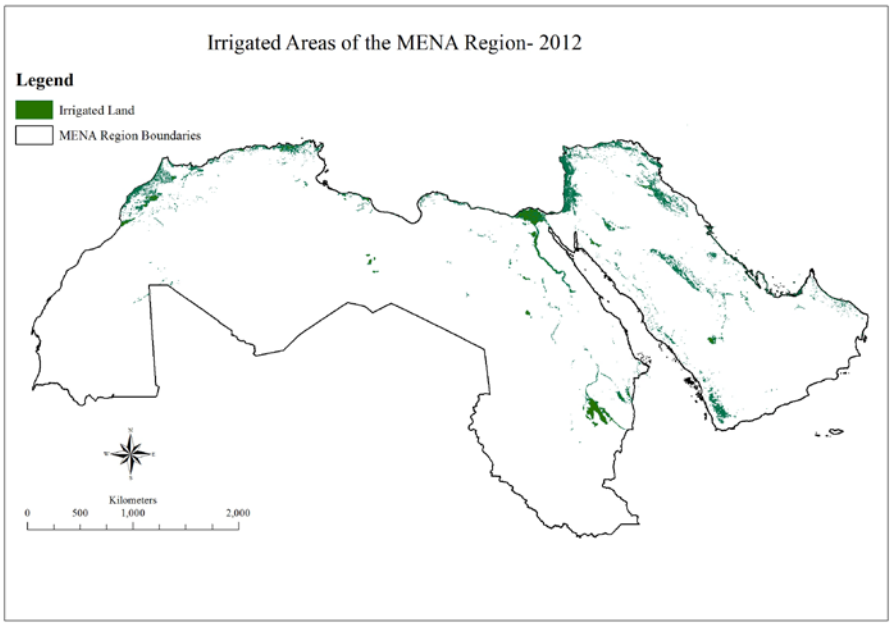


Figure 3 *Irrigated area of the MENA region*

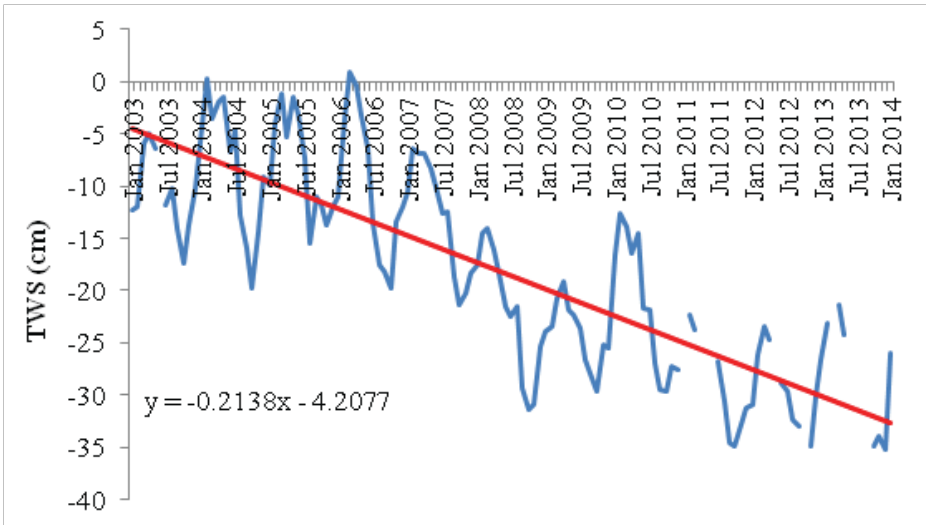


Figure 4 *Terrestrial water storage change averaged over the MENA region (2003-2014)*

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GRACE Data: http://grace.jpl.nasa.gov/

MODIS Data: http://modis.gsfc.nasa.gov/

Announcement

Partners Perception Survey

With increased emphasis on strategic alliances and partnership, ICBA is committed to reviewing the processes, procedure and guidelines used in engaging with partners and prepare a partnership plan before the end of 2014.

ICBA will be launching a Partners Perception Survey over the coming months. If you'd like to ensure that you receive a copy of the Survey and have the opportunity to provide your organization's views and opinions, please contact Apollo Muyanja in the International Cooperation and Partnerships Division at ICBA: a.muyanja@biosaline.org.ae.

Resolving water salinity and shortages in Gaza Strip

Groundwater, the main water supply in the Gaza Governorates of Palestine is becoming increasingly unusable. Decades of over-extraction (extraction exceeding replenishment) has led to an increase of groundwater salinity thus reducing the quality of available water.

Group picture of the participants in the workshop "Resolving Water Salinity and Shortages in Gaza Strip" at ICBA in Dubai

The Gulf Cooperation Council in partnership with the Islamic Development Bank, the Arab Scientific Community Organization, and ICBA joined together to discuss the water salinity and shortages issues at a workshop held at ICBA headquarter in Dubai from 4-5 May 2014. The outcome of the meeting was the development of a communication platform between researchers and field workers that will be a bridge between research knowledge and the use of that research to support adoption of scientific and practical agricultural technologies suitable for the harsh conditions in Gaza. This platform will go some way to providing suitable water quality and quantity solutions to sustain various uses of the water (e.g. household, agricultural, and industrial) in the Gaza strip.

International institutions collaborate to enhance water and food security in Yemen

Yemen is facing extreme challenges in developing its food and water security particularly under increased climate variability. Yet there are little data to guide decision-makers of current conditions and the near-time threats of famine that bring such misery to the most vulnerable in the country.

To address these challenges, ICBA hosted two days of productive discussions on 7-8th May during which international and regional experts explored different insights, technologies and possibilities for establishing a Famine Early Warning System for Yemen and three other regions in Africa. The themed sessions covered various areas of modeling and data analysis that would support this important effort.

Joining the ICBA Modeling and Monitoring Agriculture and Water Resources Development (MAWRED) team were Gary Eilerts from USAID's Famine Early Warning Systems Network (FEWS-Net), Christa Peters-Ligard and Amy McNally from NASA's Goddard Space Flight Center , Jim Verdin from the United States Geological Survey, Matthew Druckenmiller from USAID GeoCenter, Colin Kelley and Andy Hoell (University California Santa Barbara), Prof Abdulla Babaqi from Yemen's Water Environment Center, and Dr. Lakhdar Boukerrou from USAID's West Africa Water Sanitation and Hygiene Program (WA-WASH).

Group picture of the 'USAID Work Plan Coordination Meeting' participants at the International Center for Biosaline Agriculture (ICBA), Dubai, 7-8 May 2014

Dr. Rachael McDonnell, MAWRED Project Leader was pleased with the outcomes of the sessions "we welcome continuing to work with USAID and NASA in developing famine early warning systems for the region and Yemen in particular" she noted. "We know that water and food security are big challenges in Yemen and knowing when there is going to be a dry spell or when people are going to be vulnerable to food supplies is key to having a proactive rather than a reactive approach."

Dr. McDonnell concluded that during that week they have been looking at the existing technologies, the available information, and the new data that is needed to support decision makers and politicians in their work as they try managing the ever-changing climate situations.

IDB 39th Annual Meeting and 40th Anniversary

Fifteen years ago, the Islamic Development Bank (IDB) and the Government of the United Arab Emirates (UAE) established the International Center for Biosaline Agriculture. On the occasion of the IDB's 39th Annual Meeting and 40th Anniversary, it seemed appropriate to reflect on over a decade of ICBA's achievements in agricultural research for development. "ICBA, A Success Story of the IDB and the UAE Government" was held as a side event to the IDB meeting on 23rd of June 2014 in Jeddah.

The side event brought together a group of key ICBA partners—donors, development organizations, national organizations, and research institutions. Opening remarks from the UAE Minister of Water and Agriculture, H.E. Dr. Rashid Ahamed bin Fahed, Mr. Mohammad Jamal Al Saati, IDB, and Prof. Abdulrahman Sultan Sharhan, ICBA Board Chair, set a positive tone to the panel discussion that followed.

The lively panel discussion, moderated by Mr. Ahmad Hariri from the IDB, focused on the partners' past and current work with ICBA as well as future challenges that they will work together on into the future.

The Vice President of the International Fund for Agricultural Development (IFAD), Ambassador Michel Mordasani, remarked on the value of the long-standing partnership it has enjoyed with ICBA and highlighted how the partnership is mutually enforcing. IFAD's mission to improve food production systems and the nutritional level of the poorest populations in developing countries and the conditions of their lives fits well with the projects that ICBA has been able to deliver with their support in the West Asia and North Africa region.

In his remarks, Mr. Birama Sidibe, Vice President Operations at IDB, highlighted the long-lasting partnership with ICBA and ICBA's trusted role as a technical arm for IDB. ICBA's work has reached almost all of the IDB member countries and he looks forward to strengthening that relationship further and to further develop the outreach mechanism of the Center to ensure that its benefit is shared by the maximum number of countries and farmers across the entire IDB member countries.

Photo credits: Charbel El Khouri, ICBA

Photo for distinguished guests and pannel speakers during the "ICBA a Success Story of the IDB and UAE" side event during the IDB Annual Meeting in Jeddah

ICBA's partnership with the King Adbullah University of Science and Technology (KAUST) is an example of one of the upstream-downstream synergistic relationships that ICBA enjoys. Prof. Mark Tester from the BioScience Department of KAUST spoke on the value of their crop genetic work dovetails nicely with the on-the-ground, applied research that ICBA carries out. He was extremely positive on how the partnership was working and expressed his strong belief that it would further strengthen with more joint projects and sharing of knowledge.

One of the newest of ICBA's partners is the Al-Baha Chamber of Commerce. In his remarks Prof. Abdullah Al Ghamdi, the Chamber's Chairman highlighted how ICBA was the ideal partner for their joint IDB-funded project to build capacity and agricultural productivity in Al-Baha province.

Speaking on behalf of ICBA, Dr. Ismahane Elouafi (Director General) noted how important partnerships were for ICBA in delivery of its mission. The strength and range of the partnerships over the years had cemented ICBA's place as a partner of choice in delivering food security and water scarcity solutions in marginal environments. As she pointed out "ICBA's focus on innovation, impact and partnerships has brought about some good results". She added "However, the challenges are still there - degradation of soils, climate change, population pressure, access to markets for poor farmers, and without working on these issues together, we will not be effective".

The closing remarks by Mr. Mohammad Jamal Al Saati, Director of Operations Policy and Services Department at IDB and ICBA Board Member, summed up the discussion nicely and echoed the points raised by the panelists as well as his colleague on the panel, Mr. Birama Sidibe, in stating how the initial vision to create ICBA had been of great benefit to the IDB member countries. The partnership focus was certainly one of the strengths ICBA had displayed over the years and, with the new strategic direction, was only increasing in emphasis.

Announcement

New ICBA members


Anthony R. Balilo
Project Accountant


Apollo Muyanja Mbazzira
Business Dev. Manager


Qaisar M. Khan
Irrigation Engineer


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Driver

Methods to help get better data to decision makers on climate change modeling

Photo credits: Ghazi Al-Jabri, ICBA

Hands-on training for participants in the 'Climate Analysis and Downscaling Workshop'

On 31st of March 2014, ICBA hosted a training workshop on climate change analysis and downscaling. Led by Prof. Ben Zaitchik from Johns Hopkins University, the three-day training attracted participants from Lebanon, Jordan and Tunisia.

As background to the training, Mr. Karim Bergaoui, Climate and Water Modeling Scientist at ICBA, explained that decision makers and researchers working on agricultural and water use efficiency applications find it hard to work on raw climate scenarios which are based on a grid of 150-200 Km. Using the downscaling methods introduced in the workshop, higher resolution and smaller grid data can be generated, providing more accurate data for modeling and analysis.

ICBA gratefully acknowledges the support of the United States Agency for International Development, the National Aeronautics and Space Administration, and the Global Environment Facility/World Bank for the workshop.

Workshop on climate change project's impact assessment, adoption and sustainability

ICBA took it training to the partner countries in April 2014 as part of a joint project review and training with the National Center for Agricultural Research and Extension (NCARE), and the Regional Centre on Agrarian Reform and Rural Development for the Near East (CARDNE) in Jordan.

The review and training was part of the regional project 'Adaptation to Climate Change in WANA Marginal Environments through Sustainable Crop and Livestock Diversification' that ICBA and partners have been engaged with over the past few years.

During the workshop training participants developed a participatory framework and methods and tools for:

- Assessing the impact of project interventions on the livelihood of farmers at: beneficiary or target farmers' level and project area/community level
- Identifying the institutional and policy environments necessary for scaling up of proven project results
- Assessing and recommending mechanisms and tools of disseminating project results
- Assessing the exit plan and ways of ensuring sustainability of project effects
- Identifying methods for the socio-economic use of TWW and the factors that affect adoption and draw lessons for scaling up

The participating countries included Jordan, Egypt, Syria, Tunisia, Palestine, Oman, and Yemen. Among the presenters were: Dr. Fawzi Al-Shayyabi (NCARE), Dr. Abdullah Dakheel (ICBA), Dr. Mohamed Al Rifaee (NCARE), Dr. Ghaleb Tuffaha (CARDNE), Ms. Ruba Al Shawa (IFAD), and Dr. Berhanu Degefa (ICBA).

Marginal land status: challenges and potential contribution to the world food and income security

Increasing global population, degradation and depletion of natural resources and the impact of climate change all present challenges to agricultural production. To solve these challenges will require innovative thinking about sustainable management of both high productive agricultural environments and other areas that show less potential; such as, marginal lands, which have a big potential in complimenting agricultural production, poverty alleviation, improved livelihoods, job opportunities, and gender issues.

On 16 May 2014, during the IFPRI 2020 Conference on 'Building Resilience for Food and Nutrition Security' in Addis Ababa, Ethiopia, ICBA organized a side event titled "Marginal lands status: challenges and potential contribution to the world food and income security". The outcomes of this event are contributing to a white paper that ICBA is producing on the opportunities and challenges of agriculture in marginal environment.

The side event featured a panel discussion that included prominent speakers that shared their views on the various aspects of marginal lands and their contributions to income generation and nutritional security. The panel discussion was moderated by Ms. Fiona Chandler (Director of International Cooperation and Partnership, ICBA) and chaired by Dr. Ismahane Elouafi (Director General, ICBA). Speakers on the panel were:

- Dr. Dyno Keatinge (Director General, AVRDC, World Vegetable Center)
- Dr. Samuel Gameda (Director, Soil Health and Fertility, Ethiopian Agricultural Transformation Agency)
- Dr. Timothy O. Williams (Director for Africa, International Water Management Institute)
- Dr. John Kabayo (Coordinator, Drought Disaster Resilience and Sustainability Initiative, IGAD)

If any of our Biosalinity News readers would like a copy of the white paper please contact c.elkhouri@biosaline.org.ae

Opportunities to learn about small scale irrigation technologies and management in saline areas

Participants from 23 African nations participate in the BADEA and ICBA workshops on "Enhancing small scale irrigation technologies and management in saline areas in Africa"

Staff from farmers' extension services, research institutes and ministries from 23 African countries enjoyed two weeks of training on enhancing small scale irrigation technologies in saline areas.

Sponsored by the Arab Bank for Economic Development in Africa (BADEA) in partnership with ICBA, the training program "Enhancing small scale irrigation technologies and management in saline areas in Africa" was first delivered in English from 30 March – 10 April 2014 and targeted participants from Angola, Eritrea, Ghana, Kenya, Mauritius, Nigeria, Rwanda, Seychelles, South Sudan, Swaziland, Tanzania, and Zambia; then the course was provided in French from 11-22 May 2014 for participants from Benin, Burkina Faso, Cap Verde, Guinea, Guinea Bissau, Ivory Coast, Niger, Sao Tome, Chad, Togo, and Cameron.

The course provided opportunities for those attending to increase their knowledge of small scale irrigation management and improving land management of small farms and lands affected by salinity in Africa.

Agriculture is the central element of economic growth and poverty reduction in Africa and it is also the main tool for the attainment of food security and alleviation of hunger on the continent", said Mr. Mohamed El Aichouni, Chief Technical Assistance Division – Operations Department in BADEA. Mr. El Aichouni added that while the rest of the world has made significant progress towards poverty alleviation, the root cause of the food insecurity in African countries is the inability for people to gain access to food due to poverty. "As salinity continues to increasingly influence our environment there is urgency to develop cropping production systems under saline conditions." said El Aichouni. He added that the current training course focuses on upgrading the participants' skills in the field

Measuring soil salinity, part of the practical field training at ICBA

of improving small scale irrigation technologies and was designed essentially to enable them to evaluate lands affected by salinity; develop proper management for water and land resources; rehabilitate land affected by salinity; utilize modern water saving and low cost irrigation systems; monitor the success of adapted rehabilitation strategies of salt affected lands; and finally analyze water productivity in small farms.

Participants feedback

"The course was wonderful… it was very informative; I learned new things specifically about salinity which is a new problem in my country Kenya. It has not been a common problem but now it has started, and we didn't have the knowledge and the knowhow to deal with salinity problems. Now that I have undergone this course I know how to deal with salinity problems and when I go back to my country I will implement what I learned and I'm sure it will help." ***Charlotte Ooro, Kenya***

"No doubt the course has really been tremendous in terms of knowledge acquisition and sharing of experience. I particularly have gained a lot especially with regards to salinity management strategies and automation of irrigation schemes. This has really been beneficial to me; I hope to make good use of this knowledge and scale it down to the lowest level especially to the farming community to be aware of simple management strategies that will enhance food production and reduce salinity effect in my country." ***Sani Dauda Ahmed, Nigeria***

"In our country we use traditional gravitational irrigation system and we are looking at exploring the drip irrigation system. I learned much about this subject in my training here and I look forward to start what I learned in my country." ***Elisio Dos Santos Sousa Vaz, Sao Tome***

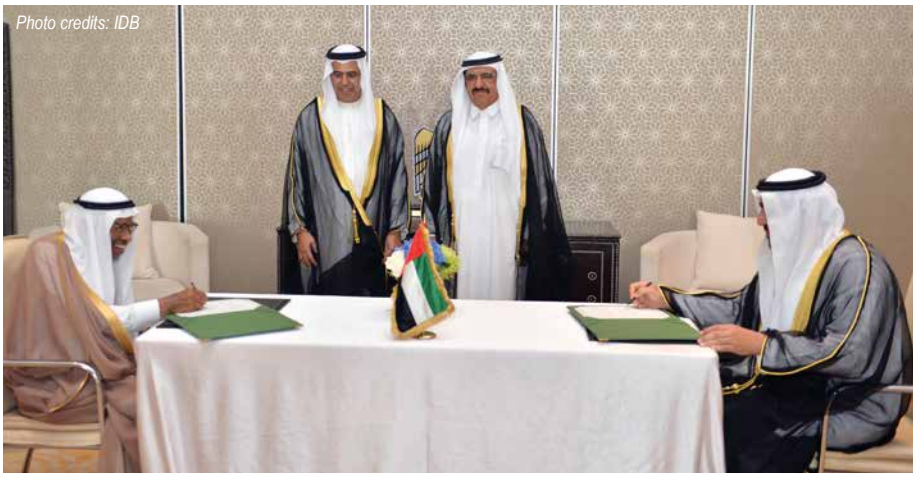
"This training was very insightful since it tackled precise problems that we share in our country: lack of water, low water quality, saline water, and soil salinity (mainly in coastal areas). So having the chance to learn about how to manage and chose the right crop for saline agriculture is an eye opener." ***Christina Maria Dos Santos Coutinho, Cape Verde***

IDB and UAE renew agreement to support ICBA

On the occasion of the 39th Annual Meeting of the Islamic Development Bank, the IDB and the UAE Government re-committed their support to ICBA.

Both organizations are convinced of the importance of water in economic and social development in general and in agriculture in particular. The original agreement between the Government of the UAE and the IDB establishing ICBA was signed in 1996 and was aimed at facilitating the transfer and use of biosaline agriculture technology in the area of cultivation and production of crops, fodder, trees, and plants that are salt tolerant. The renewal of this agreement in 2014 reflects the commitment of the two organizations to ICBA's achievements over the past 15 years and its new mission to work in partnership to deliver agricultural and water scarcity solutions in marginal environments.

H.H. Sheikh Hamdan Bin Rashid Al Maktoum, Deputy Ruler of Dubai and Minister of Finance, said that "By signing this agreement today, we are renewing our support and commitment to ICBA and to our contribution to poverty reduction in the world via agriculture in marginal environments". A feeling that was shared by H.E. Dr. Ahmad Mohamed Ali, President of IDB, who emphasized the importance of ICBA, "which was created for the main purpose of helping all of humanity in solving a major problem—water salinity".



H.H. Sheikh Hamdan Bin Rashid Al Maktoum, UAE Minister of Finance and Deputy Ruler of Dubai, with H.E. Obaid Humaid Al Tayer, Minister of State for Financial Affairs, overlooking the signing of the ICBA agreement between IDB President, Dr. Ahmed Mohamed Ali, and H.E. Dr. Rashid Ahmed Bin Fahad, UAE Minister of Environment and Water.

Dr. Rashid Ahmed bin Fahad, confirmed that the UAE's hosting of ICBA is in line with the country's interest to achieve sustainable development not only locally but to extend to a large number of developing countries and enable them to achieve their development objectives. This strategic line of action results from the philosophy of our wise leadership in its commitment to extend a helping hand to the various countries and peoples of the world.

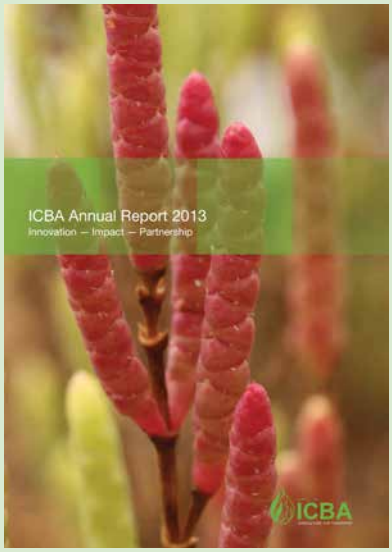
ICBA's DG, Dr. Ismahane Elouafi described the renewal of the agreement as a significant milestone for the Center. "We highly value our partnership with IDB and the Government of the UAE through the Ministry of Water and Environment and the Environment Agency – Abu Dhabi. Through this partnership ICBA can make a tangible contribution to efforts to increase food and nutritional security, to a more resilient environment and income, and to improve water security". The agreement was signed in Jeddah, Saudi Arabia, on 24th of June 2014 and will be in effect for 5 years.

ICBA Annual Report 2013: Innovation—Impact—Partnership

In its 2013 Annual Report, ICBA reflected on some of the major achievements during the year.

- In 2013, ICBA launched its new Strategy 2013-2023 and developed its first four-year Business Plan.
- The Center hosted a forum on Innovations in Agriculture and Food Security at the IDB Annual Meeting in Dushanbe, which discussed the technology and the policy aspects of the subject matter.
- ICBA scientists authored and/or produced 47 publications in 2013.
- There were new promising results in pearl millet research in Uzbekistan, where the grain production of a newly released variety exceeded the local varieties by more than 200%.
- On the irrigation management side, ICBA research showed 50% water savings achieved when using daily weather data as a tool for irrigation management.
- ICBA's Genetic Resources Program has acquired around 2900 accessions over the course of the year.
- As always, ICBA was keen on disseminating this knowledge that the research generated and the outreach included 20 training programs delivered to 673 participants from 19 countries.

ICBA acknowledges the great support of its core donors, the UAE Ministry of Environment and Water, Environment Agency – Abu Dhabi, and the Islamic Development Bank in addition to the project donors and partners who kept ICBA moving in the right direction towards greater success year after year.



The full ICBA Annual Report 2013 is available on the following URL: http://www.biosaline.org/pdf/ICBA-Annual-Report-2013.pdf

Introducing ICBA's new Board of Directors

The first meeting of the newly appointed ICBA Board of Directors took place on 28-29 May 2014. The new Board of Directors includes leaders from international NGOs, government organizations, donors' institutes, and research organizations. This reinforces ICBA's new vision to be the global center of excellence for innovative agriculture in saline and marginal environments.

The new Chair of the ICBA Board is Prof. Abdulrahman Sultan Al Sharhan, a former Dean of the Faculty of Science at the UAE University and a current member of the Higher Committee for the Zayed International Prize for the Environment. Joining Prof. Al Sharhan on the Board are:

- Mr. Abdelrahim Mohammad Alhammadi (Assistant Undersecretary of Support Services – UAE Ministry of Environment and Water). This is the second consecutive term for Mr. Alhammadi on ICBA's Board of Directors.
- Dr. Jaber Eidha Al Jaberi (Deputy Secretary-General – Environment Agency – Abu Dhabi) – well known within the UAE, the Arab World and internationally in environmental issues and actions.
- Mr. Mohammed Jamal Al-Saati (Director of Country Programs Department – Islamic Development Bank) continues to be on the Board of Directors and represents the IDB and its commitment to the center's objectives and mission.

ICBA Board of Directors visiting the ICBA research field in Dubai, UAE, during their meeting that took place from 28-29 May 2014

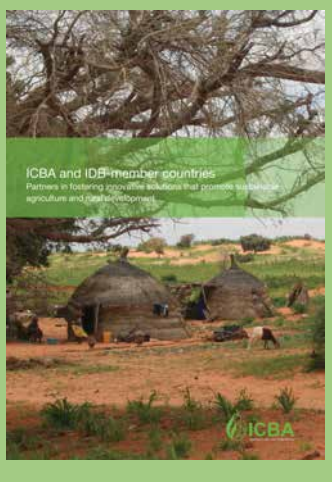
- Ms. Roula Majdalani (Director of the Sustainable Development and Productivity Division – United Nations – Economic and Social Commission for Western Asia).
- Dr. Yvon Martel (Retired Chief Scientist – Agriculture and Agri-Food Canada) who has a long experience in agricultural science management in Canada and internationally.
- Dr. Amit Roy (President and Chief Executive Officer – International Fertilizer Development Center) who has led IFDC since 1992.
- Mr. Adel Abdulla Alhosani (Director of the Operations Department – Abu Dhabi Fund for Development) is another continuing member of the Board of Directors.

"These are very exciting times for ICBA; especially that the center has embarked on a new ambitious 10 year strategy that looks at expanding the scope of ICBA's mandate, building on past successes and adapting to current and future needs," said Dr. Ismahane Elouafi, Director General of ICBA. "We look forward to working hand in hand with the new Board of Directors to continue the success story of ICBA in achieving our goals. On behalf of all ICBA employees and ICBA management; I would like to sincerely thank the previous board under the leadership of H.E. Fawzi Al Sultan for their tremendous contribution to ICBA."

ICBA and IDB-member countries: partners in fostering innovative solutions that promote sustainable agriculture and rural development

New Publication

Significant support from the IDB, the government of the United Arab Emirates, donors and fellow researchers, and partners in national programs has encouraged the evolution in ICBA's research agenda. In a report produced for the IDB Annual Meeting, ICBA collated all the work (including training) it had done in the 56 Islamic Development Bank countries, concentrated in North and East Africa, the Middle East, and Central and South Asia, since 1999. The publication summarizes ICBA's historical and current interactions with all 56 IDB-member countries on research projects and capacity building and illustrates how ICBA is working with partners to improve the livelihoods of the rural poor. In addition to research projects and capacity development, the free newsletter Biosalinity News has contributed to information sharing and knowledge exchange.



ABOUT ICBA

ICBA's work addresses the closely linked challenges of water, environment, income, and food security. The Center's applied research for development aims to address the agricultural challenges in marginal environments including assessment of natural resources, climate change adaptation, crop productivity and diversification, aquaculture and bio-energy and policy analysis. ICBA is working on a number of technology developments including the use of conventional and non-conventional water (such as saline, treated wastewater, industrial water, agricultural drainage, and seawater); water and land management technologies and remote sensing and modeling for climate change adaptation. Building capacity and sharing knowledge is an important part of all ICBA does. ICBA's work reaches countries, including least developed countries, in Central Asia and the Caucasus, the Middle East and North Africa (MENA), South and South East Asia, sub Saharan Africa and Gulf Cooperation Council countries.

ICBA's strategy 2013-2023 takes innovation as a core principle. Applied research is directed to innovative solutions to food, nutrient, and water security in marginal environments, applying new technologies including biotechnology, developing multiple uses for wastewater and seawater, becoming a pioneering knowledge hub, and extending its partnerships. With the help of its partners ICBA innovates, builds human capital, and encourages the learning that is fundamental for change.

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