ISSN 1563-1532

Biosalinity News

Newsletter of the International Center for Biosaline Agriculture

VOLUME 12, NUMBER 2 OCTOBER 2011

FROM THE EDITOR

This current issue of *Biosalinity News* conveys the breadth and depth of activities involving the ICBA team.

In Central Asia planning commenced for a regional project focusing on crop diversification and sustainable management of marginal land resources in Uzbekistan, Kazakhstan and Tajikistan to improve land productivity and the livelihoods of poor farmers living in salt-affected and degraded areas. The project is based on ICBA's R&D activities on summer crops and particularly on pearl millet and sorghum. It is implemented in collaboration with NARS, ICRISAT, ICARDA and PFU.

Research on drought and salt-tolerant *Cenchrus ciliaris* in ICBA's headquarters in Dubai is highlighted in this issue.

Capacity-building is considered as a critical plank of ICBA's mandate and this issue highlights a seminar in Jeddah, a training program in Doha and, in Dubai, the *Experts Consultation on Wastewater Management in the Arab World.* One of the experts who attended the Dubai discussions, Professor Redouane Choukr-Allah, has kindly summarised for our readers the situation of wastewater reuse in the Arab region.

Contributions on research or projects of interest to our readers are always welcome, as are letters to the Editor. Please send your submissions, including relevant photographs and figures, to:

The Editor
Biosalinity News, ICBA
PO Box 14660, Dubai, UAE
editor@biosaline.org.ae

EXPERTS CONSULTATION ON WASTEWATER MANAGEMENT IN THE ARAB WORLD

From left to right: Dr Karim Allaoui, HE Dr Mahmoud Abu-Zeid, HE Dr Rashid Ahmed bin Fahad, HE Fawzi AlSultan and Dr Ato Brown

Under the patronage of HE Dr Rashid Ahmed bin Fahad, Minister of Environment and Water, United Arab Emirates, the International Center for Biosaline Agriculture, the Arab Water Council and the Islamic Development Bank organized an *Experts Consultation on Wastewater Management in the Arab World*. Attended by experts in wastewater management from Egypt, Jordan, Iraq, Saudi Arabia, UAE, Oman, Kuwait, Tunisia, Algeria and Morocco, as well as representatives from the World Bank, the International Development Research Centre, the United Nations Secretary-General's Advisory Board on Water and Sanitation and the Singapore National Water Company, the seminar was held from 22 to 24 May 2011 in Dubai.

Continued on page 8

IDB SEMINAR IN JEDDAH

From left to right: Prof Dr Faisal Taha, HE Fawzi AlSultan, HE Dr Birama Sidbe, Dr Abdourrahman Al-Khalaf, Dr James Calvin and Dr Adil Bushnak

Held under the patronage of the Custodian of the Two Holy Mosques, King Abdullah bin Abdulaziz, the *36th Annual Meeting of the Board of Governors of the Islamic Development Bank Group* (IDB) took place in Jeddah, Saudi Arabia from 24 to 28 Rajab 1432H (26-30 June 2011).

As part of the program for the Ministers of Finance, Economy and Planning from 56 IDB member countries, the IDB-sponsored International Center for Biosaline Agriculture, in cooperation with King Abdulaziz University and the King Abdullah University of Science and Technology, convened a seminar on Monday June 27 outlining the *Role of marginal quality water in agriculture and food security with special reference to the Kingdom of Saudi Arabia*. The seminar was attended by more than 200 participants.

Dr Birama B Sidbe, IDB Vice President for Operations, welcomed all delegates, who included HE Fawzi AlSultan, Chairman of ICBA Board of Directors, Dr Abdourrahman Al-Khalaf, Dean Faculty of Meteorology, Environment and Arid land Agriculture of the King Abdulaziz University, Dr James Calvin, Associate Provost King Abdullah University of Science and Technology and Dr Adil Bushnak, Chairman of the Bushnak Group.

Continued on page 8

International Center for Biosaline Agriculture (ICBA)
PO Box 14660, Dubai, UAE Tel: +971 4 336 1100 Fax: +971 4 336 1155 E-mail: icba@biosaline.org.ae
www.biosaline.org

Sorghum and pearl millet for crop diversification and improved crop-livestock productivity and farmers' livelihoods in Central Asia

A Project Inception Workshop was held in Tashkent from June 14-16, 2011. The project focuses on crop diversification and sustainable management of marginal land resources in three countries (Uzbekistan, Kazakhstan, and Tajikistan) of Central Asia, with the goal of improving land productivity and livelihoods of poor farmers living in salt-affected and degraded areas. Each country has a large share of rural poor population; agriculture is a major contributor to their GDP.

The project is funded by the Islamic Development Bank and is being led and coordinated by the International Center for Biosaline Agriculture (ICBA). In addition to the NARS of the partner countries, international research centers, ICRISAT and ICARDA, are also participating.

The Project Inception Workshop finalized the Work Plan and the allocation of funds for different activities for the three year project. The Workshop was attended by 2 to 3 institutes from each country that will be working in different field areas that are affected by the various forms of salinity problems. The project mainly focuses on the adaptation of different salt- and drought-tolerant varieties of sorghum and pearl millet as forage crops for salt-affected areas through improved management practices. The project will also include different capacity-building and knowledge-sharing opportunities during its duration.

Participants in the workshop

Capacity-building in Qatar

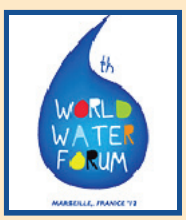
Facing problems of high salinity in the country's soils with consequent abandonment of over 300 farms and the production of 6,000 tonnes of fodder against the demand of 35,000 tonnes, the Qatari Ministry of Environment sought ICBA's technical expertise in biosaline agriculture.

An exchange of visits between representatives from the Qatar Ministries of Agriculture and Environment and ICBA resulted in the training program, *Technological Advances in Biosaline Agriculture*, held from 15 to18 May in Doha, Qatar.

During the workshop ICBA shared its research and capacity-building experience in the saline environment with delegates through interactive sessions covering topics such as forage production and management systems, the sustainable use of brackish groundwater resources, alternative crops for salt-affected environments, soil salinity and irrigation management.

Participants at the field practice

6th World Water Forum



Every three years since 1997, the World Water Forum has been held in different countries to bring about global awareness of water issues and place water on the international political agenda.

The 6th World Water Forum, which is being billed as the *Forum for Solutions*, will be held from March 12 to 17 2012 in Marseille, France. Once Marseille was chosen as the location for the 2012 Forum, water stakeholders across 5 continents commenced a series of preparatory processes which combine thematic, regional and political activities.

ICBA is contributing to the 2012 Forum by coordinating a *Target and Solutions Group* (TSG) addressing the target 2.2.4 By year 20yy, increase by xx per cent as compared to the 2005-2007 baseline the safe use of non-conventional waters, either (treated) wastewater or other low-quality water, in agriculture. This target is one of eight which are designed to achieve the Thematic Priority 2.2 Contribute to Food Security by Optimal use of Water.

Working with colleagues from international and national institutions located in Australia, India, Italy, Morocco, Sri Lanka, Syria and the United States of America, the ICBA team led by Dr Faisal Taha, Director Technical Program, have redefined the Target, prepared the Target Rationale, Description and an Action Plan outlining the key steps to be taken to achieve the target. Case studies of successful solutions are now being prepared.

For more information, contact: Dr Faisal Taha f.taha@biosaline.org.ae, Dr Ian McCann i.mccann@biosaline.org.ae or Mrs Carla Mellor c.mellor@biosaline.org.ae

Safe disposal of brine from reverse osmosis desalination plants

The lack of freshwater resources is a serious constraint to agricultural development in the United Arab Emirates. In inland areas as well as the coastal zone, saline groundwater is available for use in agriculture although it is not suitable for growing cash crops, such as vegetables which are mainly grown in greenhouses. To overcome this problem, about 400 small-scale reverse osmosis (RO) plants are used to desalinate groundwater to produce date palm or cash crops in greenhouses or to supply drinking water to animals and poultry. The use of such technologies requires proper brine concentrate management and disposal practices to minimize groundwater pollution. ICBA was commissioned by the UAE Minister of Environment and Water to undertake a thorough review/analysis to identify suitable environmentally friendly brine disposal options.

Subsequently twelve plants in inland areas and three plants in coastal areas were studied to evaluate the performance of membrane technology, irrigation management and brine disposal practices. Brackish groundwater, salinity varying from 4 to 37 dS m^{-1}, was used as feed water. The depth of water table in the investigated sites varied from 8 to 50 m; usually lower water tables were recorded in the inland areas (i.e. Liwa, Al Ain or Al-Dhaid). Higher groundwater salinity was observed in coastal areas due to sea-water intrusion. The capacity of ROs varied from 28 to 325 m^3 d^{-1}. The salt rejection values of ROs varied from 69 to 99 percent; and the flow recovery percent varied from 30 to 87. Such a wide range of performance values is due to variations in feed water salinity, pressure applied, and membrane characteristics.

Surface drippers were used for irrigating vegetables in both green houses and fields. Field irrigation techniques include micro-sprayers (for forages), furrow/basin (for vegetables/forages) and bubblers/hose pipe (for date palms and fruit trees). The chemical analysis of brine showed trace existence of heavy metals but high concentrations of NO_3-N.

The methods of brine disposal include surface disposal (to excavated/non-excavated pits or mountain terrain or steep edge of sand dunes), which is the most common practice (>50%) in the selected sites followed by well injection or dug well (>13%). Other disposal methods are pipeline to sea beach; the irrigation of salt-tolerant plants or blending brine with feed water for irrigating date palm; the use in the cooling pads of green houses; and wadi beds.

Among the disposal methods, surface disposal and dug well near the plants are critical as feed water can be further polluted by brine and chemicals used in RO plants. These disposal practices could be replaced, salinity levels permitting, by environmental friendly methods such as non-leaking evaporation ponds and biosaline agriculture. Evaporation ponds are relatively easy to construct and operate and are suitable in the areas of high evaporation rates. Community-based evaporation ponds, where several farms dispose of brine to a common pond, could be developed; they also have the potential for aquaculture thus generating additional income for farmers.

Higher concentration of NO_3-N in brine is an additional advantage for growing biosaline agriculture. To optimize this advantage that may not be suitable for very high saline brine, attention has to be given to maintain soil salinity at an acceptable level and implement appropriate irrigation scheduling to reduce deep percolation. Another alternative could be brine reduction using secondary RO plants as most of the existing plants generate brine volume more than 50% of average feed water quantity. This would definitely help in capturing additional water for growing crops and vegetables.

Some regulating procedures, especially the issuance of permits for installation of RO plants, are recommended to safeguard water and soil health from further degradation. In any case, appropriate regulations or guidelines, monitoring and capacity building are essential for better utilization of RO plants in the agricultural production system in UAE. Research findings and recommendations have been presented to the Ministry of Environment and Water.

Small RO plants used at farm level

RO plants in UAE farms could be used to grow high value cash crops in greenhouses

Wastewater reuse in the Arab region

Professor Redouane Choukr-Allah

IAV Hassan II BP 773 Agadir, Morocco, redouane53@yahoo.fr

The Arab region is one of the most dry and water-scarce regions in the world. It is also expected that by 2025, due to the population increase, the regional average water availability is projected to be just over 500 cubic meters per person per year. Despite its diversity of landscapes and climates – from the snowy peaks of the Atlas mountains to the Empty Quarter of the Arabian Peninsula – most of the region's countries cannot meet current water demand. Indeed, the situation is likely to get worse. Per capita water availability will fall by half by 2050, with serious consequences for the region's already stressed aquifers and natural hydrological systems. Many countries in the region are mining groundwater, a temporary and risky expedient. Available surface water is declining and the over-pumping of groundwater, beyond natural recharge rates, has resulted in lowering the water table and causing an increase in groundwater salinity, ground water depletion and ecological degradation. Besides, major water resources in the region are shared between countries lying both within and outside the region.

In the last three decades the Arab nation has witnessed growing water stress, both in terms of water scarcity and quality deterioration, which has prompted many governments to look for a more efficient use of water resources, and to develop interventions including municipal wastewater reuse to narrow the gap between supply and demand in the region.

The extended reuse of reclaimed (treated) wastewater could contribute considerably to the reduction of water stress and water scarcity in the Arab countries as part of an Integrated Water Resources Management (IWRM) approach, focusing on the component wastewater reuse for irrigation and other purposes.

The reuse of treated wastewater in the Arab region is predominantly for agriculture, particularly in Tunisia, Syria and Jordan. Irrigation for landscaping and golf courses is also increasing in the Arabian Peninsula and North African countries.

In fact, a very low percentage of the potential produced waste is used in the Arab region. This will require concerted efforts supported by regional and international organizations, to make a real change and increase the low volume (4.7 billion m³ per year) of treated wastewater, which represent 35% of the total generated wastewater in the Arab region.

The preliminary evaluation indicates that for an increased utilization of reclaimed wastewater, clearer institutional arrangements, more dedicated economic instruments and the setup of water reuse guidelines are needed. Technological innovation and the establishment of a best practice framework will help, but even more, a change is needed in the underlying stakeholders' perception of the water cycle.

Potential of wastewater in the Arab region

The Arab population in 2008 stands at about 343.8 million with 55% located in the urban area producing around 13.2 billion m³ per year of wastewater.

The increasing population exceeding actually more than 343.8 million has put pressure on the total annual water withdrawal 256.3 km³ per year used mainly in the agriculture sector (86% of the water withdrawals).

The total volume of wastewater generated by the domestic and industrial sectors in the Arab region is 13.7 km³ per year; of which 5.7 km³ undergoes treatment. These numbers suggest that, on average, 43% of the wastewater generated in the Arab region is treated, which is higher than Asia (35%), Latin American/Caribbean (14%) and Africa (1%). The annual volume of wastewater discharged in an untreated form in the Arab countries is 7.5 km³, which is 57% of the total wastewater produced in the region.

Total reuse is estimated at 4.7 km³ per year, and Egypt is by far the largest user with over 70% of the Arab region. Syria, UAE and Saudi Arabia are other top users and these four countries account for 92% of the region in term of the total wastewater reuse. About 83% of these treated wastewaters are used in agriculture.

Wastewater reuse in the Arab region

Arab countries can be divided into three main categories according to their disposal practices:

Category 1: Gulf areas, which includes Bahrain, Oman, Saudi Arabia, Qatar, Kuwait and UAE. All countries in the Gulf area follow similar methods in the disposal of wastewater effluent. A high percentage of wastewater after post-treatment is reused in irrigation of forage agriculture land or in landscaping while the remainder is disposed into the sea after many advanced treatment techniques.

Category 2: includes Egypt, Iraq, Jordan, Morocco and Syria. These countries are following moderate regulations (WHO Guidlines) for the disposal of wastewater effluent. Based on this fact a high percentage of the effluent wastewater is disposed to

Direct reuse being introduced at Aqaba, Wadi Musa and Irbid in Jordan

Reuse for the golf course in Tunisia

surface water bodies to be used later in irrigation or reused mainly in agriculture and golf courses. The regulations in these countries specify the types of crops that can be irrigated using this type of treated water. Moreover, this water may be used for landscaping and for industrial purposes.

Category 3: includes West Bank, Yemen and Lebanon. A large percentage of the wastewater effluents of these countries are disposed to wadis and subsequently used for irrigation of cropped lands without treatment.

Wastewater regulation in the Arab region

While most of the Golf countries have established low-risk guidelines or standards based on a high technology/high-cost approach, many low-income countries have adopted an approach based on WHO guidelines that refer to low-cost technologies and focus on health risks.

Furthermore, in the case of wastewater reuse systems in many Arab countries, monitoring and system evaluation are irregular and not well developed. This is mainly due to weak institutions, the shortage of trained personnel, the lack of monitoring equipment, and the relatively high cost required for monitoring processes.

There are weaknesses in current wastewater management practices in most Arab countries; in fact, many treatment plants are plagued by poor operation and maintenance (O&M) and are operated well beyond their design capacity. These conditions have resulted in degraded treatment reliability and diminished reuse possibilities.

Recommendations

The reuse of treated wastewater in the Arab region needs clear political support and the development of appropriate strategies in the context of each country's overall water resources policy to promote this practice. Commitment to wastewater reuse should be part of the proclaimed water policy and strategy in all countries of the Arab region. Organizational limitations of the reuse sector should be examined seriously. Such study is needed in order to identify the appropriate institution to implement the regulations, develop the sector in line with existing regulations, preserve the environment, and protect the health of the consumer. Arab countries should develop a comprehensive plan of action for reusing treated wastewater. The plan should indicate clearly assigned roles and needs to be complemented by periodic reviews and follow-up.

Arab governments should concentrate on demand-driven planning of reuse projects. A good example for this is the partnership developed between the golf courses of Agadir and Marrakech in Morocco and the water agencies in those cities to supply them with continuous treated wastewater. This demand for treated effluent is driven by the scarcity of this resource in Marrakech, and to the high salinity of the groundwater in the Agadir area.

Demand management and water conservation strategies clearly are the most cost effective approaches to reduce withdrawals. A good example is the Sulaibiya project in Kuwait which is contributing to 26% of Kuwait's overall water demand and reducing the annual demand from non-potable sources from 142 million m^3 to 26 million m^3.

Arab countries should also develop a platform of dissemination of the lessons learned from existing facilities in the Arab region. This platform would lead to improved information on the economical and financial benefits (volumes and percentage of treated wastewater reused, approximate benefit to the water economy and cost recovery of the reuse system).

The full value of treated wastewater has been recognized in relatively few water-stressed Arab countries (such as Tunisia, Jordan, GCC). In these countries, fully fledged local or state regulations supported by national guidelines set the basic conditions for wastewater treatment and safe reuse.

Cenchrus ciliaris: A Drought and salt-tolerant grass for arid lands

Mohammad Shahid* and NK Rao, International Center for Biosaline Agriculture

Commonly known as foxtail or buffel grass, *Cenchrus ciliaris* is a wholesome plant which is good for pasture in hot and dry regions and is valued for its high quality forage production in the tropics during droughts. With tall, thick and erect stems and large droopy leaves which stay green till maturity, it is a high-quality edible grass for farm animals. Its use as a fodder, either in green or dried form, increases milk production in cattle and other milch animals. Its salinity tolerance allows farmers to grow it in saline soils using briny water for irrigation. The unique grass features also make it highly drought-tolerant. A hardy plant species, *C. ciliaris* remains productive for about 8 years under proper husbandry.

Belonging to a large and widespread plant family of Poaceae (or Gramineae) and subfamily Panicoideae, the perennial species is highly variable with multi-branched stems that range from 30 to 200 cm in height at maturity. The leaf blades are linear 3-30 cm long, 2-13 mm wide and green to bluish green in color. The inflorescence is usually cylindrical in shape, 2-15 cm long, 1-2.5 cm wide, and colored purple, gray or yellow. The flowers are hermaphrodite and flower all year round. The spikelets are single or a cluster of 2-4, and are encircled by bristles of different lengths.

C. ciliaris has been used in traditional medicines and is believed to relieve kidney pain, cure wounds, sores and tumors. The plant also supports honey production as bees visit its inflorescence to collect pollen during the flowering season. In addition the grass is used in lawns.

Its natural habitats are in Africa, west and south Asia, East Indies and southern parts of Europe, while it has been successfully introduced into Australia, the Americas and various islands of the Pacific to control soil erosion as well as a forage crop. In the UAE, where it grows naturally along with two other species of the genus *Cenchrus*, it is very common in the northern and eastern parts of the country.

The grass is usually found on sandy soils, but also propagates nicely in well drained sandy loam and clay loam soils. It grows slowly in clay soil, but once established flourishes well. Though the optimum pH for its growth is 7-8, it shows good results even in pH as low as 5.5. Many of its cultivars have displayed high salinity tolerance, especially in sandy soils. High levels of aluminum and manganese in soils hinder its growth. *Cenchrus ciliaris* is a well balanced forage that is suitable for different types of domestic animals including camels, cattle, goats and sheep. On a zero-moisture basis, 100 g fresh plant includes 73.2 g total carbohydrate, 11.0 g protein, 2.6 g fat and 13.2 g ash while 100 g of its hay contains 79.2 g total carbohydrate, 7.4 g protein, 1.7 g fat, and 11.7 g ash. The digestibility of the fodder is around 60%.

Though *Cenchrus ciliaris* can be planted throughout the year, sowing at the start of the wet season gives superior results as the grass establish itself better than at other times. Its fuzzy seeds are hard to plant by hand, and therefore are mixed with fine soil or treated mechanically to smooth the bristles. Larger seeds are better for germination and are planted 1–2 cm deep. Generally, the seed rate for drilling in rows is 3-6 kg per ha while for broadcasting it is 12 kg per ha. The post-harvest maturation time of its seed varies from 1-18 months, though most of the cultivars shed dormancy within 5-6 months, after that they are suitable for planting. Sowing whole cluster of spikelets is recommended as it gives better results than the naked seed.

One hectare of C. ciliaris *can produce up to 500 kg of seed per annum*

The forage production of buffel grass is comparable or even better than other fodder crops like Rhodes grass and Bermuda grass. In marginal lands, its green fodder yield ranges 7-10 tons per ha, while in better conditions it may go up to 55 tons per ha. Improved agronomy practices can further increase the yield to 20%. The seed production of *C. ciliaris* ranges from 50 to 500 kg per ha depending on type of cultivar and soil.

Field of C. ciliaris *at ICBA*

* *For more information, contact* **m.shahid@biosaline.org.ae**

Seed collection of wild C. ciliaris *at Ras al Khaimah, UAE*

C. ciliaris *flowers help in honey production*

Salinity is one of the most severe problems affecting different crops around the world. Many of the buffel grass genotypes, especially those collected from saline regions, have shown a considerable tolerance of salinity. Some of its cultivars can successfully be grown with 12 dS m^{-1} water. Drought is also a problem in many countries. The plant has been endowed with an extensive and deep root system with swollen stem bases that enable it to withstand long drought periods and even fires. This root system also helps in preventing soil erosion and fixing sand dunes. During the hottest months of summer when there is little rainfall, buffel grass grows quite profusely compared to other fodder grasses thus providing forage for animals in lean times.

Another forage grass, *Chloris gayana* (Rhodes grass) has been a major source of locally-grown livestock feed in the UAE, especially in Abu Dhabi Emirate. But the crop needs a lot of irrigation; whereas fresh water in the UAE is an expensive commodity. To save water, the Abu Dhabi government has banned the planting of Rhodes grass in the Emirate. Being drought-tolerant and a good fodder source, *C. ciliaris* has great potential to replace Rhodes grass in Abu Dhabi and the other Emirates.

Though *C. ciliaris* is valued as high quality pasture grass and fodder, its aggressive nature makes it a problematic weed in some of the regions where it has been introduced. It is, for example, considered to be an invasive plant in parts of Australia and the USA where it suppresses the growth of different native grass species. Its biology makes it ideal for colonizing arid areas, especially after calamities like fires and long droughts. As its seed formation is apomictic (asexual), it produces a huge amount of seed without pollination. After the introduction of the grass into a region, its seeds disperse quite profusely by sticking to the fur of mammals and feathers of birds. The seed may also spread by wind as it is light in weight with bristles. Therefore a careful strategy needs to be adopted before the introduction of *C. ciliaris* into new agricultural areas.

At the International Center for Biosaline Agriculture (ICBA), more than 800 genotypes of the species from 22 different countries have been studied to assess the adaptability to the UAE and multiply the seeds for more experiments at ICBA and other research centers. Further work at ICBA has helped to identify salinity tolerant accessions. Around 20 genotypes of the species have also been collected from various regions of the UAE during different expeditions. To date ICBA has supplied hundreds of seed samples of *C. ciliaris* to various researchers working in the UAE and abroad. ICBA involvement in the *C. ciliaris* research is helping to promulgate it in the arid and salt-affected lands of the world.

Variation of different C. ciliaris *accessions*

Experts Consultation on Wastewater Management in the Arab World

Continued from page 1

In his opening address, HE Dr Rashid Ahmed bin Fahad stressed the importance of reclaimed water, which has played a vital role in bridging the gap between water supply and water demand particularly in meeting the landscape demand in main urban centers.

The Minister informed the audience that the UAE is currently studying the potential and feasibility of using fourth stage treatment levels to produce high quality treated wastewater close to potable water standards which could be used in other economic sectors. The UAE aims to adopt the latest advanced technologies in wastewater treatment field and to extend the sewerage network coverage to include all communities.

The President of the Arab Water Council, HE Dr Mahmoud Abu-Zeid, HE Fawzi AlSultan, Chairman of the International Centre for Biosaline Agriculture, Dr Karim Allaoui of the Islamic Development Bank and Dr Ato Brown of the World Bank contributed to the wealth of knowledge shared at the seminar.

Participants visited the Wastewater Treatment Plant in Dubai as well as ICBA's Agricultural Research Station.

The seminar concluded by identifying recommendations for action focusing on technology and management; policy, regulation and institutions; and research development and capacity building.

IDB Seminar in Jeddah

Continued from page 1

Scientists from the different universities, senior officials of the bank, as well as delegates from local organizations, heard how marginal quality water such as saline water could be used more extensively in agriculture and consequently impact favourably on food security.

Dr Nina Fedoroff, Visiting Professor and Chairman of the Desert Agriculture Initiative based at the King Abdullah University of Science and Technology, highlighted the potential for salt-tolerant crops, while the following speaker, Professor Dr Samir Jamil Slimani from the University of King Abdul Aziz, illustrated with the specific example of improving the crop canola using different irrigation water salinity levels.

Further insight into the role of marginal quality water was provided by Dr Adil Bushnak and Dr Walid Abderrahman, Chairman of the Bushnak Group and Miahona Co, respectively.

The seminar was concluded by Prof Faisal Taha, ICBA Director of Technical Programs, who briefed the audience on the latest innovations in saving fresh water through utilization of marginal quality water in agriculture and landscaping. The delegates appreciated hearing about the 60 projects undertaken by ICBA in over 20 member countries of the IDB Group.

Staffing Update

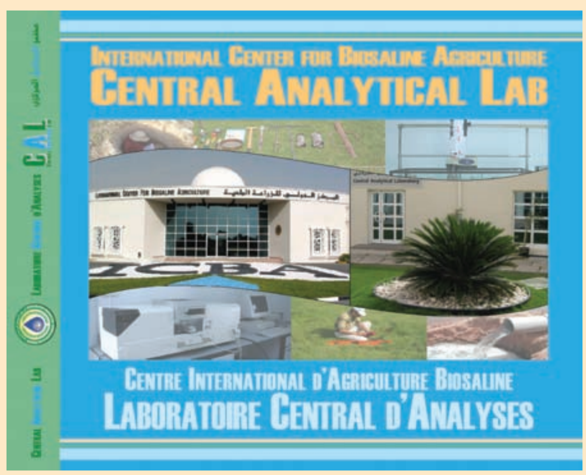
Dr Berhanu Adenew Degefa joined ICBA in May 2011 as a socio-economics scientist. Dr Degefa holds a PhD in Agricultural Economics from the University of Hannover in Germany. He worked as a Senior Research Fellow at the Ethiopian Economic Policy Research Institute in Addis Ababa from 2001 to 2011 following a ten-year period as a lecturer and researcher at the Department of Agricultural Economics of the Haramaya University in Ethiopia, where he attained the rank of Assistant Professor.

Dr Berhanu has also participated in the graduate programs of various universities and been a member of PhD examination committees, as well as reviewing scientific publications for national and international research organizations.

Gained from working with various international organizations such as the World Bank, IWMI, the UNFAO, IFAD, IIED (in the UK) and UNDP, Dr Berhanu's research experience covers a wide range of the economics of agriculture and rural development: resource economics, farming systems and management, agricultural extension, land policy, food security and climate change adaptation economics.

Central Analytical Lab

ICBA has facilitated the provision of high-quality analytical laboratory services with the establishment of the Central Analytical Laboratory (CAL). Set up to assist clients in better resource management use that is environmentally sustainable, CAL's specialist areas are detailed in a recent brochure. Available in print in English, French and Arabic, the brochure is also available online
http://www.biosaline.org/Default.aspx?pid=260



For more information on ICBA and its latest news, please visit www.biosaline.org