ISSN 1563-1532

Biosalinity News

Newsletter of the International Center for Biosaline Agriculture

Volume 3, Number 2 October 2002

From the Editor

Biosalinity News is produced three times a year by the International Center for Biosaline Agriculture (ICBA). The electronic version appears on ICBA's website www.biosaline.org.

Highlights of this issue are articles on sustainable projects on halophytes in the Arabian Gulf and new uses for saline process water. In addition, there are news items on training courses, new ICBA Board members, and networks.

This newsletter serves as a forum for exchange of news and information among people interested in research and development activities in saline agriculture. To achieve this objective we need your help and input.

The Editor will be pleased to receive short articles on research and development in saline agriculture that would be of interest to those involved in biosaline agriculture. We also welcome announcements of seminars, workshops, meetings and training courses, news of state-of-the-art saline agriculture and relevant new publications. Please send your submissions to:

The Editor
Biosalinity News, ICBA
icba@biosaline.org.ae

New ways of using saline process water

Oil companies spend millions of dollars disposing of water produced during the oil production process. To dispose of this waste, or saline process water, high pressure pumps inject the water through deep injection wells into underground rock strata up to 3 km below the surface. Not only is this expensive, such wells can cost up to US$7 million each, but the waste water contains oil and heavy metals which contaminate the underground strata.

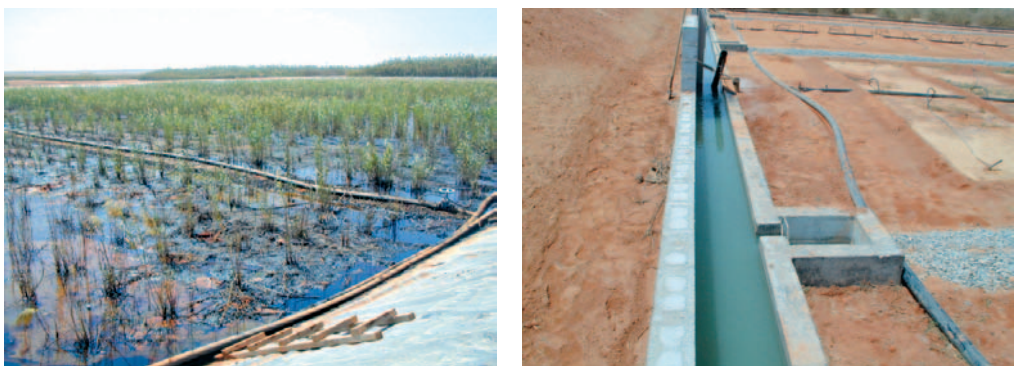
Now, a new venture in biosaline agriculture could change all this. An oil company in Oman, Petroleum Development Oman (PDO), is working with ICBA to biologically clean this water and use it to irrigate crops.

PDO became interested in using this process water for biosaline agriculture following discussions with ICBA staff. They realized that if the water could be used as a resource to grow crops, not only could this be profitable, but it would also save the millions it costs to dispose of the wastewater underground. Using the water for biosaline agriculture would also make a contribution towards conserving the environment and provide the oil company with carbon credits to offset carbon dioxide emissions.

PDO invited ICBA scientists to visit PDO's site at Nimr, 700 km southeast of Muscat. Here the company had already established reed beds to treat saline process water and remove oil and heavy metals before using the water for agriculture. After draining through the reed beds, the process water was expected to be more saline but pollutant-free. However, ICBA scientists found that the reed beds were not functioning as anticipated: the reeds were unhealthy and the water still contained a significant amount of oil and some residual heavy metals.

After thoroughly evaluating the design and management of the reed beds, and analyzing soil, water and plant samples, ICBA scientists were able to make recommendations which improved the functioning of the reed beds. The oil-in-water content dropped from over 100 parts per million to less than 15 parts per million and the water quality improved, making it acceptable for use in biosaline agriculture.

Cont. on Page 2



Reed bed treating process water (left) *and treated water outflow* (right)

International Center for Biosaline Agriculture (ICBA)
P.O. Box 14660, Dubai, UAE. • Tel: +971 4 3361100 • Fax: +971 4 3361155 • E-mail: icba@biosaline.org.ae
Website: www.biosaline.org

NEW WAYS OF USING SALINE PROCESS WATER (Cont. from Page 1)

Following the success of these initial investigations, in December 2001, ICBA started on a further project for PDO to design and implement a new reed bed system incorporating all the recommendations of earlier investigations. In the next phase, the development of biosaline agriculture, PDO has contracted ICBA to develop a 1.5-hectare pilot demonstration which will be irrigated entirely with treated process water.

BEHAR - Evaluation of salt-tolerant *Salicornia* species

ICBA finalized an agreement with the Saudi private sector company Arabian Saline Water Technology Co. (BEHAR) to characterize and evaluate germplasm of *Salicornia bigelovii* developed by BEHAR for registration and conservation purposes.

Plant and inflorescence characteristics of 24 lines of *Salicornia bigelovii* will be examined and the lines will be fingerprinted using DNA techniques to determine whether they are pure.

ICBA signs MoU with Bangladesh

ICBA's Director General, Dr. Mohammad Al-Attar, and Director of Technical Programs, Prof. Faisal Taha, visited Dhaka, Bangladesh, in June 2002, to sign a Memorandum of Understanding with Bangladesh Agricultural Research Institute (BARI) on collaborative activities. The ICBA delegation met with key personnel in relevant organizations and ministries, with a view to establishing joint projects in biosaline agriculture.

ICBA SIGNS NEW AGREEMENTS

ICBA signs Memorandum of Understanding with the UAE University

H.E. the UAEU's Director, Dr. Hadef Bin Joa'an Al-Dhahiri, and ICBA's Chairman of the Board of Directors and Director General, Dr. Mohammad H. Al-Attar signing the MoU

In April 2002, ICBA signed a Memorandum of Understanding with the United Arab Emirates University (UAEU), Al-Ain, UAE. ICBA and UAEU agreed to cooperate in areas of common interest and mutual benefit relating to biosaline agriculture, particularly in the UAE and more widely in the GCC countries.

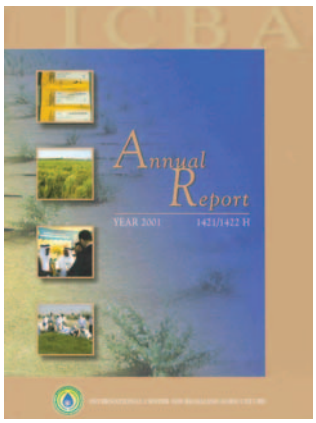
The agreement will strengthen cooperation and exchange of knowledge on research activities, studies and advisory activities in biosaline agriculture, and training programs. As part of the agreement, ICBA and the UAEU will arrange scientific seminars, workshops and symposiums, and collaborate in scientific and academic research.

A committee of three representatives of each party will be established to plan and implement the joint activities. The agreement is for four years and will be renewed and modified as needed. The signatories of the MoU were H.E. the UAEU's Director, Dr. Hadef Bin Joa'an Al-Dhahiri, and ICBA's Chairman of the Board of Directors and Director General, Dr. Mohammad H. Al-Attar.

PUBLICATIONS

ICBA Annual Report 2001

The ICBA Annual Report 2001, 1421/1422H, is now available in English, Arabic and French. To obtain copies of the report, email or write to ICBA giving your full postal address and stating your language of preference.



IDB Visitors to ICBA

Mr. Amadou Boubacar Cisse, Vice President Operations, Dr. Mottahar Abdul Aziz Al-Abbasi, Executive Director, IDB Yemen, and Mr. Farouq Al-Zaman, Advisor to the Vice President Operations, IDB, visited ICBA on 12 September 2002. The visitors were briefed on ICBA's activities, toured the facilities and were shown field experiments in progress.

Hon. Zënhõm Zahran, Executive Director, IDB (Egypt), and Undersecretary for the Ministry of Finance, Egypt, visited ICBA on 5 September.

Dr. Mohammad Al-Attar, Chairman ICBA Board of Directors and ICBA Director General briefs Mr. Amadou Boubacar Cisse, Vice President Operations, Dr. Mottahar Abdul Aziz Al-Abbasi, Executive Director, IDB Yemen, and Mr. Farouq Al-Zaman during their visit to ICBA

Hon. Zënhõm Zahran visiting ICBA's genebank accompanied by Prof. Faisal Taha, Director Technical Programs and Dr. Abdullah Dakheel, Field and Forage Crops Specialist

ICBA Consulting Partner of Global Water Partnership

Dr. Bassam Hasbini, Irrigation Management Scientist, represented ICBA at the meeting of the Consulting Partners (CP) of the Global Water Partnership (GWP), in Accra, Ghana, 17–19 June 2002.

The Global Water Partnership is focused on water in all its diverse functions, and has been created to provide a forum for coordinated action to deliver water security. The GWP aims to facilitate and promote good water governance and get action implemented through its associated programmes. The GWP works through a wide set of partners including people from civil society groups, UN organizations, government offices, financing agencies, business, regional entities, recipient groups, professional associations and international non-government organizations and resource centers.

Although it is widely understood that water should be holistically managed, it was not until the Dublin Conference on Water and the Environment in 1992 and the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 that a more comprehensive approach to water manage-

Cont. on Page 4

ICBA Forges Links with Central Asian Countries

In June, ICBA's Director General Dr. Mohammad Al-Attar and the Director of Technical Programs, Prof. Faisal Taha visited three countries in the CAC region: Uzbekistan, Kazakhstan and Kyrgyzstan. Meetings were held with key organizations and Ministries to establish strong links in the field of biosaline agriculture.

Dr. Faisal Taha, Director of Technical Programs, ICBA with scientists in Uzbekistan

ICBA visits IDRC in Cairo

Director General Dr. Mohammad Al-Attar and the Director of Technical Programs, Prof. Faisal Taha, visited the Cairo Regional headquarters of International Development Research Center of Canada in April. IDRC were briefed on ICBA's activities and opportunities for collaboration.

ICBA Consulting Partner of Global Water Partnership (Cont. from Page 3)

ment was judged necessary for sustainable development. This awareness, together with the need for participatory institutional mechanisms related to water, called for a new coordinating organization. In response to this demand, the Global Water Partnership (GWP) was created in 1996.

The initiative was based on promoting and implementing integrated water resources management through the development of a worldwide network that could pull together financial, technical, policy and human resources to address the critical issues of sustainable water management. As part of this network, ICBA's inputs on biosaline agriculture contribute towards the comprehensive approach to water management of the GWP.

For more information on the Global Water Partnership see http://www.gwpforum.org

NETWORK

ICBA to Host Inter-Islamic Network on Biosaline Agriculture (INBA)

ICBA will manage the Inter-Islamic Network on Biosaline Agriculture (INBA). INBA becomes the latest network, joining six other Inter-Islamic networks on various subjects relating to science and technology, to be financially supported by the Committee on Science and Technology (COMSTECH) of the Organization of Islamic Countries and IDB.

Dr. Mohammad Al-Attar addresses COMSTECH delegates in Islamabad

The decision to create and support the Inter-Islamic Network on Biosaline Agriculture was taken during a meeting of COMSTECH held in Islamabad in February, where the Executive Committee and General Body of COMSTECH approved the establishment of INBA. ICBA was represented at the meeting by its Chairman Board of Directors and Director General, Dr. Mohammed H. Al-Attar, and ICBA's Halophyte Agronomist, Dr. Shoaib Ismail.

The Inter-Islamic Network on Biosaline Agriculture complements the Global Biosaline Network (GBN) (http://www.biosaline.org/gbn.htm) for which OPEC contributes support.

Executive Directors of Inter-Islamic Networks Meet at ICBA

A meeting of the Executive Directors of the Inter-Islamic Network was held at ICBA headquarters on 25 June. The meeting was attended by Eng. Mohamed Sager Al-Asam, Assistant Deputy Minister (Ministry of Agriculture and Fisheries, UAE), the Executive Secretary (COMSTECH), Executive Directors of Inter-Islamic Networks, and ICBA Management and staff.

Participants of the Inter-Islamic Network Executive Directors' meeting at ICBA

Arab Fund Provides US$0.9 Million Grant to ICBA

The Arab Fund for Economic and Social Development (AFESD), with its headquarters in Kuwait, has provided ICBA with a grant for Kuwaiti Dinar 275,000 (US$0.9 million) to complete its irrigation and drainage facilities at Al Ruwaiyah.

AFESD delegation Dr. Merwat Badawi (second from left) *and Mr. Al Zaqalaei* (second from right) *discussing the irrigation system with ICBA's irrigation scientist, September 2001*

AFESD is ICBA's third founding donor, the other two being the Islamic Development Bank and the OPEC Fund for International Development. AFESD earlier provided US$1 million towards the building of greenhouses and a shade house, and the initial development of irrigation facilities. The initial development of irrigation facilities was co-financed by the OPEC Fund.

With this second grant, AFESD becomes the second highest financial supporter of ICBA.

The completion of irrigation and drainage facilities at ICBA will increase the Center's capacity to conduct experiments that will serve the GCC countries and the rest of the Islamic and developing world that find their inland water resources, utilized for irrigation, are increasingly turning saline. When the irrigation and drainage facilities are completed the Center will have 35 hectares of experimental plots equipped to test field and forage crops at range of salinities.

IFAD grant for WANA study

The International Fund for Agricultural Development (IFAD) has made a grant of US$32,000 to ICBA to assess the availability of saline water resources for irrigation in the West Asia and North Africa (WANA) region.

The study will cover saline water resources ranging between 6,000 and 15,000 parts per million. Five to six countries will be selected as case studies from the following: Algeria, Tunisia, Libya, Pakistan, Iran, Yemen, Jordan, Syria and Oman.

For each country case study the hydrologic data will be reviewed and the information checked in the field. An assessment will be made of the underground and surface water that could be economically used for irrigation using technologies generated by ICBA.

The studies will also assess to what extent the saline water resources are renewable and will determine the quantity of water at moderate salinity, brackish and high salinity.

In addition to an assessment of the quality and quantity of saline water resources, the study will also look at the area of land where such water could be used in terms of the soil characteristics and suitability for irrigation.

Halophyte Research

UNESCO supports Halophyte Research and Development in Arabia

Benno Böer, Programme Specialist, UNESCO

A large number of halophyte research and development projects have been carried out in the Gulf Arab States over the last 25 years, mainly in the United Arab Emirates (in particular Abu Dhabi and Dubai) and Saudi Arabia. Projects involved exotic and indigenous halophytes of different salinity tolerance levels, both inland, and in the intertidal zone.

The rationale for the utilization of halophytes in the Gulf is based on the rapidly declining freshwater resources. Great hopes and expectations are connected with salinity tolerant plants, both in the agricultural sector, for silviculture and aquaculture, and more recently also for CO^2 sequestration, habitat restoration and habitat manipulation.

UAE among the world leaders

The UAE is today one of the most advanced countries in the world in the field of research and experiments in biosaline agriculture. The International Center for Biosaline Agriculture (ICBA), and the United Arab Emirates University are active in enhancing the utilization of marginal water resources for plant production. Other institutes working in this field that need to be mentioned are the Ministry of Agriculture and Fisheries, the Environmental Research and Wildlife Development Agency, the Abu Dhabi Municipality, and others.

Sesuvium – a success story

Substantial success has been achieved, although it is difficult to measure economic progress based on scientific achievements. However, one of the best indicators for the economic relevance of halophyte research and development in the Arab Gulf Region is probably the succulent halophyte *Sesuvium portulacastrum*, which was first introduced to Abu Dhabi in 1989, and is now widely used in greening projects throughout the Gulf region as an amenity plant. It has replaced the freshwater-dependent bermuda grass (*Cynodon dactylon*) in many urban areas, and it can be observed in Bahrain, Oman, Qatar, Saudi Arabia, and the United Arab Emirates, as well as in other Arab countries outside the Gulf.

Mangrove and sabkha – changes on the landscape level

Another successful species is the local mangrove *Avicennia marina*, which is important for the fishing industry (via primary productivity and a spawning habitat), and as a habitat for numerous indigenous birds, and marine wildlife. Several hundred thousand specimens have been planted in the Gulf. Other promising halophyte cash crop candidates are the seagrasses and the marine algae.

The United Arab Emirates has about 4,000 km^2 of coastal sabkha, offering a large potential area not only for biosaline agriculture, but also for nature conservation. The largest sabkha is Sabkha Matti, located in the west and extending for about 120 km inland. A recently published volume provides substantial information on what is known on sabkha ecosystems (*Sabkha Ecosystems Vol. I.: The Arabian Peninsula and adjacent countries*, published by Kluwer Academic Publishers; developed in conjunction with UNESCO, ERWDA, and the University of Regensburg). The volume contains science-based recommendations into sabkha research, landscape conservation, and development.

Saline irrigation – coastal agriculture for the future

Biosaline agriculture has great potential for application on saline and hyper-saline soils in the UAE, and might contribute to large-scale changes in regional coastal land-use in the future, especially within the coastal sabkha in

Cont. on Page 7

UNESCO supports Halophyte Research and Development in Arabia (Cont. from Page 6)

Experiments with Sesuvium portulacastrum *at ERWDA's National Avian Research Centre showed great success. An earth wall was planted in 1996 with* Sesuvium portulacastrum *and irrigated with saline groundwater. The vegetation cover increased from 0 to100%.*

western Abu Dhabi. Salinity-tolerant plant farms are already established in Nashallah, Dubayyia, and Dubai.

It is necessary to point out that the development of exotic halophyte cash crop and amenity plants should be carried out with great care, in order to avoid the introduction of invasive plant species, and attached micro-organisms. This can be achieved with quarantine programmes for introduced plant genetic resources. It is equally important to avoid soil and ground water salinization via incorrect irrigation and drainage methods.

More co-ordination towards the research, environmentally sound application, the documentation, and the successful production and marketing of the products is now required. The Gulf Arab States play undoubtedly an important and a leading international role in the development of halophytes and salt-water utilization. Together with its regional and international counterparts, and above all with the International Center for Biosaline Agriculture (ICBA), based in Dubai, the UNESCO Regional Office in the Arab States of the Gulf is working towards the continuation of co-ordinated and sustainable halophyte projects in the Gulf. UNESCO also supports halophyte development in Egypt, Libya, Morocco, and Sudan.

New members of ICBA Board of Directors

The seventh meeting of ICBA's Board of Directors was held on the 26 May 2002 in Dubai, United Arab Emirates.

Two new members joined ICBA's Board of Directors: Mr. Abdelmajid Slama and Dr. Fareed Hussain Al Darwish.

Mr. Slama was appointed by the Islamic Development Bank (IDB). He is a Tunisian national, currently Director, Near East, North Africa and Europe Division of the International Fund for Agricultural Development (IFAD). IFAD is a long-established UN body with headquarters in Rome. Mr. Slama has worked with IFAD since 1983, prior to which he was Director General, National Centre for Agricultural Studies, Tunisia, reporting directly to the Tunisian Minister of Agriculture. He holds a degree in Agronomy from the University of Tunis and another in Agricultural Economics from the University of Minnesota (USA). He brings to the ICBA Board 30 years of experience in Agricultural Development. Currently Mr. Slama is a member of the Board of Trustees of the International Fertilizer Development Center (IFDC), a partner Center of the Consultative Group on International Agricultural Research (CGIAR).

Dr. Fareed Hussain Al Darwish, a national of the United Arab Emirates, is the Assistant Dean for Student Affairs, Faculty of Food Systems, at the UAE University in Al Ain, a responsibility he has held since 1996. However, he has been associated with the University's Faculty since 1983. Dr. Al Darwish is a soil scientist and has a PhD in Soil Science from the Oregon State University, USA. He will contribute to the Board his experience in irrigation, irrigation management, water-use efficiency, water flow in soils, salt-affected soils and irrigation water quality.

International Symposia

ICBA co-organized the **Second International Symposium on Ornamental Horticulture in Arid Zones,** Al Ain, 1-3 April 2002 held under the patronage of H.E. Sheikh Tahnoon Bin Mahammad Al-Nahyan.

ICBA's Director General Dr. Mohammad Al-Attar gave a presentation during the Inaugural session and ICBA's Director of Technical Programs, Prof. Faisal Taha participated as Rapporteur of the Scientific Committee, chair of one of the symposium sessions and also co-chaired the Recommendations Committee.

An ICBA delegation comprising the Director General Dr. Mohammad Al-Attar, the Director of Technical Programs Prof. Faisal Taha, and the Halophyte Agronomist Dr. Shoaib Ismail, represented the Center at an International Symposium on **Optimum Resources Utilization in Salt-Affected Ecosystems in Arid and Semi-Arid Regions,** Cairo, 8 – 13 April 2002. The symposium was organized by the Desert Research Center (Ministry of Agriculture and Land Reclamation, Egypt) and ICBA was a co-sponsor.

Training Facilities Completed

The training facilities at ICBA were completed and furnished in early March 2002. The facilities, which include a lecture room for 95 persons and a computer-networked training room for 27 persons, provide excellent facilities for training courses and workshops in the field of biosaline agriculture. The facilities have already been used for three courses in 2002. A further three courses are planned for 2003 for scientists and technicians working in the developing IDB member countries.

International Atomic Energy Agency Workshop

At the request of the International Atomic Energy Agency (IAEA), ICBA organized a one-day workshop on **Sustainable Utilization of Saline Ground Water and Wastelands for Plant Production**. The workshop was held on 23 March 2002 and attended by senior management and technical staff from IAEA, ICBA, the Ministry of Agriculture and Fisheries, the Ministry of Water and Electricity, ERWDA, UAE University and Abu Dhabi, Al Ain, Dubai and Sharjah Municipalities. Welcome speeches were given by the senior management of IAEA and ICBA. Drs. Faisal Taha, Abdullah Dakheel, Shoaib Ismail and Bassam Hasbini made presentations in the technical session, which dealt with irrigation with saline water, production of halophytes and salt-tolerant plants, and sustainable production.

A field trip introduced participants to ICBA's activities, including eight projects and research on newer aspects of biosaline agriculture.

Participants of the IAEA workshop in the field (left)*, and in the shadehouse* (right)