

# Biosalinity News

Newsletter of the International Center for Biosaline Agriculture

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## FROM THE EDITOR

*Biosalinity News* is produced three times a year by the International Center for Biosaline Agriculture (ICBA) in Arabic, English and French. The electronic versions can be found on ICBA's website [www.biosaline.org](http://www.biosaline.org).

The highlight of this issue is the report of ICBA's participation in the World Food Prize Symposium at Des Moines, USA in October. The theme of the 2002 Symposium, was global water insecurity. ICBA was delighted at the international recognition of its role in biosaline agriculture conferred by the invitation to Dr. Al-Attar, Director General ICBA, to speak at the Symposium. Dr. Al-Attar took the opportunity to draw attention to the problem of salinity in irrigated agriculture. His presentation generated much interest amongst delegates and led to several expressions of interest in collaborative activities.

In addition, this newsletter features work on assessing the productivity of date palms when irrigated with salty water and news items on training courses, new ICBA staff members, and the Inter-Islamic Network on Biosaline Agriculture (INBA).

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 projects in saline agriculture that would be of interest to readers. We also welcome announcements of seminars, workshops, meetings and training courses, and relevant new publications.

Please send your submissions to:

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## Director General ICBA highlights biosaline agriculture at World Food Prize Symposium

**D**r. Mohammad Al-Attar, Director General, ICBA, drew the attention of a global audience to the key role of biosaline agriculture at the World Food Prize Symposium, October 24-25, Des Moines, Iowa, USA when he spoke on 'New Water for Old Crops: Can we Change the Future?'



*Dr. Mohammad Al-Attar addressing the World Food Prize Symposium, Des Moines, USA*

The World Food Prize Symposium is held annually in conjunction with the World Food Prize Laureate Award Ceremony. This year the theme was 'From the Middle East to the Middle West: Managing Freshwater Shortages and Regional Water Security', which addressed the looming water shortages in many parts of the world. Significant figures in the global water community gathered to discuss water, one of the most critical issues facing the international

(Cont. on Page 2)

## Burkina Faso seminar on combating salinization

**I**n October, Islamic Development Bank Governors gathered in Ouagadougou, Burkina Faso for the twenty-seventh Annual Governors' Meeting of the Islamic Development Bank.

To highlight the potential of biosaline agriculture for IDB member countries, ICBA invited the Governors to a seminar on 'The role of ICBA in combating salinization and assisting developing countries'.

The seminar was chaired by H.E. Mr. Salif Dialo, Minister of Agriculture, Burkina Faso and was attended by H.E. Mr. Seydon Bouda, Minister of Economics and Development, H.E. Bervit Quattara, Minister of Commerce



*The ICBA seminar at the twenty-seventh IDB Annual Governors' Meeting. From left to right: Prof. Faisal Taha, Dr. Mohammad Al-Attar, Mr. Muzafar Al-Haj Muzafar, H.E. Mr. Salif Dialo and H.E. Mr. Seydon Bouda*

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## International Center for Biosaline Agriculture (ICBA)

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## Director General ICBA highlights biosaline agriculture at World Food Prize Symposium (Cont. from Page 1)

community in the new millennium. The impressive array of experts included speakers from Egypt, the West Bank, Syria, United Arab Emirates, Sweden, Vietnam, Canada and the USA.

Dr. Al-Attar took the opportunity to call attention to the problem of salinity in irrigated agriculture and ways to improve the productivity of farmers who rely on saline water to grow their crops.

Dr. Al-Attar said that he was delighted to receive the invitation to speak at the Symposium because it acknowledged the valuable work that is being done to show that salty water can be used to produce both food crops and animal feed. "In our discussions with delegates, Prof. Dr. Faisal Taha, Director of Technical Programs, ICBA, Dr. Sandra Child, Communications Specialist, and I were able to emphasize the key role that biosaline agriculture

can play in relieving pressure on scarce freshwater," Dr. Al-Attar said.

Dr Al-Attar's paper will be published in the first volume of an annual series 'World Food and Agriculture: Perspectives on Research and Policy' edited by Dr. John Miranowski and Dr. Colin Scanes and published by Iowa State University Press/Blackwell International.

Following the Symposium, Dr. Sandra Child, Communication Specialist at ICBA, took part in the World Food Prize Global Youth Institute as a Faculty Expert and Discussion Moderator.

Approximately 100 high school students took part and presented papers on topics related to the Symposium theme. The organizers are keen to expand the program to involve high school students internationally. In addition, they welcome

offers for placement of interns who spend 8-week internships in the summer working at agricultural research organizations around the world.

As a follow-on to the Symposium, Dr. Al-Attar was invited to become involved in the Nominating Academy of the World Food Prize.

The World Food Prize, created in 1986 by 1970 Nobel Peace Prize Laureate Dr. Norman E. Borlaug, recognizes breakthrough contributions to improving human development by increasing the quality, quantity and availability of food in the world. In conjunction with the International Symposium, The World Food Prize Foundation presented the 2002 World Food Prize to Dr. Pedro A. Sanchez, for his work in agroforestry, at the Laureate Award Ceremony.

## LINKAGES

### ICBA Launches Satellite Office in Abu Dhabi

ICBA made a significant step towards strengthening relationships with government and non-governmental organizations in its host country, the United Arab Emirates, by establishing an office in Abu Dhabi in October.

Dr. Abdul Rahman Abdoul Khaleq, Advisor, Private Office of H.H. UAE President, and Dr. Mohammad H. Al-Attar, Chairman, Board of Directors, and Director General, launched ICBA's satellite office in Abu Dhabi on Sunday October 13, 2002. The launch was attended by Mr. Ibrahim Bin Taher Al-Mehrezi, ICBA's Office Manager in Abu Dhabi.

Dr. Abdoul Khaleq welcomed ICBA's initiative, which is aimed at "strengthening and facilitating ICBA's mission and mandate with governmental and non-governmental organizations working in the UAE". Dr. Abdoul Khaleq also stressed that ICBA's step is one of the many outcomes of the initiative of H.H. Sheikh Zayed Bin Sultan Al Nahayan, President of the UAE, in greening the country and changing it from desert to a green oasis.

Dr. Al-Attar stressed that "in launching ICBA's Office in Abu Dhabi ICBA is implementing its strategic plan and emphasizing linkages in Abu Dhabi in particular, and in the UAE in general". Dr. Al-Attar thanked H.H. Sheikh Zayed Bin Sultan Al Nahayan, President of the UAE and H.H. Sheikh Maktoum Bin Rashed Al Maktoum and other Emirates Rulers for sponsoring ICBA in the UAE.



*Dr. Abdul Rahman Abdoul Khaleq (right) and Dr. Mohammad H. Al-Attar (left) at the opening ceremony to launch ICBA's satellite office in Abu Dhabi*

## RESOURCE MOBILISATION

### IAEA grant for developing proposal to expand biosaline agriculture in UAE

The success of first phase of the seven-country IAEA project 'Sustainable Utilization of Saline Groundwater and Wastelands for Plant Production' in the UAE has encouraged the Government to continue with the next stage of the project to expand the results to new areas and farmers.

There are large areas in the UAE, for example in Abu Dhabi, Fujairah and Ras Al Khaimah, where farmers have abandoned their farms due to scarcity of water and increasingly saline groundwater. Biosaline agriculture provides opportunities for improving farmers' incomes in these areas. The Government firmly believes that biosaline agriculture promises a viable alternative for the development of these salt-stressed areas of the UAE.

At the request of the Ministry of Agriculture and Fisheries, ICBA will develop plans for the UAE component of the next phase of the project. Like each of the other six countries, the UAE will devise tactics to show farmers how biosaline agriculture technologies developed by scientists will work for them on their own farms. A Feasibility Study and National Project Proposal will be submitted to IAEA.

The Ministry of Agriculture and Fisheries designated ICBA as its representative in the project and ICBA coordinated and hosted the final project meeting for the first phase in October (see p.8). To assist ICBA in developing the feasibility study and proposal for the UAE, IAEA will provide US\$50,000.

### Sheikh Zayed Private Office grant for CAC training course

The Sheikh Zayed Private Office has contributed US\$20,000 towards a training course in Central Asian Countries to be held in Tashkent, Uzbekistan, in May 2003. The OPEC Fund is also sponsoring this course.

Most countries of the Central Asia region, particularly Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, and Krgyzstan, face major salinity problems. The areas affected vary significantly, but range between 30% (Kazakhstan) to 50% (Uzbekistan). Salinity problems have significantly reduced agricultural production and have had an adverse effect on agricultural land. Yet knowledge of biosaline agriculture is still in its infancy in many of these countries. However, many government agencies and organizations have expressed a strong desire to train their staff in biosaline agriculture to enable them to deal with the major agricultural and environmental constraints resulting from salinity.

ICBA and the International Center for Agricultural Research in Dryland Areas (ICARDA) are jointly developing a course to meet these needs. The course will introduce both the theory and practice of using saline water in sustainable agricultural production.

### Arab Fund irrigation contract awarded

The Arab Fund for Economic and Social Development (AFESD) recently committed Kuwaiti Dinar 275,000 (US\$900,000) to complete the irrigation and drainage system at ICBA headquarters. The contract has now been awarded and work began in late

### Date palms and olive trees from Saudi Arabia

In April 2002, H.E. Dr. Abdoulla Ben Aboul Aziz Ben Mo'amar, Saudi Arabian Minister of Agriculture and Water visited ICBA and was keenly interested in the field trials of date palms. Saudi Arabia has already evaluated many varieties of date palms and olive trees for salinity tolerance and some have shown promising salt-tolerant qualities under Saudi Arabian conditions. To enable ICBA to expand the range of varieties being evaluated, the Minister arranged to send 30 specimens of each of eight varieties of date palm and four varieties of olives for testing under the different conditions in the UAE.

Fifteen of each of the eight date palm varieties have been planted and, when established, will be tested at 5, 10 and 15 dS/m over 7-10 years. The remaining trees will be rapidly evaluated in controlled experiments to study the effects of watering at a range of salinity levels.



*Date palms received from Saudi Arabia in the nursery*

January 2003.

When the work is completed ICBA will have 35 hectares of experimental plots equipped with a sophisticated irrigation system. In crop trials, scientists will be able to test plants at a range of salinities.

The Arab Fund is the second largest financial supporter of ICBA.

## INBA NEWS

In 2002, the Committee on Science and Technology (COMSTECH) of the Organization of the Islamic Conference and IDB, assigned the task of coordinating the new Inter-Islamic Network on Biosaline Agriculture (INBA) to ICBA.

Since then, Dr. Shoaib Ismail, Network Coordinator at ICBA, has been developing a task list for coordinating the network and will shortly be sending out an information brochure about the Network and inviting applications for membership.

Like many such networks in other specialist areas, INBA will help members exchange information, skills, knowledge, experiences, and resources through

meetings, workshops, publications, cooperative programs and other activities. Exchanging information and improving coordination will lead to less duplication of work and effort.

Although many centers around the world are working in biosaline agriculture they often work in isolation from each other. INBA will link people of different levels, disciplines, organizations and backgrounds who would not otherwise have an opportunity to interact.

From its initial conception, ICBA was intended to act as a focal point for biosaline agriculture, gathering information on what has already been done and what is already known in the field, and bringing this knowledge and

information to bear on the problems facing farmers and landscape managers in the developing world. Coordinating INBA is one of the strategies to achieve this. INBA will create awareness among biosaline agriculturalists that others have similar concerns and developmental problems and help in addressing complex problems and issues that seem overwhelming to those working on only one level.

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## APAARI meeting hears about GBN and INBA

As an active associate of the Asia-Pacific Association of Agricultural Research Institutions, ICBA participated in the Seventh General Assembly Meeting and the Expert Consultation on 'Strengthening of Research Partnerships through Networks and Consortia' at the WorldFish Center, Penang, Malaysia 2-4 December.

Prof. Dr. Faisal Taha, Director of Technical Programs, represented ICBA and made a presentation on 'Networking and Strengthening Linkages in Biosaline Agriculture'. Prof. Taha described ICBA's role in coordinating the Global Biosaline Network (GBN) and Inter-

Islamic Network on Biosaline Agriculture (INBA).

The Global Biosaline Network, primarily for individuals, now spans 43 countries, and enables many practitioners in biosaline agriculture to communicate directly and share information with each other.

The Inter-Islamic Network on Biosaline Agriculture, on the other hand, is primarily a Network for agencies involved in biosaline agriculture. INBA encourages dialogue, information sharing and collaboration to sustain the growth of and linkages between institutions and individuals, as well as to encourage learning.

### Burkina Faso seminar on combating salinization (Cont. from Page 1)

and Promotion and other key Burkina Faso representatives, IDB Vice-President for Finance and Administration, Mr. Muzafar Al-Haj Muzafar and other senior officials.

Dr. Mohammad Al-Attar, Director General ICBA, warmly welcomed the opportunity to present ICBA's strate-

gies to IDB Governors. Further seminars will be held in years to come to address problems of salinity in water and soils in Islamic countries and encourage local, national and regional collaboration with ICBA to combat the problem.

Prof. Faisal Taha, Director of Technical Programs at ICBA, gave an

overview of ICBA's technical programs and achievements during 2002.

ICBA believes such seminars are important in promoting dialogue and interaction and integrating biosaline agriculture technology into development projects in Islamic member countries.

## 3rd World Water Forum, 16-23 March 2003, Kyoto, Japan

Every three years, the World Water Council, along with the Global Water Partnership, and the International Water Resources Association, convenes an international water forum. The first was held in Morocco in 1997, the second in the Netherlands in 2000, and the third will be in Kyoto, Japan, in March 2003.

The 3rd World Water Forum, or 3WWF, in Kyoto will be a huge gathering of more than 7,000 participants representing world leaders, governmental agencies, UN agencies, regional / international funding agencies, NGOs, consultants, and private sector companies.

The 3WWF Middle East and Mediterranean Regional Day (MMRD) is planned for 20 March 2003. The Islamic Development Bank (IDB) and ICBA will sponsor a joint session to highlight critical water issues in the region and draw

global attention to local, national and regional perspectives on problems and best practices. The session, "Non-conventional water resources management" will consider desalinization, the use of salty water in irrigated agriculture, and reusing treated wastewater. Professor Faisal Taha, Director Technical Programs, ICBA and Dr. Karim Alloui, IDB, are the convenors of this session.

Dr. Mona El Kady, Ministry of Water Resources and Irrigation, National Water Research Center, Egypt, will chair a session on Arab 'Water in the Arab Countries'. Dr. Mohammad Al-Attar, Director General, ICBA, is a keynote speaker in this session and will present a paper entitled 'Saline water as a resource for the future in Arab countries'.

For more information on the 3WWF check the Forum's website at <http://www.worldwaterforum.org>

## New staff join ICBA



Dr. John Stenhouse joined ICBA in July 2002 as Plant Genetic Resources Scientist. He has over 20 years experience of research and research management, mainly in plant breeding and genetic resources, in Sierra Leone, Belize, Zimbabwe, India and Italy.

Immediately prior to joining ICBA, Dr. Stenhouse worked for the Food and Agriculture Organization of the United Nations (FAO) in the Research, Extension and Training Division of the Sustainable Development Department, providing institutional support to national agricultural research systems. Earlier, he worked for 10 years with the International Crops Research Center for the Semi-Arid Tropics (ICRISAT) with responsibilities in sorghum breeding and genetic resources.

Dr. Stenhouse holds a PhD degree in Agricultural Botany from the Queens University of Belfast, UK.

Dr. Sandra Child joined ICBA in August 2002 as Communications Specialist. She has more than 20 years experience in strategic communication in national, federal and international research and



academic institutions in many countries. Before joining ICBA, Dr. Child was Head of Information and Communications at ICLARM – The World Fish Center, in Penang, Malaysia.

Dr. Child has a PhD degree in Geology from the University of Liverpool, UK.

Ghassan El-Eid joined ICBA in December 2002 as an IT and Computer Supervisor. He has 10 years experience in IT administration and system engineering and has held several positions in the private sector in his area of expertise in Lebanon.

Mr. El-Eid came to the United Arab Emirates to work on the successful implementation of a GIS utility system for the Abu Dhabi Water and Electricity authority as a system configuration pillar leader.

He holds a masters degree in computer science from the Lebanese American University.



# Date palms and biosaline agriculture in the United Arab Emirates

Dr. Abdullah Dahkeel, Field and Forage Crops Scientist, ICBA

**T**he date palm, *Phoenix dactylifera* L., has been called the ‘Tree of Life’. Few plant species have played such a major role in the well being of people living in hot, dry environments. Were it not for the date palm, human habitation would not have extended as far as it has into the hot and barren desert regions of the globe.

Date palms prosper where many other fruit trees could not exist or, if they could survive in such conditions, where they would produce few fruit. Together with camels, date palm have been one of the most sustainable agricultural systems in harsh desert environments.

Date palms have flourished in Arabia and the Middle East for over 7,000 years. Highly valued for their resilience to harsh desert climates, like the camel, they make very productive use of desert resources and can produce between 100 and 200 kilograms of fruit per tree per year. Dates are a very nutritional food and the palms are long-lived, surviving for up to 100 years. Not only do the palms provide food. Virtually every part of the palm is used by desert dwellers for example, for shelter, fuel, and fibre.

### The date palm in the United Arab Emirates and Gulf Cooperation Council countries

The Arabian Peninsula is both a center of origin and a center of diversity of the date palm. Of over 1,500 known date palm varieties, there are nearly 250 varieties in the Gulf Cooperation Council countries and 120 varieties in the Emirates. One hundred of these varieties have been collected at the

Ministry of Agriculture’s Al-Hammranieh Research Station and around 120 at the UAE University Farm.

Countries of the Gulf Cooperation Council produce and consume nearly half the world production of dates. More than 50 million of the 105 million productive date palms worldwide grow in the Arabian Peninsula. In the United Arab Emirates in particular, date palm cultivation has expanded dramatically in the last few decades. In the 1970s there were around 1.5 million palms in the Emirates but recent estimates put the current number of palms at over 40 million, covering an area of over 185,000 hectares.

### Environmental constraints on date palm cultivation in the UAE

Keen government support and improved cultural and production techniques led to rapid expansion in date cultivation over the last 30 years. As production soared, producers came up against pests and diseases (such as the Red Palm weevil), environmental constraints (such as heat, drought and salinity), and production constraints (irrigation, fertilization, pre- and post-harvest management).

### Salinity

Although dates palms are amongst the most salt-tolerant fruit-bearing plants, rising salinity levels are seriously affecting date production in the region. Most date cultivation relies on fossil groundwater which is not only being rapidly depleted but is also becoming more saline.



*Shahla, one of the ten elite date varieties being evaluated at ICBA*

In 2001, ICBA, the Ministry of Agriculture and Fisheries (MAF) and Abu Dhabi Municipality (ADM) reviewed salinity problems in date palm production and set up a series of projects on key issues.

### Water resources and use in agricultural production in the UAE

Fossil groundwater resources are the main source of water for irrigation in the UAE. But the fossil groundwater scenario is alarming.

In some areas groundwater has been pumped to such an extent that less is available and what is available is much more saline. Farmers used to rely on many inland aquifers for freshwater for irrigation. But over the last three decades, the water table in these aquifers has dropped by 20 to 30 meters and salinity has risen to 3,000 to 5,000 ppm, or even 8,000 ppm in depressions and sub-coastal areas.

In other coastal and sub-coastal areas, and in areas with very high water tables, groundwater can still be pumped in fairly large quantities. But the groundwater is highly or even extremely saline because drawing water from the aquifers by pumping has allowed seawater to infiltrate. To make the problem worse, highly saline water from deeper strata rises to mix with shallower less saline water, again sending salinity levels up.

A survey by ICBA showed the wide extent of the problem. In more than 50 farms in Abu Dhabi and the Northern Emirates, groundwater salinity was 25 dS/m, or half as saline as seawater. The survey concluded that, in general, salinity is high in date farms more than 15 years old and that supplies of groundwater of less than 3 dS/m are very limited. And the situation is getting worse. Where water is relatively more abundant, then salinity is also higher.

When farmers must make do with highly saline water they tend to compensate by over-irrigating the date palms. This causes salts to accumulate in the upper layers of the soil and has a negative effect on the trees. The effects of salt accumulation are further aggravated by poor soil structure, poor drainage, and high evaporation. Planting forage crops as an under-crop and distributing irrigation water in open channels are also common practices which heighten the negative effects of salt accumulation. In some cases the problems become so acute that farms are abandoned.

### **Strategic research**

What can be done to prevent deterioration of date production as groundwater becomes more saline? To combat the problem of rising salt levels in irrigation water, salt-tolerant date varieties and, equally important, good management practices using salty water need to be developed.

Fortunately, the Arabian Peninsula is

home to vast date palm genetic resources and many of these are adapted to local environmental conditions, salinity, extreme heat and drought. This indigenous genebank may hold the key to developing more salt-tolerant date varieties. At the same time, methods need to be developed which will allow farmers to cultivate date palms profitably with the only water available to them, increasingly salty groundwater.

### **Current projects**

#### **Long-term screening for salt-tolerance**

Over the last year ICBA and MAF have established a long-term field project at ICBA headquarters to test the salt-tolerance of 10 of the most popular varieties of date in the UAE: Fardh, Lulu, Jabri, Naghal, Khesab, Barhi, Khalas, Khinnazi, Shahla, and Bu Mann. Five replications of each variety will be tested at three salinity levels: 5, 10 and 15 dS/m.

Just recently, ICBA received eight Saudi Arabian varieties of date palm that will be included in the trials (see p.3). As time goes on it is hoped that this trial can be expanded to embrace other important date palm genetic material from the region.

#### **Screening of tissue culture varieties**

The UAE University Date Palm Tissue Culture Laboratory (DPTCL) is a leader in producing date palms by tissue culture. Palms mass-produced by tissue culture are ideal subjects for salinity screening trials because they can be produced in large numbers and are identical in age, size and stage of development. Screening under a range of conditions can be done rapidly and gives reliable results. Now that this mass-produced tissue culture material is available, the whole process of finding promising salt-tolerant material has become much quicker. Once the most promising varieties have been quickly identified by screening, then they can

move to the next stage which is further testing in experimental plots.

#### **Farm salinity survey**

Although salinity is widespread in the UAE, there is little concrete data on the impact of salinity and farm practices on the different varieties of dates. To fill this gap, ICBA, the Ministry of Agriculture and Fisheries, municipalities and other agricultural agencies in the UAE will make a detailed survey of 50-100 farms. It is a huge task but the survey will provide crucial data for deciding the most important areas for research.

#### **Field genebank**

Genebanks do not need to be 'dry academic repositories' but can be living entities for generating and sharing information and knowledge among the many different groups who have an interest in genetic diversity. Traditional genebanks conserve seeds of crop plants for future research and crop improvement. But there are opportunities to go far beyond traditional agro-biodiversity genebanks to build an invaluable resource for the Arab world. ICBA plans to build a living genebank of date palms as a resource for developing salt-tolerant date palms for the region in the future.

As well as these few projects aimed at managing the problems of increasingly saline irrigation water on date palms, other projects are being discussed which will make a difference to date production in the region. One example is a project to identify salt-tolerant genes and transfer them to commercial varieties of dates. Another is a project to use tissue-culture techniques to mass-produce propagules from individual date palms which have naturally adapted to a saline environment. These propagules can be used to study how these individual plants have adapted and become exceptionally salt-tolerant.

For more information contact:

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## MEETINGS

### International Atomic Energy Agency (IAEA) meeting on saline water in agriculture

The final meeting of the seven-country project “Sustainable utilization of Saline Groundwater and Wastelands for Plant Production” was held at ICBA, 12-16 October. Project coordinators from the IAEA, Morocco, Tunisia, Egypt, Syria, Iran, Pakistan, and the United Arab Emirates attended the meeting.

Mr. Jorge Morales, Inter-regional Projects Manager, IAEA, Eng. Mohammad Al-Asam, Assistant Deputy Minister for Water and Soils, Ministry of Agriculture and Fisheries, UAE, and



Workshop participants inspect salt-tolerant shrubs at ICBA

Member of ICBA's Board of Directors, and Eng. Abdullah Al-Mutawe'a, Director of Radiation Protection and Control Department, Ministry of Electricity and Water, UAE welcomed participants at the opening ceremony.

National Coordinators presented their country reports and described the results achieved. Workshop participants shared the lessons learned from their experience and made recommendations on what needs to be done further.

Dr. Mohammad Al-Attar, Director General ICBA, urged the IAEA to take a leading role in supporting further collaborative research in extending the results of the project to larger areas and other regions to gain additional economic

impact from this technology. He emphasized that cooperative regional projects will contribute enormously to passing on the results and scaling up adoption of biosaline agriculture.

Over the last six years, six of the seven countries in the region participating in this project, Morocco, Tunisia, Egypt, Syria, Iran, and Pakistan have been demonstrating aspects of biosaline agriculture to end-users in each country.

The Ministry of Agriculture and Fisheries in the United Arab Emirates, which joined the second phase of the project in 2000, recently designated ICBA to represent the UAE in the project.

### Joint UNESCO-ICBA workshop on arid ecosystems and water

The UNESCO Regional Office in the Arab States of the Gulf Countries, the Islamic Development Bank, and ICBA, jointly organized the 'Gulf Regional Expert Workshop on Arid Ecosystems and Water: Towards Policy Guidelines for Ecosystems and Water Management in the Gulf', 27-28 October, at ICBA headquarters.



Dr. Benno Böer and Dr. Miguel Clüsener Godt, UNESCO and Dr. Abdullah Dakheel, ICBA, at the UNESCO-ICBA Workshop on Arid Ecosystems and Water

Participants discussed the urgent need to initiate policies and strategies to manage ecosystems and water resources in the Arab Gulf states. Experts presented their experiences in the use of groundwater, desalinated water and treated drainage water in the region and identified critical areas for research.

## TRAINING

### Training Course on Quality Evaluation and Utilization of Salt Tolerant Forages

As living standards improve, diets change and people eat more meat and dairy foods, meeting the demand for more livestock products is one of many challenges faced by agricultural development workers. The rising demand for livestock products, together with population growth, is increasing pressure on agricultural land and freshwater used for livestock production.

One way of meeting this challenge is to develop forage crops that can be grown with saline water and on marginal and salt-affected land. This will conserve freshwater and prime agricultural land for more intensive agricultural crops. Fortunately, there are many salt-tolerant plants and halophytes that have a high potential for providing nutritious animal feed.

A one-week course, 22-26 February, co-sponsored by the OPEC Fund for International Development and held at ICBA headquarters and the United Arab Emirates University, focused on (i) production and management strategies for salt-tolerant forage plants and halophytes; and (ii) assessment of their nutritional value (*in vivo* and *in vitro*) and utilization in animal feed.

The course helped specialists in forage production and animal nutrition improve their knowledge of salt-tolerant forage crops, their growth, cultivation and use. It was also helpful to laboratory technicians involved in chemical and biochemical analysis of forage crops.

Course leaders were Dr. Abdullah Dakheel, Field and Forage Crops Scientist and Dr. Shoaib Ismail, Halophyte Agronomy Specialist, from ICBA, and Dr. Ghaleb Alhadrami, Assistant Dean and Associate Professor of Animal Nutrition and Eng. Adel Al-Awadi, Laboratory Specialist, from the United Arab Emirates University.