

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). The electronic version appears on ICBA's website www.biosaline.org

This newsletter is expected to serve 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.

Highlights of this issue are articles on the importance of rapid screening salt-tolerant plants in biosaline agriculture. Future issues will endeavor to carry such articles by scientists working on biosaline agriculture that would be of interest to all persons interested in saline agriculture.

The Editor will be pleased to receive short articles on research and development in saline agriculture; announcements of seminars, workshops, meetings and training courses; reviews of state-of-the-art saline agriculture and relevant new publications. Please send your submissions to:

The Editor
Biosalinity News, ICBA

Irrigated Farms of Abu Dhabi: Solving Water Logging and Resulting Salinity

The Sewerage Projects Committee of the Emirate of Abu Dhabi, UAE, requested ICBA to conduct investigative research on the extent of salinity resulting from water logging problems in important farm areas of the Emirate. The Extension Department of the Emirate requested ICBA to determine the extent of water logging and identify critical areas for drainage.

In collaboration with a private sector company, ICBA launched a study of an initial grid of 28 farms in a coastal farming area in Abu Dhabi. This farming area is served by a branched irrigation pipe network, supplying water procured from several ground water sources. Soil samples were collected at 50 cm below the surface, along with irrigation and ground water samples. The samples were first investigated at ICBA and saturated paste extracts of the soil samples were later analyzed at the Abu Dhabi Municipality Agriculture Laboratory. The objective was to identify sources as well as patterns of ground water movement. A topographical investigation was also conducted to identify natural depressions in the area under study and subsequently a topographical map was obtained using the data.

The study revealed the presence of a clay layer at several locations in the study area. Water logging was most severe at these locations during the agricultural season, particularly during irrigation.

A subsurface drainage system with a large radius of influence was designed for critical locations in this farming area. In a subsequent effort, about 80 piezometers were installed at various locations throughout Al-Ajban farming area. Ground water levels were measured using these piezometers prior to the installation of the drainage network.

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Water-logged farms in Abu Dhabi (left) and ICBA Irrigation Management Scientist Dr Bassam Hasbini collecting soil samples.

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SOLVING WATER LOGGING AND RESULTING SALINITY (Cont. from Page 1)

Construction activities of the drainage network are currently underway and will be completed by May 2002. ICBA will continue monitoring groundwater levels as well as incoming water quality to design a water allocation scheme that will serve the purposes of irrigation and leaching of salts in salt-affected farms. This project, when completed, is expected to enhance agricultural productivity of some 180 hectares of farmland.

Memorandum of Understanding (MoU) Signed with AOAD

In October 2001, ICBA signed an MoU with the Arab Organization for Agricultural Development to collaborate in activities relating to biosaline agriculture. Dr Salem Al-Lozi, Director General of AOAD, and Dr Mohammad Al-Attar, ICBA's Director General were the signatories of the agreement signed in Dubai.

AOAD is a regional inter-governmental technical organization working under the umbrella of the League of Arab States, with a mandate to enhance agricultural development in the Arab region. Its headquarters are in Khartoum, Sudan. Its workplan, policies and budget are determined and approved by its General Assembly, which is composed of Ministers of Agriculture in the 21 Arab Member States.

The objectives of AOAD emanate from sense of realization, conviction and desire of Arab Member states to explore avenues for strengthening relations and developing cooperation in different agricultural activities to achieve food self-sufficiency and surplus in a framework of regional agricultural and economic integration.

ICBA SIGNS NEW AGREEMENT



Mr Jacques Diouf, Director General of FAO, (right) and Dr Mohammad H Al-Attar, Director General of ICBA sign the Memorandum.

ICBA Signs Accord with FAO in Rome

The Food and Agriculture Organization of the United Nations (FAO) will collaborate with ICBA, in existing or cooperative programs in the fields of agriculture, food, rural development and the environment with specific relevance to biosaline agriculture. This is an outcome of a Memorandum of Understanding signed between the two organizations in Rome on 11 February.

The signatories of the important accord were Mr Jacques Diouf, Director General of FAO and Dr Mohammad H Al-Attar, Director General of ICBA.

The recognition of ICBA by FAO is a boost to the role of international agricultural research in the Near East and particularly in ICBA host country, UAE.

Both President of the Islamic Development Bank Dr Ahmad Mohamed Ali, and the UAE Minister of Agriculture and Fisheries Saeed Bin Mohammad Al-Raqabani,

provided encouragement and support to cement the relationship between the two organizations.

The ICBA delegation later held discussions with senior executives of FAO to build on this important accord at FAO headquarters in Rome following signing ceremony. The ICBA delegation consisted of Director General Dr Mohammad Al-Attar, Director of Technical Programs Prof. Faisal Taha, and Donor Relations Specialist Mr Jugu Abraham.

FAO is a specialized agency of the United Nations with headquarters in Rome, Italy. FAO's mandate includes collecting, analyzing, and disseminating information, advising governments on political and planning matters acting as an international forum to debate questions regarding food and agriculture, and providing direct aid for development.

At the request of FAO, ICBA will collaborate in the preparation of studies that are of a scientific, technical or economic nature.

ICBA'S RESOURCE MOBILIZATION

IAEA Gives ICBA Modest Financial Support for Research Activities

Following ICBA's participation in the Annual Meeting of the Coordinators of the International Atomic Energy Agency (IAEA) in Amman, Jordan, IAEA has committed in-kind and financial support to ICBA for various activities. Prof. Faisal Taha, Director, Technical Programs, participated in the meeting.

As many as thirteen nominees of IAEA will participate in training courses to be conducted at ICBA during 2002 at the expense of IAEA. The Vienna-based organization will support the cost of an extension agent/farmer to benefit from a hands-on training for 2 weeks in Pakistan. Partial support for an in-country training course in UAE has also been pledged.

IAEA has decided to award three fellowships for Algerian and Iranian nationals to work at ICBA for a month. It has also provided funds for

fellowships for ICBA staff to work on isotope hydrology in Pakistan/Spain/Poland. Partial support worth US\$3000 has been committed by IAEA for a senior ICBA scientist to visit research and development organizations in India and Pakistan.

IAEA has decided to provide US\$3000 to ICBA to procure salt-tolerant seeds for its research activities.

ICBA will also benefit from IAEA's decision to provide ICBA with research equipment worth US\$ 15,000.

ICBA and IAEA signed an MoU in Dubai on 23 March 2002. This MoU identifies many areas for joint collaboration. Mr Jorge Morales Pedraza, Inter-Regional Projects Manager, IAEA, expressed strong interest to jointly develop with ICBA and other relevant organizations an Inter-Regional Project in the field of biosaline agriculture.

Dubai Supplies Water Free of Cost to ICBA

On 10 October 2001, the Ruler's Court of Dubai decided to waive ICBA from charge of water supplied to the Center for research purposes. Water is a critical resource for research experiments in biosaline agriculture and a costly commodity in Dubai.

Dr Mohammad Al-Attar, Director General of ICBA stated that this decision of in-kind support by the Rulers of Dubai is a significant contribution to ICBA that can be valued between US\$ 0.25 million and \$0.5 million per annum. This decision also emphasizes the progressive commitment of the Ruler of Dubai and of the UAE towards agricultural research and efforts to conserve natural resources in the Near East and other parts of the developing world.

OPEC Fund Provides Grant for Training and Networking

The OPEC Fund for International Development approved a grant for US\$ 200,000 that will partially support ICBA's training activities for the years 2002 and 2003 and its web-hosted Global Salinity Network. This is the third grant from the donor to ICBA since its inception.

However, this support will be directed to benefit the least developed countries among the member-countries of the Islamic Development Bank (IDB). Invitations were sent to 19 IDB least-developed countries to nominate a participant each for the first training course at ICBA in the

year 2002. The responses from countries ranging from Senegal in West Africa to Bangladesh in South Asia have been encouraging. Presently, rich member countries of the IDB are invited by ICBA to nominate participants from their countries to attend the courses free of cost. However, these countries support the nominees' travel and living costs in Dubai for the duration of the course.

The OPEC Fund for International Development had provided \$1.25 million over the earlier two grants to develop ICBA's irrigation facilities and has emerged as the second highest donor of ICBA after IDB.

ICBA FORGES PARTNERSHIPS

ICBA Joins Global Water Partnership

ICBA is now recognized as a consulting partner of the Global Water Partnership (GWP). Dr Khalid Mohtadullah, Executive Secretary of the GWP Secretariat, located in Stockholm, Sweden, officially declared ICBA as a GWP consulting partner in a communiqué to Dr Mohammad Al-Attar, Director General, ICBA.

GWP is committed to supporting the implementation of integrated water resources management worldwide. GWP's mission is to support countries in the sustainable management of their water resources.

ICBA's commitment to the world body is to endeavor to efficiently maximize sustainable agriculture and horticulture by using saline and low-quality water, thus conserving global fresh water resources, especially the dwindling fresh water resources in UAE and other GCC countries, currently partially utilized in an unsustainable manner for agriculture and landscape management activities.

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 management 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 World Bank, the United Nations Development Program (UNDP) and the Swedish International Development Agency (Sida) created the GWP in 1996.

The GWP is a working partnership among all those involved in water management: government agencies, public institutions, private companies, professional organizations, multilateral development agencies and others committed to the Dublin-Rio principles.

Today, this comprehensive partnership actively identifies critical knowledge needs at global, regional and national levels, helps design programs for meeting these needs, and serves as a mechanism for alliance building and information exchange on integrated water resources management.

ICBA's induction into the GWP is expected to sharpen the focus of sustainable use water management in the Gulf region among the global partners in the water initiative.

CGIAR Recognizes ICBA as a Partner

ICBA is now acknowledged as a partner of the Consultative Group on International Agricultural Research (CGIAR) with its headquarters at the World Bank in Washington, D.C., USA. The web site of the CGIAR lists ICBA as a Partner of the global agricultural research group. ICBA is the only such CGIAR Partner located in the Middle East and the Near East.

The CGIAR is an association of 58 public and private members, who support a system of 16 international agricultural research centers known as the Future Harvest centers spread around the world. Some of these centers played a pivotal role in the Green Revolution in India in the sixties. The CGIAR is sponsored by the World Bank, Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), and the United Nations

Development Programme (UNDP). Acceptance of ICBA as partner of this association is a recognition of agricultural research activities in the region.

GCC to Join CGIAR

H.E. Sa'eed Bin Mohammad Al-Raqabani, the UAE Minister of Agriculture and Fisheries, knowing the quality work of CGIAR in agriculture was very supportive of the GCC countries joining CGIAR. Thanks to his long-term vision, all the GCC countries have decided to join CGIAR in 2002. Collectively the GCC countries will contribute US\$ 500,000 annually in support of CGIAR's agricultural research activities that are of relevance to the regional needs. The General Secretariat of the GCC will be representing all the GCC countries at the CGIAR annual meetings and other related events.

ICBA Becomes Associate Member of APAARI

ICBA is now recognized as an Associate Member of the Asia-Pacific Association of Agricultural Research Institutions (APAARI), an association with headquarters in Thailand. ICBA received a communication to this effect from the Executive Secretary of APAARI, Dr R S Paroda.

APAARI's mission is to promote the development of national agricultural research systems in the Asia-Pacific region through inter-regional and inter-institutional cooperation.

"This will increase the much desired representation of the West Asian region in the Asia-Pacific body," said Mr Paroda, in a letter to Dr Mohammad

Al-Attar, Director General of ICBA.

Acceptance of ICBA as an associate member of this association is a recognition of agricultural research activities in the region. In November 2001, Prof Faisal Taha, Director, Technical Programs at ICBA, attended the Sixth Executive Committee Meeting of APAARI meeting in Thailand.

During the APAARI meeting, held to set regional priorities for agricultural research, soil and water salinity emerged as a high research priority for Pakistan, Iran and Bangladesh. Representatives of the three countries at the meeting expressed interest to collaborate with ICBA in this area of research.

Memorandum of Understanding (MoU) Signed with Sudan

On 30 Dec 2001, ICBA signed an MoU with Sudan to collaborate on activities relating to biosaline agriculture. Dr Faisal Hassan Ibrahim, Minister of Agriculture, Animal Wealth and Irrigation, State of Khartoum, Sudan, and Dr Mohammad Al-Attar, ICBA's Director General were the signatories of the agreement signed at ICBA's headquarters in Dubai. The agreement will be in force initially for four years.

The Sudanese Minister specifically sought collaboration from ICBA in the field of research and production of animal feed. The dignitary addressed a press conference at ICBA and later viewed various on-going experiments at ICBA.

IFAD President Meets with ICBA Delegation

A high-level delegation from ICBA, consisting of Director General Dr Mohammad Al-Attar, Director of Technical Programs Prof Faisal Taha, and Donor Relations Specialist Mr Jugu Abraham met with Dr Lennart Båge, the President of the International Fund for Agricultural Development (IFAD) at IFAD's headquarters in Rome.

Dr Bage was briefed on ICBA's efforts to conserve fresh groundwater by growing salt-tolerant crops irrigated with salty water on marginal lands, provision of training for professionals in least developed countries and initiation of possible areas of collaboration in agricultural research between the two institutions in the Near East and North Africa. Dr Båge expressed interest and support for ICBA's activities in developing countries. He welcomed cooperation with the Center and indicated interest to visit ICBA during the Annual Meeting of the World Bank in September 2003 in Dubai.

IFAD is a specialized agency of the United Nations established in 1977 to finance agricultural development projects primarily for food production in the developing countries. IFAD is a co-sponsor of the Consultative

Group on International Agricultural Research (CGIAR), a global body that has recognized ICBA as a partner institution. IFAD supports agricultural projects that benefit the poor in rural areas of developing countries.

Ruler of Sharjah Receives ICBA's Director General



His Highness Dr Shaikh Sultan bin Mohammed Al Qasimi, Member of the Supreme Council and Ruler of Sharjah (right), officially received Dr Mohammad Al-Attar, ICBA's Director General on 23 January. Dr Al-Attar briefed His Highness on the role of ICBA and praised the Ruler of Sharjah for his support to Arab scientific and cultural institutions.

SALT TOLERANCE IN PLANTS

DEVELOPING METHODS TO RAPIDLY SCREEN PLANTS AT ICBA

Dr Shoaib Ismail, Halophyte Agronomist, ICBA

Salt-tolerance is the ability of plants to survive under excess salts in the rooting medium without any adverse affects. This has been a debatable definition, as the tolerance to salts in plant species varies with stage of growth. Plants known to be sensitive to salts during germination are known to tolerate very highly salinities during vegetative stages (as do most of the halophytes). On the other hand, those plants that exhibit higher tolerance in the early stages may not necessarily show the same tolerance later. In addition to the type and concentration of salts present in the growth medium and the ambient environmental conditions, the level of tolerance has much to do with genetic factors. Even seeds of the same species collected from different agro-ecological zones around the world (accessions) exhibit significantly different response to salts. As such, testing seed lots for salt tolerance is done at two levels, (i) new crops/varieties and/or wild plants to be released for commercial purposes; (ii) species introduced into a new geographical region.

Testing for salt tolerance has been conducted for many years and still continues as more varieties among crop species are released each year. In addition, plants that were considered as “wild” are assessed for their economic potential as food, feed, oil, wood, medicine, etc. These studies have been carried out at different levels, from laboratory germination studies (in petri dishes), to pots and field studies. The choice of the method depends on the objectives and duration of the study intended. Normally petri dishes studies are conducted for a quick assessment, whereas, field studies are preferred for long-term evaluation.

The laboratory/greenhouse test is usually a rapid one where seeds are grown over a range of salinity levels for a specific duration. It is preferred to use a system whereby

there is no permanent accumulation of salts in the growth medium. Hence, except for studies in petri dishes (where the saline solution permanently remains), others are preferably grown under soil-less conditions (hydroponic), in gravel culture or in pure sand. The data recorded usually include germination, survival and growth (depending on the duration of the experiment). Growth is monitored in terms of shoot height, number and size of leaves, inflorescence and seed production (if any), etc. Using mathematical models, salt tolerance of the test species can be determined as the threshold salinity level (maximum salinity level without any effect on growth of the plant) and the slope value (reduction in growth with unit increase in salinity level). The most commonly used is the one proposed by Maas and Hoffman in 1977 (*Crop salt tolerance – current assessment* Jour. Irrig. Drain. Div., 103: 115-130.)

$$Y = 100 - b (EC_e - a)$$

where,

Y = Relative yield
of plant

a = Threshold salinity

b = Slope

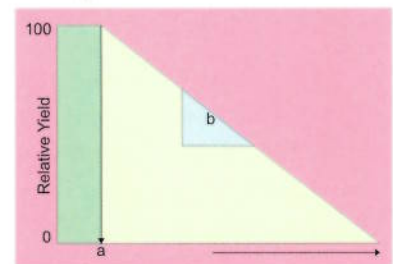


Figure: Mathematical model developed by Maas and Hoffman to determine salt tolerance in plants.

The seeds of potentially salt-tolerant plants are acquired by ICBA under exchange protocols with different centers all around the world. The gene bank at ICBA presently holds more than 6000 plant accessions, many of which are potentially salt tolerant. Screening is conducted in locally fabricated systems where small pots are filled with fine gravel and irrigated with different levels of saline water (EC_{iw} 10-40 $dS.m^{-1}$) at

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Salt-tolerance screening at ICBA: (left to right) pot studies; lysimeter studies of mangrove species in collaboration with ERWDA; and field studies.

increments of 5 dS.m⁻¹. The saline solution is prepared in nutrient solution and irrigated after every 1 hr for 5 minutes. The drained solution is recovered in the respective storage tanks and re-utilized. The study period ranges from 6 to 8 weeks depending on the growth of the plants. The current setup is able to assess the tolerance level of 30 different species/accessions at a time. Temperature, humidity and light are controlled through an automatic environment-controlled system.

ICBA has also developed facilities for testing the salt-tolerant genetic material (after initial screening) through locally fabricated lysimeters. This provides the necessary information regarding optimal water requirement (for different salinity levels) needed to calculate the salt-balance between irrigation and drainage water, soil salinity, and salt uptake by plants. Calculations are done on the basis of the volume of water added to the system (sandy soils) with the respective salt loads and the deter-

mination of the volume of water drained and its salinity. The difference indicates the amount of salts in the soil profile and plants after evapo-transpiration. Currently, ICBA is undertaking trials on salt-tolerant *Salavadora persica* and *Haloxylon salicornicum*. In addition, trials are also conducted in co-operation with Environment Research and Wildlife Development Agency (ERWDA), Abu Dhabi, UAE, on three exotic mangrove species, *Rhizophora mucronata*, *R. stylosa* and *Cerriophora tagal*.

A RAPID METHOD TO SCREEN SORGHUM FOR SALT TOLERANCE

Ghassan Al-Laham, Directorate of Scientific Agricultural Research, Field Crops Section, Damascus, Syria

Sorghum (*Sorghum bicolor*) is a typical crop in the drylands of the Middle East, best suited to marginal lands that receive low rainfall. In these areas, soluble salts are found in abundance due to the scarce rainfall. Currently, there are no in-depth studies to elucidate genotypic responses of sorghum to high salinity stress and their ability to resume growth, once the stress is overcome.

Salt-tolerant sorghum genotypes are essential for salt-affected areas of the world. Engineering solutions to the salinity problem are expensive. Irrigation with low quality water only aggravates the problem.

The objective of this research was to develop a screening method capable of identifying salt tolerant genotypes in sorghum. In order for the screening method to be fully efficient, it has to mimic the natural salinity stress in the field. Plants are usually subjected initially to a non-lethal salinity level before facing a lethal one. This "stress induction" prepares the plants for the lethal salinity level, and this is why an "optimal stress induction" level and an "optimal lethal" level were included, before transferring the plants to normal growth conditions to resume growth with fresh water irrigation.

Methodology: Two-day old sorghum seedlings were subjected to several stress-inducing salinity levels (0, 50, 100, 125, 150 and 200 mM NaCl) for 16 hours, and then the seedlings were transferred to one of several (300, 400, 450, 500, 550, and 600 mM NaCl) lethal salinity levels for 48 hours. The seedlings were transferred after this to petri dishes, and were allowed to resume growth under normal (fresh water) conditions for 72 hours. A control treatment was included, where seedlings were allowed to grow for the whole period under fresh water conditions. At the end of the 72-hour period,

seedling height and root length were recorded for each seedling and treatment, and the reduction in these two traits, as compared with the control, was recorded and statistically analyzed.

Results: The different combinations of sub-lethal and lethal salinity stress levels were successful in elucidating genotypic differences in tolerance to salinity. The rate of reduction in seedling height and root length increased as the salinity level increased. The 150 and 400 mM NaCl were found to be the optimal sub-lethal and lethal salinity levels, respectively; the rate of reduction in both seedling height and root length were the lowest for these two salinity combinations, as compared with the rest.

These two salinity levels were then used to screen a large sorghum germplasm collection, where some Syrian varieties (e.g., Izra'a 10, Izra'a 15 and Izra'a 18) were found to be salt tolerant, while others (e.g., Izra'a 22) were found to be highly sensitive.

Conclusions:

1. There is ample genetic variation for salinity tolerance in sorghum,
2. The ability of stressed seedlings to resume growth is one of the most important phenotypic traits reflecting genotypic stress tolerance; it was possible to identify stress tolerant genotypes and select them for field studies,
3. The proposed screening method is a quick, and easy one to identify stress susceptible and stress tolerant 48-hour old seedlings, and to accomplish the screening procedure within 7 days.
4. It is hypothesized that subjecting the seedlings to a sub-lethal salinity level will lead to a better tolerance to lethal salinity levels.

ICBA PARTICIPATES IN INTERNATIONAL WATER RESOURCES CONFERENCE

At the invitation of the Zayed International Prize for the Environment, ICBA participated in the Dubai International Conference on Integrated Management of Water Resources in the Third Millennium, held 2-6 February 2002.

ICBA's contributed by organizing a workshop on "Alternative Water Resources Management Technology" that was held on the fourth day of the conference. The workshop was chaired by Prof Faisal Taha, Director, Technical Programs, ICBA. Dr Mohammad Al-Attar, Director General of ICBA, chaired the session on Water Management. Dr Bassam Hasbini, ICBA's Irrigation Management Scientist, and Dr Taha presented a technical paper during the event.

In concert with the international conference, an International Exhibition on Water and Energy Technology was held in Dubai. ICBA participated by presenting an exhibit of its publications and posters.



Visitors at ICBA's stall at the International Exhibition on Water and Technology in Dubai

ICBA TO PARTICIPATE IN INTERNATIONAL WORKSHOP IN CANADA

An international workshop on "Crop Water Management for Food Production under Limited Water Supplies" will be held in Montreal, Canada, in July 2002, in conjunction with the 53rd International Executive Council Meeting of the International Commission on Irrigation and Drainage (ICID). Organized by the national committees of ICID in Canada and Italy, the event will be held under the auspices of two UN organizations—the Food and Agriculture Organization and the World Bank and in cooperation with five other organizations including ICBA.

The main objective of the workshop is to bring together eminent international experts to make recommendations on methods and strategies suitable to overcome the regional extreme yield variability in deficit and uncertain water conditions and to achieve the maximum food production with an appropriate water allocation.

ICBA will be involved in the discussions on adoption of drainage and scheduled irrigation to prevent water-logging and salinity risk and improved technology to overcome the adverse environmental impact of poor quality irrigation water.

Further details on the workshop are available with the Italian National Committee of ICID, Rome, Italy. Email: italcid@libero.it Fax +39-06-4884728

A related event at the same venue will be an international workshop on irrigation advisory services and participatory extension in irrigation management.

Human Resource Development: Three Courses Each Year

Three courses to enhance human resource capabilities of the national agricultural research systems are being held each year since 2001 at ICBA headquarters in Dubai. The following courses have been planned/conducted for 2002.

- Design and Management of Irrigation Systems for Biosaline Agriculture, 9-13 March

Twenty-four participants from 12 countries (Bangladesh, Egypt, Jordan, Lebanon, Oman, Pakistan, Palestine, Senegal, Sudan, Syria, UAE, and Yemen) participated in the 5 day course.

- Production and Management of Salt Tolerant and Halophyte Forages and Tree Species, 27 April to 2 May 2002

- Agroecological Surveys and Germplasm Collections, October 2002 (dates to be decided)

Participating agencies will be required to support travel and accommodation expenses of their nominees. ICBA will coordinate transportation and housing for participants coming from outside the UAE.

A limited number of participants from least developed member-countries of the Islamic Development Bank, nominated by their national agricultural research authorities and accepted by ICBA, will be provided air travel, accommodation and board by ICBA on behalf of the OPEC Fund for International Development for the duration of the courses held during 2002 and 2003.

For additional details, visit our web pages: www.biosaline.org/tc_2002.htm and www.biosaline.org/tc_2003.htm

ICBA to Co-sponsor Horticulture Symposium

Under the patronage of His Highness Sheikh Tahnoon Bin Mohamed Al Nahyan, the Ruler Representative for the Eastern Province, Deputy Chairman of the Executive Council and the Chairman of the Al Ain Municipality, the Al Ain Municipality and Town Planning Department and the Al Ain Economic Development and Tourism Promotion Department are organizing "the Second International Symposium on Ornamental Horticulture in Arid Zones" from 1 to 3 April 2002 at Al Ain, UAE. Co-sponsors of the event are the United Arab Emirates University and ICBA.

Prof. Faisal Taha, Director of Technical Programs at ICBA, will serve as rapporteur for this important symposium.

The symposium is expected to foster better utilization of available natural resources and review among other facets of ornamental agriculture, the state-of-the-art technologies and research findings regarding irrigation and saline water application in ornamental horticulture and landscape maintenance.