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Biosalinity News

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FROM THE EDITOR

In this issue we report on another important step forward in the implementation of the project 'Saving freshwater resources with salt-tolerant forage production in marginal areas of the West Asia and North Africa (WANA) region - an opportunity to raise the incomes of the rural poor'.

The project aims to impact poverty, but how do we ensure that we understand the major characteristics of poverty in the specific target population and that we measure the relevant characteristics? This is the first time that socio-economic aspects have been included in an ICBA project and, to help identify appropriate indicators and methodology, ICBA sought the advice of an expert group of socio-economists from the region.

This group generously and enthusiastically shared their experiences and expertise, with the result that a realistic methodology and plan of action has been developed.

This is a wonderful example of sharing, exchange of knowledge and experience, and of capacity building. We all gained a great deal from the exchange of experiences.

This issue also features a contribution on some aspects of halophyte utilisation research in the European Union. Once again, may I remind you that The Editor welcomes such short contributions on research or projects that would be of interest to readers.

Please send your submissions to:
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Seminar on managing salinity at Islamic Development Bank Annual Governors' Meeting in Malaysia

The seminar on managing salinity sponsored by ICBA and the Malaysian Agricultural Research and Development Institute (MARDI) at the Annual Meeting of Islamic Development Bank Governors in Malaysia, June

In June, Islamic Development Bank Governors gathered in Kuala Lumpur, Malaysia for the thirtieth Annual Governors' Meeting.

To highlight the achievements of ICBA in the fields of poverty alleviation and working with the private sector, ICBA and the Malaysian Agricultural Research and Development Institute (MARDI) co-sponsored a seminar on 'The Activities of the International Centre for Biosaline Agriculture'.

The seminar was chaired by H.E. Dr. Amadou Cisse, Vice-President Operations, Islamic Development Bank, and was attended by senior staff and scientists from MARDI, IDB, and major universities in Malaysia.

Dr. Mohammad Al-Attar, Director General ICBA, warmly welcomed participants. Dr. Bassam Hasbini, Irrigation Management Scientist, made a presentation on 'Success Stories at ICBA'.

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Expert consultation determines socio-economic indicators for WANA salt-tolerant forage project

Participants of the Expert Consultation: (front row from left) Dr. Amer Fahed Abed Al Nsour, Jordan; Dr. Ali Chebil, Tunisia; Dr. KPC Rao, Principal Scientist, ICRISAT; Dr. Majed Zakaria, Ministry of Agriculture and Fisheries, UAE; Dr. Sandra Child, ICBA; Dr. Mohammad Al-Attar, ICBA; Mr. Hasnain Shah, Pakistan; (back row from left) Dr. Shabbir Shahid, ICBA; Mr. Amjad Bader, Syria; Dr. Shoaib Ismail, ICBA; Dr Faisal Taha, ICBA; Mr Jugu Abraham, ICBA. (Dr. Abdullah Dakheel, ICBA, and Dr. Bassam Hasbini, ICBA, also participated but are not in the photo.)

A group of experts met at ICBA to contribute their expertise and experience to help ensure that the socio-economic aspects of the project 'Saving freshwater resources with salt-tolerant forage production in marginal areas of the West Asia and North Africa (WANA) region - an opportunity to raise the income of the rural poor' are appropriately addressed. The consultation was funded by IFAD and other donors.

During stimulating discussions, the experts identified and defined the socio-economic indicators that will measure the impact of the project on poverty reduction in the target rural areas in the seven WANA countries.

Five of the seven countries implementing this project participated in the consultation: Jordan, Pakistan, Syria, Tunisia and the UAE, together with Dr. KPC Rao, a specialist in socio-economics from ICRISAT. The outcomes of the consultation will be shared with the non-participant countries.

The proposed framework (Table 1) and guidelines developed during the consultation will now be forwarded to each NARS technical coordinator for review and finalization.

Table 1 Proposed framework for socio-economic assessment of salt-tolerant forage production in WANA

Activity	*Socio-economic indicators*	*Method of analysis*
Analysis of the current situation (survey by questionnaire)	·Income ·Employment ·Gender participation ·Productivity of 1 m^3 water ·Knowledge about the use of saline water ·Livestock productivity ·Forage composition	Descriptive analysis
Analysis of proposed alternatives	Profitability and sustainability of proposed alternatives	·Partial budget analysis ·Financial analysis of alternative investments
Assessment of profitability of new technologies	Perceptions of farmers and farm level profitability	·Tabular analysis ·Partial budget analysis ·Financial analysis of alternative investments
Early adoption/impact studies through repeat survey and prediction of long-term impact	Adoption rates, changes in baseline socio-economic indicators	·Descriptive analysis ·Cost-benefit analysis ·Simulation analysis

Session on Biosaline Agriculture Technology proposed for fourth WWF meeting, Mexico, 2006

At the June preparatory meeting for the 4th World Water Forum (WWF) in Mexico in 2006, sponsored by the Arab Water Council and World Bank and held in Cairo recently, the Islamic Development Bank (IDB) made a commitment to sponsor a session on Biosaline Agriculture and Biosaline Technology. IDB and The Arab Water Council will collaborate with ICBA to organize the session. ICBA was selected as convener, and Professor Dr. Faisal Taha, Director of Technical Programs at ICBA, will liaison with participated organizations.

Japanese Consul visits ICBA

Mr. Arakawa, Consul from the Consulate General of Japan in Dubai, visited ICBA's facilities on 28 June. He had extensive interactions with Dr Al-Attar, ICBA's Director General, who briefed him on the Center's activities. Mr. Arakawa, who is fluent in Arabic, evinced considerable interest in ICBA's activities in the region.

ICBA Director General, Dr. Mohammad Al-Attar (left) and Mr. Arakawa from the Consulate General of Japan in Dubai (right) meeting at ICBA, 28 June, 2005

Farewell to departing staff

Dr. Mohammad Al-Attar with departing staff, Dr. John Stenhouse, Dr. Sandra Child, and Dr. Bassam Hasbini, at the farewell dinner

Dr. Bassam Hasbini, Irrigation Management Scientist, was the very first scientist to join ICBA when the Center was established in 1999. Dr. John Stenhouse, Plant Genetic Resources Scientist, and Dr. Sandra Child, Communications Specialist, joined ICBA in 2002.

These three senior staff are now leaving , and ICBA management and staff bade them farewell and wished them well for the future at a dinner at the Grand Hyatt, Dubai, on 25 June.

Dr. Hasbini will be taking up a position in the private sector in Abu Dhabi. Dr. Stenhouse will be returning to Scotland and undertking a series of consultancies. Dr. Child will be accompanying her husband on a posting to Tajikistan.

New ICBA staff

Two new members of staff joined ICBA recently. Carla Mellor, an Australian, is ICBA's new library consultant. Carla brings a wealth of knowledge and over 20 years experience in library and information services.

Loubna Baya, from Morocco, will provide administrative support for the Inter-Islamic Network on Biosaline Agriculture.

ICBA warmly welcomes Carla and Loubna and looks forward to their contributions to enhancing ICBA's library and information services, and services to INBA members.

INTER-ISLAMIC NETWORK ON BIOSALINE AGRICULTURE (INBA)

New information services for INBA

Members of INBA will soon receive details of new information services that will be provided by the Library and Information Services, International Center for Biosaline Agriculture.

Services will include: assistance with finding information sources on topics relating to salinity; a bibliographic search service; a reference request service for ICBA library materials (copyright permitting) for research purposes; and an alert service for additions to the ICBA library collection. Scientists in OIC-member country R&D organizations, ministries of agriculture and water resources, universities, national, regional and international agricultural research and development agencies, extension services, and end-users, including farmer groups and non-governmental organizations (NGOs), will be able to request these services through their INBA Country Coordinator.

COMSTECH meeting, November 2005

The 12th Session of the General Assembly of COMSTECH, will be held 22-24 November, 2005, in Islamabad, Pakistan. Progress reports of all the Inter-Islamic Networks will be submitted during the meeting, including the Inter-Islamic Network on Biosaline Agriculture (INBA).

Database of scientists

A key role of INBA is to encourage communication between scientists in OIC member countries who are working on issues relating to Biosaline Agriculture. One of the first activities of INBA has been to begin the process of preparing a database of scientists engaged in this field of agriculture.

The construction of the database is well under way and it is hoped that the first version will be ready by the third quarter of this year. Both hard and soft copies of the database will be distributed during the 12th Session of the General Assembly of COMSTECH.

Leading R&D organizations in OIC-member states will also receive copies of the database.

Scientists who wish to be included in the database and who have not yet been contacted by ICBA may request the form for providing information for the database from Dr. Shoaib Ismail, Coordinator INBA (s.ismail@biosaline.org.ae) or Loubna Baya, INBA Administrative Assistant (l.baya@biosaline.org.ae).

Individuals who complete and return the forms by the end of August 2005 will be included in the first version of the database.

COLLABORATION

ICBA and INRA, Morocco, sign MOU

ICBA and the Institut National de la Recherche Agronomique (INRA) signed a Memorandum of Understanding during the regional workshop on 'Integrated management of saline water resources and environments for forage production in the North Africa Region' held in Rabat, 13-18 June.

The MOU will foster collaboration between ICBA and INRA in research and development, exchange of information, training and seminars, and seeking funding to support joint activities of common interest.

Dr. Hamid Narjisse, Director General INRA (left) and Dr. Mohammad H. Al-Attar, Director General ICBA (right), signing the MOU

Priorities for sustainable production of forage in saline environments in North Africa

Outcome of the workshop on Integrated mnagement of saline water resources and environments for forage production in the North Africa Region, Rabat, Morocco, 13-18 June 2005. Dr. Abdullah Dakheel, ICBA

Regional workshops provide a fertile environment for participants from countries with similar environments and agricultural systems to share their knowledge and experiences and develop strategies for moving forward to solve key common problems.

During the regional workshop (see page 8 of this newsletter for a report and photos) on 'Integrated management of saline water resources and environments for forage production in the North Africa Region' held in Rabat in June, scientists from Algeria, Egypt, Mauritania, Morocco, and Tunisia exchanged views and with the help of specialists from the Institut National de la Recherche Agronomique (INRA) the Desert Research Center (DRC), Egypt, and ICBA, developed a list of priorities for the region.

Identifying packages of salt-tolerant plant production systems

There is a need to develop plant production packages, including management options, suitable for different salinity levels encountered in dry environments. Production packages should take account of environmental and economic feasibility. Special attention should be given to identifying systems for water-limited environments such as oasis systems and areas with limited groundwater resources.

Irrigation and drainage systems

The need to critically evaluate modern irrigation and drainage systems from economic and environmental perspectives and to determine situations where they can be efficiently applied.

Agricultural drainage water

The need to identify environmentally sustainable and economically feasible systems for the use of agricultural drainage water in plant production and other uses.

Continuous monitoring of soil and irrigation water salinity

The use of saline water/soils in agricultural production, either as a normal agricultural practice or as a part of a specially designed Biosaline Agriculture Production System, as a solution to an existing salinity problem, has a great risk associated with it. Salinity thresholds should be monitored and proper management intervention applied.

Strategy to increase forage productivities of sabkhas and salt-affected rangelands

Such natural systems are abundant in arid environments; there is a need for biosaline agriculture to develop strategies to optimize productivity of such ecosystems.

Biotechnology and genetic engineering in biosaline agriculture

Several areas were identified including:

a. The use of tissue culture techniques for the propagation of salt-tolerant plants and halophytes that are not efficient in seed production. Practical large-scale adoption of halophyte cultivation is limited in many instances by lack of appropriate techniques to propagate and mobilize such plants.

b. The use of marker-aided techniques in selection and breeding of improved salt-tolerant genotypes.

c. Genetic engineering and gene transfer has great potential to enhance salinity tolerance and productivity in conventional and non-conventional plants.

Remote sensing and mapping of soil salinity

This is recognized as an important tool in management of salt-affected environments and in planning land use strategies.

Capacity building

Priorities identified include:

a. Regional workshops and training activities organized on regular basis

b. Hands-on training for trainers and project implementers in the field

c. Exchange of visits among scientists and technicians in institutes involved in biosaline agriculture

d. Identifying effective means for information exchange among regional institutes

Role of ICBA and other national and international research institutes in the region

Priorities include: coordination among regional institutes; facilitating exchange of information; capacity building and development of bilateral and multilateral projects.

Cashcrop halophytes: The future of desert greenification

Helmut Lieth and Hans-Werner Koyro for the European team of halophyte utilisation researchers

For almost a decade a European consortium of saline systems researchers has worked to develop a procedure for sustainable utilisation of halophytes for food production, fodder production and landscape management. Towards this goal, the consortium of plant physiologists, animal physiologists, biochemists, ecophysiologists and ecological modelers are cooperating to design a sustainable system of halophyte utilisation, based on the best scientific knowledge on halophytes (and soils) and the economic feasibility under particular conditions, and are implementing pilot projects.

The consortium is promoting the use of seawater, solar energy and halophytes in desert countries with ocean or sea coasts to enable people to live in hitherto uninhabited deserts. For the European region these conditions mainly exist in countries near the Mediterranean Sea, and in North Africa.

The members of the consortium have demonstrated through pilot projects that sustainable saline production systems are economically feasible and provide acceptable living conditions for men and livestock in many Mediterranean desert areas.

History of halophyte utilisation in Europe

The use of halophytic species as food and fodder has a long history in coastal areas of Europe. Species such as *Aster tripolium*, *Salicornia* sp. and *Triglochin maritima* were commonly used as vegetables, cooked or as salad, for fodder, and as an ornamental species. Furthermore, many species were collected for herbal tea and for folk medicine. Migrating birds are known to feed on several halophytes, and these species were therefore used as landscape management species.

Tall reeds in salt marshes were used for roofing material and as reinforcement for adobe fillings between the wooden oak frames of the walls of houses near the coast.

The knowledge of the utilisation of these species still persists in local communities but agricultural developments during the last hundred years have caused the population in general to rely on rainfed agriculture, since most of the land area in Europe gets enough rain for both grain and fodder crops. Some knowledge of uses of halophytic species is still available though and so is the scientific interest on salinity tolerance and the potential of these plants as raw material for industry and pharmaceuticals. New analytical developments in phytochemistry and biochemistry have triggered the use of new technologies for halophytes, both on land and in the oceans. The include new ideas for closed fish farming systems, which would enable the production of seafood in desert areas.

The scientific roots

Two events are significant in the history of halophyte research in Europe. During the 1920s, the Hungarian-Austrian botanist Hugo Boyko, and his wife Elisabeth Boyko, worked extensively on halophytes, first in the Neusiedler See in Austria and then, for many years, on the Gulf of Aqaba. Boyko found that many plants which were considered to be glycophytes could tolerate substantial salinity levels on sandy soils. However, his findings did not result in large-scale acceptance of halophyte cultivation, although in some isolated places indigenous populations made extensive use of leaves and fruits of mangroves for food, and wood for building material for ships and houses. Many other institutions in Europe dealt with salinity as a stress problem and from an ecological perspective, particularly in Great Britain, France, Spain and Italy. The prevailing opinion at that time was that soil salinity was particularly problematic and that saline soils needed to be desalinated before they could be used for any large-scale production of standard crops.

Work on saline systems in 1960 in Canadian saltmarshes confirmed Boyko's findings. Plants which were usually not found in clay soils in saline environments did gow where there were sandy patches. Salt marshes have a strong pattern of differential sedimentation according to grain size and plant distribtuion follows this pattern.

Further work on mangroves in Venezuela, and in several places on the North American East coast, showed clearly that saline ecosystems are among the most productive biotopes in the world. This led to the concept of transforming desert regions into productive systems by devel-

oping suitable production systems. Such systems should not only be ecologically sustainable but also economically feasible and provide a healthy environment for both humans and livestock. This concept was gradually developed in the Environmental Systems Working Group at the University of Osnabrueck, and spread to several other universities in Germany.

In 1981, HH. Sheikh Zayed Bin Sultan al Nahyan, the late President of the United Arab Emirates, introduced many halophytic species from around the world to the Emirates in an attempt to improve the arid environment. Under Sheikh Zayed's auspices, a salinity garden in Nashalla and the saline agriculture research project at the UAE University in Al Ain, were established.

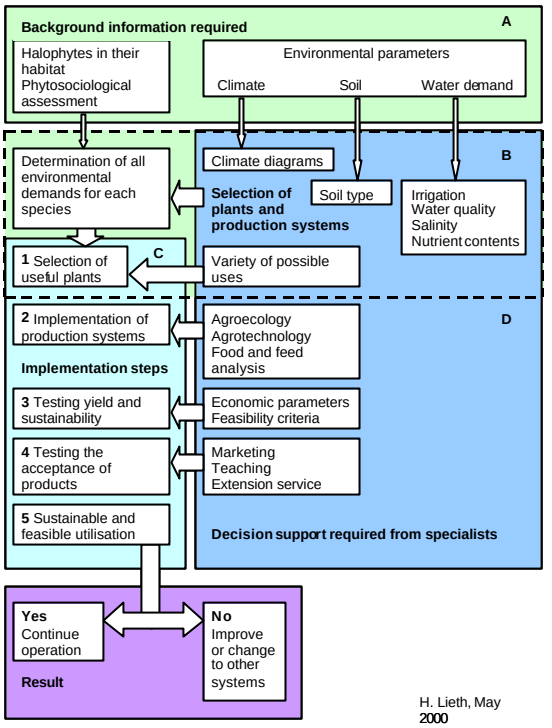
Subsequently, an international conference was held at the UAE University in 1990, attended by scientists with experience in halophyte ecology from all over the world. The result of the meeting was the publication of two volumes summarising current work on developing saline production systems. The Al Ain conference stimulated interest in saline production systems, particularly in the Mediterranean region and the semi-desert belt ranging from North Africa in the west to China and Japan in the east. The Concerted Action Group of the European Community grew out of this interest and set up the the International Society of Halophyte Utilisation (ISHU). The president of ISHU is currently Prof. Hassan el Shaer of the Desert Research Center, Cairo.

Concerted Action Group of the European Community

The sustainable management of limited water resources requires an integrated approach to maintain a balance between a steadily increasing demand for water and its ever more limited availability. Since agriculture in the Mediterranean area is by far the largest water consumer, it is obvious that attention be primarily focussed on the potential of water savings (parallel energy and economic savings). However, it is necessary to develop sustainable biological production systems which can tolerate higher water salinity. Freshwater resources will become limited in the near future, as will arable land for common crops. The aim is to develop sustainable systems which enhance land productivity in dry or saline sites, using saline irrigation techniques.

Present work

Several plant species for oil seed, vegetable and spices are traditionally cultivated in Europe in saline environments. Most of them occur in the tidal zone. However the potential use of these species is many times more than the current actual use.



Flow chart for implementation of saline production systems

In order to improve the cultivation of these species, several projects were started by the EU to consolidate research results achieved so far and to improve the production system. More species have to be analysed and additional uses for saline production systems have to be identified. A precondition for species selection is the identification/or development of drought and salinity tolerant crops. Researchers and institutions exchange their experiences in order to develop a sustainable halophyte production system by a) selecting promising species, b) studying the physiology of salinity tolerance, c) studying ecological sustainability, and d) engineering an economy.

Once halophytes have been studied in their natural habitat and their environmental requirements determined, the selection of potentially useful plants may be started with a so called quick check system. This screening of mechanisms to avoid salt injury in individual species is directed to the four major constraints of plant growth on saline substrates: a) water deficit, b) restriction of CO^2-uptake, c) ion toxicity and d) nutrient imbalance.

Future projects

Sustainability in a production system in which saline water is pumped in large quantities onto fields requires evaluation of economic feasibility. In order to achieve a

(Continued on page 8)

Regional workshop in Morocco

A regional workshop organized by ICBA and the Institut National de la Recherche Agronomique(INRA) on 'Integrated management of saline water resources and environments for forage production in the North Africa Region', with participants from Algeria, Egypt, Mauritania, Morocco, and Tunisia, was held in Rabat, Morocco 13-18 June 2005.

Scientists from INRA, the Desert Research Center in Egypt, and ICBA, covered key aspects of managing saline resources for forage production in the region. The presentations were followed by field trips to Marrakech, Tadla, Kalaa of Sraghna and the Sed Masjoun Plain where participants observed saline environments and strategies for managing forage production in such conditions.

On the final day, participants discussed the main issues in managing forage production in saline enviroments and developed priorities for the region (see page 5 of this newsletter).

The workshop was funded by the OPEC Fund for International Development.

Participants of the workshop in Morocco, June 2005

Participants examining cultivation of prickly pear

Cashcrop halophytes (continued from page 7)

sustainable production system several topics have to be studied carefully: a) irrigation with sea water without increasing surface salinity, b) selection of economically interesting production sytems, c) testing physiological requirements of plants and animals regarding salinity types and levels, and d) developing tools and management practices.

After the selection of halophytic species for a particular climate and a particular utilisation, the following topics need to be studied to establish potentially useful cash crop halophytes: a) green house experiments using local substrates (and climatic conditions) in order to select and propagate promising sites, b) studies with lysimeters on field site level to study the water consumption and ion movements, c) design of sustainable production systems in plantations in coastal areas or for inland sites (for example for economic use) and d) testing yield and (economic) acceptance.

Further information

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Proposal for capacity building program in biosaline agriculture for Arab League

The Arab League, in recent discussions on its program for 2006 and 2007, made a recommendation for ICBA to develop a Capacity Building Program in Biosaline Agriculture for 2006/2007 for the 22 Arab League member countries which are also IDB member countries. Prof. Faisal Taha, Director of Technical Programs presented ICBA's capabilities in capacity building and will coordinate this activity. The recommendation will be submitted to the Arab League Ministerial Committee for approval.