



Biosalinity News

Newsletter of the International Center for Biosaline Agriculture

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DECEMBER 2006

FROM THE EDITOR

The lead article in this, the final issue of *Biosalinity News* in 2006, concerns the departure of our Director General. On behalf of the entire staff, the Editor wishes godspeed to the boss in his retirement. Dr Al-Attar has been a motivator and an inspiration to all of us.

Some very sad news is also reported in this issue. ICBA has lost two dear friends and research colleagues, Clive Malcolm and Nick Yensen.

Two science articles are included. Dr NK Rao, whose arrival was noted in our last issue, has submitted an intriguing article about sunflower, a crop with promise for dry and saline environments (page 5). On pages 6 and 7, a multi-authored paper from Pakistan outlines recent participatory successes with woody perennials on the coastal lands of that important country.

A brief summary of Forage Project activities in Syria appears on page 4.

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

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Director General retires

Dr Mohammad Al-Attar, Director General of ICBA since its inception in 1999, has decided to call it a day. For the past seven years, Dr Al-Attar's name has been synonymous with ICBA. It is fitting and proper that this last issue of 2006 be dedicated to this unique man, whose indefatigable efforts to build and strengthen ICBA have meant so much to so many.



Although his intention was to depart ICBA as early as mid 2006, Dr Al-Attar responded positively to the wishes of the Islamic Development Bank when requested to stay on board until a successor could be identified. By any measure, the outgoing Director General's accomplishments have been enormously successful – from overseeing the Center's construction to developing partnerships from Morocco to Turkmenistan.

Fortunately for ICBA, the Center's relationship with Dr Al-Attar will continue because his nomination for membership on the new Board of Directors has been enthusiastically confirmed. A formal farewell function, which will be covered in the next issue of *Biosalinity News*, has been scheduled in early 2007.



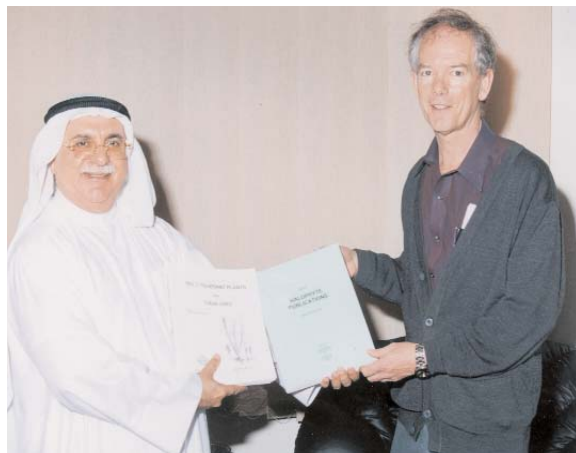
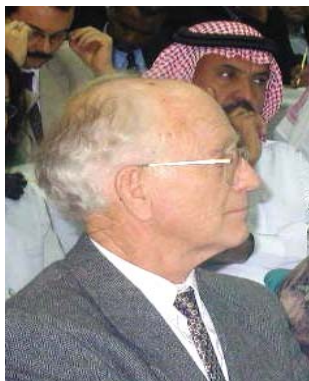
Dr Al-Attar with ICBA's three key supporters: Mr Fawzi AlSultan, Chairman of the Board of Directors; Dr Ahmad Mohamed Ali, President, Islamic Development Bank; and Dr Saeed Al-Kindi, Minister of Environment and Water, UAE. All three visited ICBA together on 14 September to felicitate Dr Al-Attar on his accomplishments and to wish him well in his retirement.

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In memorium



Clive Malcolm (left) and Nick Yensen (right, with Director General Dr Mohammad Al-Attar).

Since the publication of the last issue of this newsletter, ICBA has lost two close friends. Both Clive Malcolm and Nick Yensen were profoundly important to us as scientific collaborators, but we feel their loss most deeply on the personal level. ICBA is only seven years old, but Clive and Nick have been close colleagues from the beginning, and their contributions to our work and to our lives will be keenly missed.

Ironically, both men recently submitted articles to this newsletter for publication. Clive's article, *Sustainable plant communities on saline land, an analysis of a half century of research in Western Australian farmers' fields*, appeared in Volume 6, Number 3, in December 2005. Nick's submission, *ICBA associates propose revolutionary new concept for halophytes*, co-authored with Dr Karl Biel, was published in the very next issue: Volume 7, Number 1, in March 2006.

Clive Malcolm, whose research on the saline drylands of his native Western Australia has been of seminal importance to scientists and farmers throughout the arid and semi-arid regions of the world for several decades, passed away on 19 September.

'The passing of Dr Clive Malcolm is sad news for ICBA,' said Director General Dr Mohammad Al-Attar. 'Clive was a dear friend of mine. I met him first time in Dubai back in 1996. We both were members on the ICBA Advisory Committee for over three years. His experience and vast knowledge of biosaline agriculture were very helpful in guiding ICBA in the right direction.'

Nick Yensen succumbed to a long battle with pancreatic cancer on 24 August. Upon learning the sad news of Nick's passing, Director General Dr Mohammad Al-Attar spoke for all of us when he wrote, 'I was deeply touched and saddened hearing about the tragic death of my dear friend Nick. This is a great loss to all of us.'

Founder and CEO of NyPa International, Nick was an important halophyte scientist who enthusiastically shared his research with ICBA. It is

fitting that our research agenda will continue to include *Propagation and development of Distichlis spicata var. Yensen-4a under arid environment*, a project focused on the dissemination of the halophytic grass variety he created. Popularly known as NyPa Forage, this extremely salt-tolerant forage species is a boon to poor farmers in coastal regions because it can be irrigated with seawater.

We extend our heartfelt condolences to the families of these fine men. They will be sorely missed.

An early photo of Nick and his wife Dr Susana Yensen, who unfortunately also passed away recently. In accordance with their wishes, their families held a memorial service in Sonora, Mexico, where they first met.



This photo of the ICBA Advisory Committee was taken in 1996 during the construction of ICBA's headquarters. Clive Malcolm (second from right) was a key member of the committee.

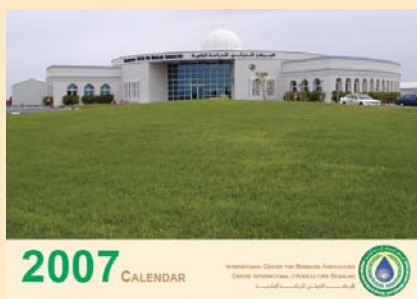


NEW PUBLICATIONS AND PAPERS

ICBA Annual Report 2005 (1425-26H).
120 pages. Arabic.



The United Arab Emirates and ICBA: Partnership in action. Arabic.



2007 calendar. Wall calendar featuring images of ICBA crops.



التقرير السنوي للعام ٢٠٠٥
(١٤٢٥-١٤٢٦ هـ)
المركز الدولي للأمناء المائية

Shahid SA and Hasbini BA. 2006. Optimization of modern irrigation for biosaline agriculture. Arab Water World Magazine. Jul-Aug 2006, Vol 30 Issue 6: 30-31.

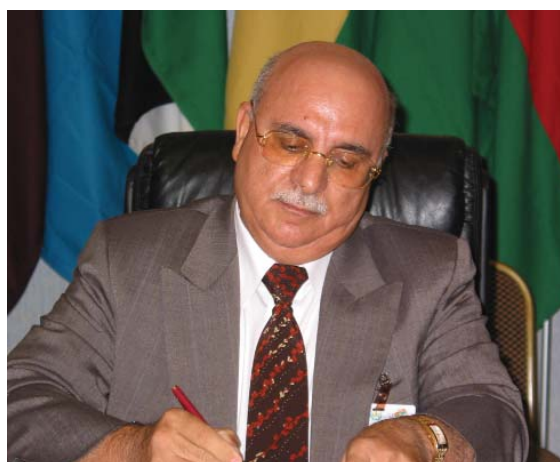
Al-Maskri AY, Shahid M and Jaradat AA. 2006. Multivariate phenotypic structures in the Batini barley landrace from Oman. Journal of Food, Agriculture & Environment 4(2): 208-212.

McGaw EM. A unique center with a unique mandate in The Cooperation Council for the Arab States of the Gulf 2006. London: International Systems and Communications Limited, 2006.

Abdefattah MA and Shahid SA. 2006. Characterization and classification of soils in the coastline of Abu Dhabi Emirate in Proceedings of the International Symposium on Agricultural Constraints in the Soil-Plant Atmosphere Continuum, Ghent, Belgium, 4-7 Sep 2006, pp.347-354.

Shahid SA. 2006. Real time dynamic automated soil salinity monitoring in biosaline agriculture. International Conference on Saline Agriculture-Sustainable Crop Production on Salt-Affected Land, Faisalabad, Pakistan, 4-6 Dec 2006. Abstract published in Abstract Book, p.5.

STAFF NEWS



Dr Mohammad Hassan Al-Attar, Director General, who announced his retirement early this year, will depart in March 2007. At the request of the Islamic Development Bank, Dr Al-Attar has agreed to remain at the helm of the Center until his successor arrives. See the related article on page 1.

Zaynal Thannon Younis, Acting Finance and Administration Director, left ICBA in November to return to the private sector. A Search Committee headed by the Director General is actively engaged in recruiting a replacement for Mr Younis.

New website

The ICBA website has had a long-awaited overhaul. Please visit us soon and let us know what you think of our new look.



FORAGE PROJECT UPDATE

The latest major step forward in ICBA's largest project, *Saving freshwater resources with salt-tolerant forage production in marginal areas of the West Asia and North Africa*, took place 9-15 September in Syria. The activity, a traveling workshop, was focused on capacity building in integrated the management of saline water resources for forage production.

Organized by Syria's General Commission for Scientific Agricultural Research (GCSAR) in collaboration with ICBA, the workshop was sponsored by the International Fund for Agricultural Development (IFAD) and the Arab Fund for Economic and Social Development (AFESD).

The main objectives of the workshop were to document the successful establishment of demonstration farms at various national programs sites and farmers' fields, and to exchange experiences and knowledge in biosaline agriculture.



Farmers who had given up growing cash crops have found new hope with salt-tolerant forage species like sesbania (left) and pearl millet (right).

A total of 25 technical staff from each of the seven partner countries participated in the workshop: Jordan 4, Oman 2, Pakistan 2, Palestine 3, Tunisia 3, Syria 8 and UAE 3.

Participants visited diverse agro-ecosystems, large-scale irrigation and drainage systems, farmers' fields and

GCSAR implementation sites. The tour included forage shrub production sites, water harvest projects, Palmyra Oasis, the 22,000-ha Al Talilah wildlife protected area and other protected areas. In eastern Syria, participants visited sites near Deir-Ezzor and took part in a field day with farmers and technical staff. A lengthy stop at the Euphrates Dam, with its storage lake and irrigation projects, was an important highlight.

At the conclusion of the workshop, all participants agreed that similar activities should be held in future. CDs containing lectures, photographs and training materials were distributed.

Palmyra: This UNESCO Heritage Site is a reminder that agriculture in Syria is extremely ancient.



In Collaboration with International Center For Bio
Will Organize Traveling Works
SAVING FRESHWATER RESOURCES WITH SALT-TOLI
9-15/9/2006 Damascus - Syria سوريا

Prof Dr Faisal Taha, Director of Technical Programs, ICBA, and Dr Majd Jamal, Director General, GCSAR, at the workshop inauguration.



Water for a thirsty country: the Euphrates Dam provides irrigation for thousands of farming families.

Syrian farmers pause for a group photo during the workshop.



RESEARCH HIGHLIGHTS

Greening the desert: Quest for new crops

Dr NK Rao and Dr Mohammed Shahid, Plant Genetic Resources Program, ICBA

Over the past decade, agricultural production in the UAE has increased sixfold. According to figures from the Ministry of Environment and Water (MoEW), agricultural production now stands at over AED 2 billion (USD 540 million) per year, with an average yield of over 600,000 tons of crops such as tomato, cucumber, eggplant, lettuce, cabbage and animal fodder.

Most of the country's soils are sandy and nutrient-poor. Only a limited number of crops like date palm, barley, pearl millet, alfalfa and sugar beet grow successfully. ICBA's genetic resources program has been looking into options for agricultural diversification, especially to identify crops adapted to local conditions that can produce economic yields. Among these crops, sunflower looks particularly promising.

Sunflower (*Helianthus annuus* L.), which originated in North America, gets its name because the flower follows the sun's movement across the sky – a phenomenon known as heliotropism. Indigenous Americans used sunflower as food, medicine, and as a source of dye and oil. Sunflower was introduced to Europe by Spanish, English and French explorers, and by the early 1600s had become a common garden flower in Europe, from whence it spread along the trade routes to Africa and Asia. The first country to develop sunflower as an important commercial oilseed crop was the Soviet Union. Presently, it is the world's second most important oil crop after soybean.

Sunflower has a highly efficient root system that can utilize nitrogen and moisture from lower soil levels and



Sunflower seeds are extremely high in oil content.

thus can be grown in areas too dry for other crops. The crop is moderately tolerant of salinity and can be grown on a wide range of soils, provided they are deep and

well-drained. Because sunflower removes considerable quantities of sodium and chloride from soils, intercropping or rotating it with other crops can reduce salinity and improve soil conditions.



There are two types of sunflower: oilseed and confectionary. The former is used for food, cooking oil, lubricants, soap, paint and varnish. In confectionary sunflower, the protein-rich meal provides excellent feed for livestock.

Commercial varieties of sunflower contain 39-49% oil in the seed. The oil is considered premium because of the high level of unsaturated fatty acids. It also has an energy content equivalent to 90% percent of diesel, making it a promising crop for biofuel production. Additionally, the crude protein level of sunflower silage is greater than that of maize silage.

Recently, ICBA acquired some 100 germplasm accessions from the USA. These were sown in mid-November. Compost was incorporated into soil before planting, and during crop growth a single dose of urea one month after planting and three split doses of NPK were applied by banding alongside the rows. As a prophylactic treatment, micronutrients were sprayed twice. All the accessions grew extremely well, although there was considerable variation between the accessions. For instance, plant height ranged from 0.5 to 3 m, flowering from 35 to 120 days and head diameter from 10 to 15 cm. While stems of most accessions bore a single head on each plant, a few accessions produced 3-11 axillary flowers.

Sunflower appears to hold great promise for crop diversification in the UAE. It can be used as high quality edible oil, animal feed, industrial application and alternative fuel. Moreover, it is suitable for landscaping and cut flower production. ICBA is pleased to make small quantities of seeds of this multifaceted crop available for agriculturists and horticulturists.

FOCUS ON SALINITY

Growing salt-tolerant woody perennials on coastal saline lands in southern Pakistan: a coordinated approach

MU Shirazi¹, JA Shah¹, MA Khan¹, MH Naqvi¹, KA Jafri¹ and R Ansari²

1. Nuclear Institute of Agriculture, Tandojam

2. Department of Botany, University of Karachi

Salinity can be defined as the plant growth-inhibiting presence of excess soluble salts in the growing medium. Salt-affected lands are dominated mainly by NaCl/NaSO₄, CaCl₂, MgCl₂ and MgSO₅. The main causes of soil degradation are improper management, over-exploitation of vegetation for domestic use, deforestation, overgrazing and chemical pollution.

The biological management of salt-affected soils is an economical approach within the reach of poor farming communities. Through the integrated use of genetic resources (plants, animals, fish, insects and micro-organisms) and improved agricultural practices, saline soils and irrigation water can be used profitably and sustainably.

One important biological measure, the identification and evaluation of salt-tolerant tree species, is the subject of this paper. Research conducted over the past two decades has shown that certain species can survive under harsh saline conditions. The deep rooting systems of certain trees make managing water resources easier and reduce annual maintenance costs.

Of the four main districts in southern Pakistan (Karachi, Thatta, Badin and Tharparkar), Badin is agriculturally the most important. Situated between 24° 5' to 25° 25' N and 68° 21' to 69° 20' E, the district is bounded on the south by the Arabian Sea and the Rann of Kutch (Fig.1). Because the southern part of Badin lies near the Indus River Delta, it is particularly susceptible to seawater intrusion. To put these salt-affected lands to use, coordinated efforts to adopt various biological techniques are necessary.

The average elevation of Badin is 50m above sea level. The district is part of the Lower Indus Plain which is formed by the alluvial clay and sand deposits of the Indus. The taluka of Badin, one of four talukas in the district of the same name, is a rice-growing swampy deltaic land impregnated with natural salts. Rural areas are typified by waterlogging and salinity and non-availability of pure drinking water.

The target area is about 13 km southeast of the main city. As the project was a coordinated approach, farming communities were organized into 12 groups known as Saline Agriculture Farmers' associations (SAFAs). To make the project more attractive, various

interventions were introduced. Male SAFAs were offered loans for fertilizer, farm operations at subsidized rates, animal vaccinations, distribution of feed for cattle and distribution of bio-power fertilizer. Their female counterparts were offered demonstrations of smokeless stoves and training in mat making and kitchen gardening.

The tree-growing program was initiated in two steps: salinity evaluation of soil and groundwater, and demonstration plots of salt-tolerant species.

General survey

A detailed survey of the target area was conducted during 2002/03. Soil samples were collected from two depths (0-30 cm and 30-60 cm) from 21 different locations. The various types of vegetation growing at each location were observed and cataloged.

Analytical results showed that most of the soils were loamy in texture (silty loam, loam, clay loam). Some heavy soils (clay and silty clay) were also found. The degree of saturation varied according to the presence of clay content. The salinity data revealed that almost 80% of the soils were strongly saline. Salinity levels were higher in surface samples and decreased in the deeper samples. Salinity was dominated by Na and Cl ions, likely due to the proximity of the sea. Ca, K and HCO₃ were also present.

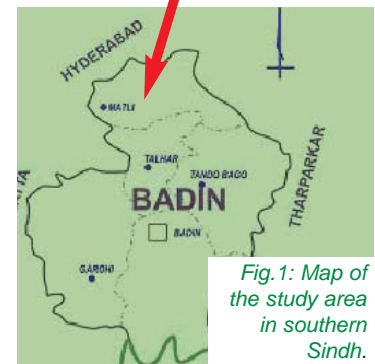


Fig. 1: Map of the study area in southern Sindh.

Test boring for groundwater

The target area is commanded by two non-perennial canals, Morjhar and Imam Wah. Because both canals flow during *kharif* (the rainy season), water shortage is the main problem of target area, particularly during *rabi* (the post-rainy season). Sometimes sufficient water is available for animals. Keeping in view the use of under groundwater, test boring was undertaken at 11 locations in nine SAFA areas.

Groundwater samples were collected from 11 locations to a depth of 75 feet (23m) at 10-foot (3.05m) intervals. The results revealed that almost all samples were highly brackish and unfit for irrigation. Canal water was therefore used for irrigation during tree planting operations. The EC of groundwater ranged from 0.9 dS/m at 20 feet (6.1m) to 103 dS/m at 75 feet (23m). The lower EC values might have resulted from seepage of standing irrigation water from the rice fields. The results of only one location (the Abra SAFA) were encouraging; EC values ranged from 0.9 to 1.3 dS/m to the depth of 60 feet (18.3m).

Demonstration plots

Trees play an important role in the economic utilization of salt-affected lands by providing green coverage to barren land and reducing soil deterioration. A tree plantation program was therefore started immediately after the initiation of the project. Suitable saline patches were selected and analyzed for the suitability of particular tree species. Several species were planted according to their tolerance to salinity.

During the study, over 16,000 trees were transplanted over 63.5 acres (25.7 ha) of salt-affected land in different various SAFA areas using appropriate agronomic practices. Overall survival was good (65%). Among the salt-tolerant species, the highest survival rates were those of *Acacia stenophylla* (80%), *Eucalyptus camaldulensis* (70%) and *A. ampliceps* (55%).

A. nilotica, which also performed well, was completely damaged by waterlogging from an adjacent rice field and/or water shortage at the Soomra SAFA, and only 27% of the trees survived. In a mixed plantation at Sarwari SAFA, however, *A. nilotica* performed extremely well with 72% survival.

Fruit tree species were planted on moderate to high salinity patches. The fruit species jojoba (*Zizyphus*

jujuba) and coconuts (*Cocos nucifera*) were planted in medium-salinity patches (8-15 dS/m). The survival of *Z. jujuba* was 69% at Abra SAFA and Misri 64% at Chandio farm.

The 8-acre (3.24 ha) jojoba plantation at Mirza farm (owned by a progressive farmer) was damaged by waterlogging and only 2 acres (0.81 ha) could be saved at that site with an 18% survival rate.

Other fruit species planted on less saline patches (5-8 dS/m), were chikoo (*Manilkara zapota*), guava (*Psidium guajava*), lemon (*Citrus lemon*) and oil palm (*Phoenix dactylifera*). *M. zapota* which was planted on 10 acres (4.05 ha) showed 75% survival. Planted on a small scale, other fruit trees showed similar survival rates: guava 53% on 7.5 acres (3.04 ha), lemon 100% on 0.5 acres (0.2 ha) and oil palm 100% on 1.5 acres (0.61 ha).

The farmers of the target area have taken keen interest in the project and are fully cooperating in the economical and efficient utilization of salt-affected land. Good economic returns from these marginal lands are expected within 1-2 years.

Captions

1. Healthy coconuts on saline soil.
2. Healthy guava growing in saline soil at Sindhu SAFA.
3. Mixed cropping of tree species at Sarwari SAFA.
4. *Acacia ampliceps* flourishing at Abra SAFA.
5. *Eucalyptus camaldulensis* performing well on saline land.



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OTHER NEWS

CAPACITY BUILDING AT FULL TILT

The last quarter of 2006 saw an abundance of training activities at ICBA headquarters. Capacity building has always been one of ICBA's strongest priorities.



Hands-on training in communications technologies was provided to staff of the Ministry of Environment and Water, UAE, 12-15

November. Participants visited Al-Futtaim Printers and Publishers, a long-time ICBA service provider.

Following up the capacity building initiative sponsored by the Islamic Development Bank through COMSTECH (reported in Vol.7 No.2 of this newsletter), a



group of interns were selected by INRAN, the national research program of Niger, for advanced training in Dubai.



Donor meeting in USA

As usual, ICBA participated in the Annual General Meeting of the Consultative Group on International Agricultural Research (CGIAR), which was held in Washington DC from 4 to 7 December. ICBA was represented by BoD Chairman Fawzi AlSultan, Director of Technical Programs Prof Dr Faisal Taha and Eric McGaw, Communications Specialist. Also in attendance was Dr Shawki Barghouti, who attended several of the meetings in his capacity as Strategic Planning Consultant.



Mr Franklin Moore, Director of USAID's Office of Environment and Science Policy (left) discussing potential collaborative research activities with Dr Barghouti (center) and Dr Taha (right).



The Arab Organization for Agricultural Development (AOAD) sent a group of over 30 participants for training in *Utilization of saline water in agriculture* from 19 to 22 November.