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Biosalinity News

Newsletter of the International Center for Biosaline Agriculture

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FROM THE EDITOR

Following the lead article in our last issue, which concerned the retirement of Director General Dr Mohammad Al-Attar, this one announces the arrival of his successor, Dr Shawki Barghouti.

A major ICBA milestone took place in February when stakeholders from many countries gathered in Dubai to debate the center's shifting research focus and to approve the Strategic Plan 2008-12 (page 2).

The status of ICBA's largest research activity, its multi-donor Forage Project, was discussed at length in Amman, Jordan, in March (page 4).

The science article on pages 6 and 7 is a continuation of the one submitted in our last issue that concerned sunflower. This time the quest for new crops for saline environments is about quinoa.

Other items are a report of the inauguration of the Soil Survey in Abu Dhabi and the European Union-funded bio-energy project in South Asia.

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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New Director General assumes office

Dr Shawki Barghouti assumed the office of Director General of ICBA at the beginning of April. Dr Barghouti, a Jordanian national, was selected after an intensive search for a replacement for Dr Mohammad Al-Attar, who announced his retirement in mid 2006.

Dr Barghouti holds a PhD in Agricultural Development from the University of Wisconsin, USA. Prior to his employment by ICBA, he served with the World Bank in Washington DC as Advisor, Agricultural Science and Technology, as well as Manager of the Agriculture and Water Portfolio for South Asia. From 1997 to 1999, he served as Director General of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Hyderabad, India. He was also instrumental in establishing the International Center for Agricultural Reasearch in the Dry Areas (ICARDA).

Dr Barghouti welcomed by Mr Fawzi AlSultan, Chairman, ICBA Board of Directors.

Dr Barghouti has 35 years of experience in agricultural development and management, 20 of them in the Middle East. As a co-author of ICBA's Strategic Plan (see article on page 2), he is quite familiar with the Center's capabilities and goals.

Dr Barghouti hosted a farewell lunch for his predecessor, Dr Mohammad Al-Attar, at ICBA headquarters on 25 March.

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Strategic Plan debated in Dubai

The consultancy team that drafted ICBA's Vision and Strategy Document. From left: Dr Donald Suarez, Dr Shawki Barghouti and Dr David Seckler.

The long-awaited Strategic Planning Meeting took place 5-6 February at the Metropolitan Hotel in Dubai. The meeting was the culmination of a process begun in early 2006, when three respected scientists were recruited to draft a *Vision and Strategy Document*. These scientists, each a stalwart in agricultural research and development, worked closely with ICBA management and scientists in preparing the draft document.

The team was comprised of Dr Shawki Barghouti, who recently succeeded Dr Mohammad Al-Attar as ICBA's Director General (see lead article), Dr David Seckler, the former Director General of the International Water Research Institute, and Dr Donald Suarez, Director of the US Department of Agriculture's Salinity Laboratory in Riverside, California.

Dr Mark Winslow, a Marketing Specialist with ICRISAT, was seconded to facilitate the meeting. With the assistance of ICBA staff, he collated the minutes of the meeting and the discussion groups to assemble a document entitled *New Horizons: ICBA's Strategic Plan 2008-2012*. Although the specifics remain under discussion, it is clear that the center's expanded research agenda will embrace such concerns as integrated water resources and marginal water quality. Importantly, the center's traditional mandate of biosaline agriculture will remain an integrated part of the new Strategic Plan.

Upper left: the Plenary session in progress. Above: the meeting brought together key policymakers from all over the world. Dr Mohammad Saeed Al-Kindi, the UAE's Minister of Environment and Water, is seen in the front row with Mr Fawzi AlSultan, Chairman of the Board, and Dr Mohammad Al-Attar, Director General.

A night to remember: Farewell to the DG

At the suggestion of Prof Dr Faisal Taha, ICBA's Director of Technical Programs, advantage was taken of the Strategic Planning Meeting (covered on page 2) to give Director General Al-Attar a proper farewell. A special evening was set aside during the meeting to honor the man who did so much to make ICBA a center of excellence. The venue chosen for this special occasion was the Kempinsky Hotel.

On hand were colleagues and friends from all over the Gulf region and beyond – scientists, policymakers, stakeholders and employees. After dinner, which was sweetened by an ensemble of Lebanese musicians, a number of guests rose to tell the audience what Dr Al-Attar meant to them. A special Power Point featuring photographs taken throughout the DG's long tenure was shown. After the speeches, a special Emirati troupe performed a native dance. It was a fitting tribute to the man who led ICBA so well for so long.

The ICBA staff, represented here by Badria Bochi, Carla Mellor and Diane Giessen, was on hand to say adieu.

A fitting farewell. Testimonials honoring the DG were made by many. Among them:

1. Dr Abdel Nabi Fardous, Director General, National Center for Agricultural Research and Technology, Jordan

2. Eng Mohammed Saqer Al-Asam, Assistant Undersecretary for Water and Soil, Ministry of Environment and Water, UAE

3. Dr Mahmoud Solh, Director General, ICARDA

4. Dr Majd Jamal, Director General, General Commission for Scientific Agricultural Research, Syria.

5. Prof Dr Faisal Taha, Director of Technical Programs, ICBA

FORAGE PROJECT UPDATE

The largest research project in the ICBA portfolio, *Saving freshwater resources with salt-tolerant forage production in marginal areas of the West Asia and North Africa*, reached the midpoint of its duration when the Technical and Steering Committees met 11-15 March at Amman, Jordan.

Organized by Jordan's National Center for Agricultural Research and Technology Transfer (NCARTT) in collaboration with ICBA, the workshop was sponsored by the International Fund for Agricultural Development (IFAD), the OPEC Fund for International Development (OFID) and the Arab Fund for Economic and Social Development (AFESD). HE Dr Mostafa Qrunfleh, Minister of Agriculture, officially opened the meetings, which were subsequently chaired by Dr Abdoul Nabi Fardous, Director General of NCARTT.

Above: The project has introduced new salt-tolerant forage crops like canola to Jordanian farmers.

Right: Listening to presentations during the field day.

A farmer makes his point with Dr Abdullah Dakheel, Project Coordinator, during the field trip to Al Khaldia.

Left: Farmers share their experiences with forage trials.

Below: The Steering Committee (upper) and the Technical Committee (lower).

Prof Dr Faisal Taha, ICBA's Director of Technical Programs, presented a summary of the achievements made during 2006 as well as the Work Plan and Budget for 2007. One key decision was to form working groups to formulate guidelines for three activities: production, irrigation and socio-economics. Countries with comparative advantage in each of these activities will take the lead.

In his concluding remarks, Dr Fardous said, 'Sustaining the successes of this project in farmers' fields is essential. Even when the project funding ends a year from now, ICBA should remain the focal point of this network.'

RESEARCH HIGHLIGHTS

Soil Survey inaugurated

On 17 January 2007, ICBA's largest ever collaborative project with a host country agency, Soil Survey for the Emirate of Abu Dhabi, was officially inaugurated at Remah, a test site 30 km west of Al Ain.

ICBA's senior management and staff were joined by Mr Majid Al Mansouri, Secretary General of Environment Agency-Abu Dhabi (EAD), as well as the staff of the contractor, GRM International, for this important milestone.

A newsletter about the project is produced monthly by ICBA's Dr Shabbir Shahid, Salinity Management Scientist.

The survey team, which is composed of staff from EAD, ICBA and the contractor, GRM International, pause for a group photo.

STAFF NEWS

Abdul Sathar Chedanguil joined ICBA in February as Helper-Driver, Abu Dhabi Office. Mr Chedanguil is from India. **Hiba Kamal**, Administrative Assistant for the Abu Dhabi Office, left ICBA in April after serving the center for one year.

Mr Majid Al Mansouri, Secretary General of EAD, joins forces with ICBA Director General Dr Mohammad Al-Attar at a test site in Abu Dhabi Emirate.

ICBA attracts attention

ICBA's work is showcased on the website of the OPEC Fund for International Development (OFID).

Baedaa Khalil, Communications Assistant, receiving a memento from Mr Saeed Mohammad Al Tayer, General Manager of Dubai Electricity and Water Authority (DEWA) in recognition of ICBA's excellent stall at WETEX 2007 in Dubai.

Dr Barghouti and Dr Al-Attar visiting the ICBA stall at the biennial Environment Exhibition at Abu Dhabi in February. Manning the stall were Ibrahim Bin Taher, Government Liaison Officer, and Ghazi Al Jabri, Communications Coordinator.

Desert farming: The quest continues

NK Rao and Mohammed Shahid, ICBA

Crop diversification is key to agricultural productivity because it enables risk management. In the UAE, where soils are nutrient-poor, identification of crops adapted to local environment is especially important. ICBA's Genetic Resources Program has been studying a range of salt-tolerant crops for their ability to produce economic yields, and ultimately to introduce them to local farmers. In addition to sunflower, which was reported in the last issue of this newsletter, quinoa looks particularly promising.

Quinoa (*Chenopodium quinoa* Willd.) is native to the Andes Mountains of Bolivia, Chile and Peru. It is an annual herb that reaches 1-2m height and matures in 5-6 months. It produces white or pink seeds in large sorghum-like clusters. Although the seeds are very small, they comprise 30% of the dry weight of the plant.

Quinoa is one of the few crops grown in the salt beds of southern Bolivia and northern Chile. According to the International Potato Center (CIP), which is based in Lima, Peru, quinoa can germinate in a mixture of one third seawater (40 dS/m) and two thirds fresh water. CIP also reported that quinoa can be grown under extremely dry conditions with as little as 200 mm rainfall in sand. Clearly, this is a crop with excellent potential for both drought-prone and saline areas.

Quinoa is also a highly nutritious food. The nutritional quality of the seeds is comparable to that of dried whole milk and the protein quality and quantity is often superior to better-known cereals (Table 1). Quinoa is higher in lysine than wheat, and its amino acid content is well balanced for both human and animal nutrition, on a par with casein (Table 2).

While quinoa grain compares favorably with major cereal crops in nutritive value, when it comes to tolerance for salinity it has few equals.

Table 1. Comparisons of the nutritional quality (% dry weight) of quinoa with other crops.

Crop	Dry weight (%)					
	Water	Crude protein	Fat	Carbo-hydrates	Fiber	Ash
Quinoa	12.6	13.8	5.0	59.7	4.1	3.4
Barley	9.0	14.7	1.1	67.8	2.0	5.5
Buckwheat	10.7	18.5	4.9	43.5	18.2	4.2
Maize	13.5	8.7	3.9	70.9	1.7	1.2
Pearl millet	11.0	11.9	4.0	68.6	2.0	2.0
Oats	13.5	11.1	4.6	57.6	0.3	2.9
Rice	11.0	7.3	0.4	80.4	0.4	0.5
Rye	13.5	11.5	1.2	69.6	2.6	1.5
Wheat	10.9	13.0	1.6	70.0	2.7	1.8

Table 2. Essential amino acid pattern of quinoa compared to wheat, soy and skim milk.

Amino acid	Amino acid content (g/100g protein, %)			
	Quinoa	Wheat	Soy	Skim milk
Cystine	2.4	2.2	1.4	0.9
Isoleucine	4.0	3.8	4.7	5.6
Leucine	6.8	6.6	7.0	9.8
Lysine	5.1	2.5	6.3	8.2
Methionine	2.2	1.7	1.4	2.6
Phenylalanine	4.6	4.5	4.6	4.8
Threonine	3.7	2.9	3.9	4.6
Tryptophan	1.2	1.3	1.2	1.3
Tyrosine	3.8	3.0	3.6	5.0
Valine	4.8	4.7	4.9	6.9

Although quinoa grain has low sodium content, its calcium, phosphorus, magnesium, potassium, iron, copper, manganese and zinc content is higher than those of wheat, barley or maize (Table 3).

Quinoa seeds are generally used to make flour, soup and breakfast cereal. They can also be used for brewing beer and for animal feed. Quinoa flour works well as a starch extender when combined with wheat flour or with corn meal for making biscuits, bread, and processed food. Quinoa leaves can be eaten as a leafy vegetable like spinach, and its leaves and stalks can be fed to ruminants. In poultry feeding trials, chicks fed with a ration containing cooked quinoa made equal gains to those receiving maize and skimmed milk.

Quinoa seed coat usually contains bitter tasting

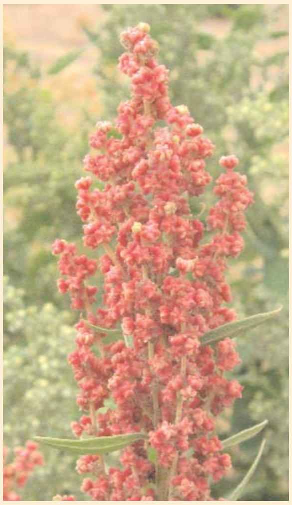
Table 3. Comparisons of the mineral content in quinoa grain with barley, maize and wheat

Crop	Ca	P	Mg	K	Na	Fe	Cu	Mn	Zn
	%				PPM				
Quinoa	0.19	0.47	0.26	0.87	115	205	67	128	50
Barley	0.08	0.42	0.12	0.56	200	50	8	16	15
Maize	0.07	0.36	0.14	0.39	900	21	-	-	-
Wheat	0.05	0.36	0.16	0.52	900	50	7	-	14

compounds, mainly saponins. However, these can easily be removed by washing in cold water. Cooking also removes the bitter taste.

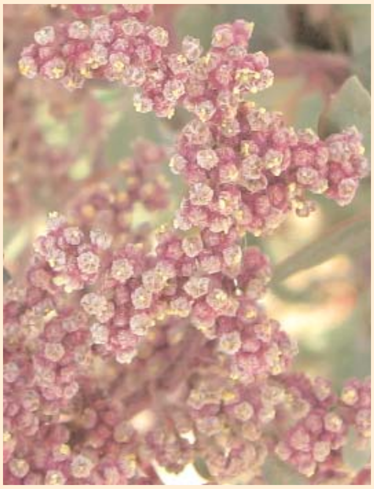
The ICBA genebank acquired about 120 germplasm accessions from the United States Department of Agriculture (USDA) in 2001. Recently, these materials were grown on the ICBA farm using drip irrigation with municipal water (2.8 dS/m). Many of the accessions grew extremely well. Considerable variation was observed for many morphological traits, especially the foliage and panicle colors. Based on its performance on the farm, its high nutritive value, its tolerance for drought and its capacity for being irrigated with seawater, quinoa appears to hold great promise for crop diversification in the Middle East and North Africa.

ICBA plans to conduct further studies to identify locally adapted genotypes and to develop suitable agronomic and management practices for commercial production.



An additional bonus: accessions with colored foliage and panicles makes quinoa appropriate as an ornamental plant for home gardens and general landscaping.

The data used in the tables was extracted from an article entitled Quinoa *(Oelke et al. 1992) in* Alternative Field Crops Manual, *University of Wisconsin and University of Minnesota, 1992.*



RESEARCH PARTNERSHIPS

Bio-energy: what is it?

Bio-energy is produced by the release of stored chemical energy from plant biomass.

The most important plants that produce bio-energy are tree species like *Eucalyptus*, *Populus* and *Salix*. When these trees are grown on rotations of 1-15 years, they can produce 10-15 tons of biomass per hectare each year.

12,000 ha of such woody crops could supply enough biomass for a 30 MW power station.

Donor: European Union

The Bio-energy Project will:

- Advance the knowledge of salinity thresholds of promising tree species.
- Assess production potential of various plantation techniques.
- Assess the effect of water consumption by trees on water tables.
- Assess economic performance in relation to existing and developing markets.
- Identify how saline areas can be most profitable on both local and global scales.
- Achieve an understanding of international regulations, fair-trade systems and salinity credits.

Three partner countries

Our other partners

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