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Word from ICBA Director General

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These are exciting moments for ICBA. The Center has published its Business Plan 2013-2016, which seeks to strengthen ICBA's role as a global center of excellence by further defining our priorities and recognizing the anticipated funding and competitive environment. There will be increased emphasis on strong monitoring, evaluation and communication. The Business Plan will align ICBA's activities across the center.

Along with the new ICBA Strategy 2013-2023 and the new ICBA Business Plan 2013-2016, ICBA has revisited its entire brand identity and has done a major rebranding for the Center. The new feel and look of ICBA is well aligned with ICBA new strategy and emphasizes the importance of 'Innovation' 'Sustainability' and 'Partnership' in ICBA's journey to achieve its mission and vision. ICBA is about Agriculture for Tomorrow (نزرع للغد), which will be done only through innovative technologies and methodologies and in partnership with a variety of stakeholders.

The end of 2013 and the beginning of 2014 was a very busy time for the center; we had several exciting events with the Treated Wastewater Conference, the Quinoa Science Forum, and numerous trainings on and off campus. We had the chance to expand our partnerships agreements vertically and horizontally. Vertically by exploring new opportunities with existing partners and horizontally by expanding our partnerships outreach, where now our partnerships expand from Australia all the way to Peru.

Last but not least, I would like to thank all those that have responded to our Biosalinity News survey; this is our effort to make sure that we are always listening to our readers and ensuring that we keep on improving Biosalinity News in terms of what is of interest and value to you. One of the major changes that we are adopting as a result of the readers' feedback was to increase the focus on the digital version of Biosalinity News through applying advanced web technologies to deliver an interactive and user friendly online version of Biosalinity News.

I hope you enjoy the rest of this issue of Biosalinity News.

Sincerely yours,

Ismahane Elouafi

Cover page image: Castor plant growing in ICBA reseacth field in Dubai. Photo credits: Mohammed Shahid, ICBA

In this issue...

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Salt accumulation zones under different irrigation systems – Technical note

Under irrigated agriculture the water requirement of crops is offset through irrigation using different irrigation systems, such as flood, border, basin, furrow, sprinkler, drip (surface and subsurface), and bubbler. The irrigation method, water application rate, frequency of irrigation, field condition (leveling), bed shape, and uniformity of irrigation water application determines depth of wetted zone, and subsequent zones (surface and sub-surface) of salts accumulation. The surface accumulation of salts can be observed visibly. However, it is not easy to observe subsurface salts accumulation in moist conditions.

Laboratory studies are needed to emphatically diagnose the level of salinity in subsurface areas. There are a few tips which farmer can use to diagnose the salinity problem in their farms. These include, but are not limited to:

- surface white salt crust
- salt-stains on dry soil surface
- delayed/reduced germination
- reduced plant vigor
- change in leaf color
- foliar damage
- plants that are either dead or dying
- water logging

In this article explanation is provided on salt accumulation under different irrigation systems.

In a furrow irrigation system soil salinity varies widely from the base of the furrows to the tops of the ridges. Figure 1 shows different patterns of salt accumulation in ridges between furrows. These patterns guide the best seed placement to minimize the salinity affects. Seed placement at safe site is essential to avoid high salt concentration affects to plants. It should be noted that post harvest plowing of furrow field will redistribute salinity to allow further cultivation in the area.

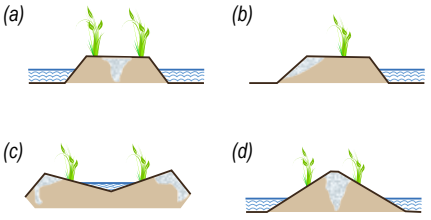

Figure 1: *Salt accumulation in the center of the flat top bed, the bed is irrigated by both furrows (a), salt accumulation and safe zone for seeding when alternate furrow is irrigated (b), salt accumulation on sloping beds and safe zone for seeding (c), salt accumulation on sloping bed, safe zone for seeding when the bed is irrigated by both furrows is evident (d), barley seeded on the shoulder of the bed (e), salt accumulation in the bed top is evident (adopted from Shahid 2013).*

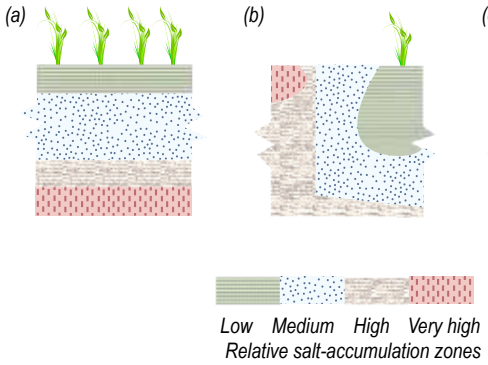

Figure 2: *Relative salt accumulation zones under sprinkler and basin irrigation systems (a) drip irrigation (b) and sub-surface irrigation system (c) Modified from Chhabra (1996).*

Sprinkler irrigation system uniformly distributes water; however, high wind can distort water distribution. Sprinkler irrigation leaches the salts evenly and the lateral salt distribution is relatively uniform. The salts build up is in deeper layers [Figure 2(a)]; it can be drained to avoid water table build-up. Highly saline water can cause foliar damage (necrosis salt injury). The sprinkler irrigation is highly effective in leaching salts at surface and providing a conducive soil environment for seed germination and initial stage of plant growth.

Water flows downward uniformly in flood, border and basin irrigation systems when there is no high water table. Under such circumstances surface accumulation of salts is unlikely. The salt accumulates in deeper layers based on wetted zone.

Drip irrigation system delivers water near to plants roots through closely spaced tubes and emitters. The flow rate of emitters can be controlled to make frequent and controlled irrigation. The water and salt flow from emitter to the boundary of wetting zone [Figure (2b)]. Salts concentrate through evaporation and plant uptakes. Salt accumulation is on the boundaries of wetted soil volume, lowest being under the immediate vicinity of water source, highest being at the center of two emitters and boundary of wetted soil volume.

In sub-surface irrigation, the soil above water source has no means of water to leach salts. This causes salts to accumulate at surface due to capillary rise and evaporation [Figure 2(c)].

Salt-accumulation is faster when saline/brackish water is used, and when the soils are fine textured. Only rainfall and/or switch over from sub-surface to sprinkler irrigation can leach salts, otherwise salts will accumulate to toxic levels. The use of fresh water for irrigation may be an ideal choice for sub-surface irrigation.

Modern irrigation systems save significant quantity of irrigation water; however, the salt accumulation zones are different for each irrigation system. Therefore it is essential to adopt suitable practices for placing seeds in relatively the lowest salinity zone, following by proper irrigation management to control soil salinity build-up.

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Written and submitted by Dr. Shabbir A Shahid, Salinity Management Scientist, ICBA

Salt accumulation in a grass field irrigated through drip irrigation system

Bioenergy crop production: A case for creative use of reclaimed wastewater in the Arabian Peninsula

There is growing interest worldwide in renewable energy sources to reduce environmental pollution associated with the use of fossil fuels. In the Arabian Peninsula, due to the abundant reserves, all countries at present are entirely dependent on fossil fuels to meet their growing energy needs. Fossil fuels however are non-renewable and will one day be depleted. According to a recent research from Saudi Arabia, the world's biggest crude oil producer and exporter, it runs the risk of becoming an oil importer by 2025 if the current economic and demographic trends continue (Salameh, 2012). Other forms of energy such as nuclear energy projects present execution risk given the lack of local expertise and high capital costs (Al-Tamimi, 2012). The same could be said for other oil-rich nations, including the UAE. Already, countries in the Arabian Peninsula have among some of the highest greenhouse gas emissions per capita. Therefore, the time has come to look to the future and seriously consider the use of alternative energy sources such as biofuels.

Arab countries are expected to face severe water scarcity as early as 2015, when, under current predictions, the annual per capita water share in the region will fall to less than 500 m^3. Given that agriculture uses nearly 70-80% of all water, the reuse of reclaimed (treated) wastewater for irrigation could contribute considerably to the reduction of water scarcity for domestic use. In many countries of the Arabian Peninsula, due to the problem of social acceptance and the perception of health risks, municipal wastewater, even after tertiary level of treatment, is not used for growing food and feed crops. In the UAE, of the 600 MCM of tertiary-treated wastewater produced per year, 58% (352 MCM) is used mainly for landscaping and the rest is discharged into the sea. In fact, reclaimed wastewater can be a valuable resource to grow bioenergy crops for the specific purpose of producing liquid fuels, with considerable economic and environmental benefits, when social barriers prevent its use for growing edible crops. If bioenergy crops can be cultivated on a commercial scale, they can reduce pressure on fossil fuels, while simultaneously improving environmental quality and reducing desertification/soil erosion which is also a matter of serious concern in the region. As these crops are not grown for food, there will be no health risk involved. However, the possibility of growing biodiesel feedstock crops or even the use of biodiesel blends in fuel has not been studied in the region in spite of the known benefits. To fill this void, ICBA has recently evaluated some bioenergy crops for their local adaptation and seed yield potential to assess their suitability for biodiesel feedstock production. In this article, the potential of castor and mustard as bioenergy crops for the region is described.

Castor plants grown at ICBA research facility in Dubai

Castor (*Ricinus communis* L.)

Castor is a member of the Euphorbiaceae family. It is a perennial plant growing to a height of 2-3 m. The fruit is a globose capsule, 2.5 cm in diameter, usually containing three seeds. In the wild, castor is able to adapt to arid conditions and withstand long periods of drought. Castor seeds contain up to 60% oil which is inedible however the oil when used for bio-diesel has very low cloud point and pour point which makes it suitable for use in extreme winter temperatures. A single reaction step is required for the trans-esterification process of castor oil because of its favorable acidity level. Therefore, in a large-scale process, it would be less costly to produce bio-diesel from castor seeds than with others with a higher acidity level (Menon et al. 2014).

In field trials carried out in sandy soils with freshwater irrigation at ICBA research station, the average seed yield of 11 hybrids ranged between 1,528 and 2,975 kg/ha, with an overall mean of 2,177 kg/ha. Typical seed yields reported for castor ranges from 900 to 1,200 kg/ha under irrigation. A study of the response of castor hybrids to three saline irrigation water treatments (5 dSm^{-1}, 10 dSm^{-1} and 15 dSm^{-1}) also showed that castor can tolerate up to 5 dSm^{-1} salinity in irrigation water without any negative effect on seed or oil yield. Nevertheless, increase in salinity of irrigation water to 10 and 15 dSm^{-1} decreased the average seed yield by 66% and 82%, respectively. The seed oil percentage by weight among the 11 hybrids was found to be in the range of 23% to 48% with an average of 38%. The study also suggested the percentage oil content is not affected by salinity (Menon et al. 2014).

The castor seed yields obtained at ICBA were much higher than the global average yields, showing that castor is a promising crop for bio-diesel feedstock production in the UAE and other countries of the region.

Mustard [*Brassica juncea* (L.) Czern.]

Mustard belongs to the Brassicaceae family. Members of the Brassicaceae family are often used for biodiesel production, as the

seed has an oil content usually greater than 40%. Two forms of mustard are known – brown mustard or Indian mustard, grown in India where the larger brown seeds are used for oil extraction, and yellow mustard, grown mainly in China which has smaller yellow seeds and used more as a leafy vegetable. Mustard is an erect, annual to biennial herb growing up to 200 cm tall with slightly glaucous, often dark green and more or less hairy leaves, distinct from the bluish green, glabrous leaves of the other leaf brassicas. It is also very drought-tolerant and many varieties can express greater osmotic adjustment than other oil crops, including canola. Seed yields of brown mustard in India range from 900–1,200 kg/ha and in the United States about 1,100–1,500 kg/ha.

In field trials at ICBA, the seed yields of five mustard accessions (previously selected for superior performance from a set of 100 accessions) ranged between 1,025 kg/ha to 1,510 kg/ha with an overall average of 1,330 kg/ha, which is very similar to the yields obtained in the United States. In a separate study at ICBA, no significant differences were found in biomass yields between fresh and low-salinity water (5 dSm^{-1}), though further increase in salinity to 10 dSm^{-1} and 15 dSm^{-1} reduced yields by 33% and 50%, respectively (Rao and Shahid, 2014).

Mustard seed oil is not currently a common bio-diesel feedstock. However, it has the potential to be a cheaper feedstock than the two most common oilseeds – canola and soybean – currently used for biodiesel.

Use of reclaimed wastewater to grow bioenergy crops not only avoids competition with traditional crops with respect to the use of fresh water but also allows productive use of this resource, which is otherwise wasted by dumping into the sea. The salinity of the reclaimed wastewater from the Dubai municipality was found to range between 2 and 3 dSm^{-1}, with both castor and mustard being able to tolerate up to 5 dSm^{-1} of irrigation water salinity and no adverse impact expected on seed yields. On the other hand, the reclaimed wastewater was found to be rich in minerals – especially nitrogen, potassium and phosphorus (estimated to be 30, 20 and 2 mg/L, respectively) to supply considerable amounts of nutrients to boost plant growth and productivity. As a consequence, the seed yields are likely to be much higher than those obtained with freshwater as shown by several other studies.

Research on Mustard at ICBA field in Dubai

We can conclude that castor and mustard can be successfully cultivated as bioenergy feedstock crops with significant economic benefit using reclaimed wastewater, while public acceptance for growing food and feed crops remains a major issue.

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Written and submitted by Dr. N.K. Rao, Plant Genetic Resources Scientist, ICBA

Sample of castor seeds from the ICBA experiment in Dubai

A new early maturing pearl millet variety of high quality and forage yield resistant to salinity in Uzbekistan

Arable lands in many parts of Uzbekistan are under serious degradation as a result of mono-cropping of cotton and wheat. Intensive surface irrigation is causing soil erosion, loss of organic matter, salinization and waterlogging, which greatly reduces the sustainability of agriculture but also the long-term security and income of poor rural communities.

One of the promising research areas is the diversification of agro-biodiversity on low productive lands that have differing levels of water and soil salinity. Diversification facilitates replacement or alternating of traditional crops (e.g. cotton, wheat, corn, rice), often quite difficult on marginal land, with salt-loving (halophytic) or salt tolerant dual-purpose crops such as sorghum (*Sorghum bicolor* (L.) Moench) and pearl millet (*Pennisetum glaucum* (L.) R. Br.). In an effort to introduce these non-conventional salt tolerant crops the regional offices of ICBA and the International Center for Agricultural Research in the Dry Areas (ICARDA) in Uzbekistan, together with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and national partners are assessing ways and benefits of integrating pearl millet and sorghum into local crop-livestock feeding and farming production systems in diverse agro-ecological zones in Central Asian countries. Screening of more than 52 improved lines of pearl millet through on-station and farmer-participatory trials under different field management practices have identified a number of varieties (including Sudan Pop III, Guerinian-4, IP 6104, IP 6112, IP 131150, IP 19586, HHVBC Tall, Raj171, ICMV 7704 and MC 94 C_2) as the most salt/drought tolerant and highly productive varieties for food, grain and forage production. The high morphologic diversity in grain size, color and number of grain/panicle were observed as distinctive features for majority of the screened varieties of pearl millet. If these cultivars are grown near the watering points

Part of the ICBA pearl millet experiment field in Uzbekistan

in the vicinity of the livestock herds (size of 2000 units) on 10 hectare area, their survival ratio could easily be doubled from 2.0 kg to 4.0 kg day^{-1} per animal during the severe winter season. Trials also identified promising dual-purpose varieties that produce grain for food or feed for poultry, as well as feed for livestock.

In 2013 a new early maturing local variety of pearl millet named "Hashaki 1" was firstly released in Uzbekistan based on series of cross-pollinations of HHVBC Tall variety (from ICRISAT germplasm with local varieties. "Hashaki 1" has shown good re-growth after two cuttings. Relative growth rates, biomass (fresh and dry) and grain production of the new released variety exceeded the local varieties by 2.0-2.5 times. As a second crop pearl millet, with 65-70 days maturity such as demonstrated with the "Hashaki 1" variety, showed a good chance of fitting under the prevailing cropping system in all the eco-regions of Uzbekistan. At 47 days before first cut "Hashaki 1" accumulate 68.3 t/ha-1 of green biomass. Sowing with 30 cm inter-rows space significantly increases the plant density and, consequently the fresh forage production at the end of harvesting from the fields. The early-term seed bedding (middle of March at soil temperature +5-10^{o}C), as was demonstrated in a trial in Central Kyzylkum desert, allowed three cuts (7, 8-9.1 kg/plot green forage) with grain yield varying from 2.3-3.0 t/ha. The weight of 1000 seeds was 11.8 g with an average weight of panicle with seeds being 38.3 g. Content of juice in the stems was an average of 62.5%. As early maturing pearl millet material "Hashaki 1" performed well in dryland saline environments and could be widely planted as main crop in early spring or as second crop after the wheat harvest or in rice rotation system.

The average threshold salinity levels for "Hashaki 1" variety ranged from 2.6 to 8.5 dS m^{-1}, while maize and sorghum was more sensitive than pearl millet to soil and water salinity under shallow (1.0-1.8 m) and saline water tables (1.5-4.8 dSm^{-1}).

The nutritional value of biomass and grains of "Hashaki 1" was also examined under differing levels of soil salinity, developmental stage and cutting practice. Preliminarily data has shown medium content in protein and energy and low in fiber and lignin concentration in dry matter biomass of "Hashaki 1". Crude protein calculated for dry matter biomass ranges from 6.1% to 9.7% in unfertilized soils to 10.8% to 12.0% under nitrogen-fertilized conditions. Nutritional value of forage of "Hashaki 1" in summer seed planting as second crop after harvesting of winter wheat reaches 12.6% of crude protein at 25.1 % of cellulose content. "Hashaki 1" silage has proved itself the equal to maize silage when cut at 8 to 12 weeks (full flowering), when dry matter

Pearl millet growing tall and healthy in salty conditions in ICBA's experiment in Uzbekistan

yield compares favorably with maize. Forage of pearl millet can be ensilaged alone (taking the whole plant or only tillers or leaves) or mixed with other grasses and legumes. The fresh forage of "Hashaki 1" variety as was demonstrated under experimental conditions, and tested small ruminant animals, has fairly good digestibility and palatability with DMD (dry matter digestibility) being about 66-69%.

Seed multiplication of "Hashaki 1" through engaging with interested farmers has been conducted, to ensure seed purity, and protection against bird damage. In perspective, seed will be produced by individual or a cluster of farmers from nearby villages on a remunerative price to recover the cost of seed production, plus 30-50% profit. Seed producing farmers will visualize some benefit in producing the seed as an incentive, ensuring an adequate and timely supply of quality seeds. The international centers and national institutions in the target area are providing technical guidance for quality seed production. However, since the pearl millet is a new grain crop in Central Asian countries, no readily available markets exists as yet.

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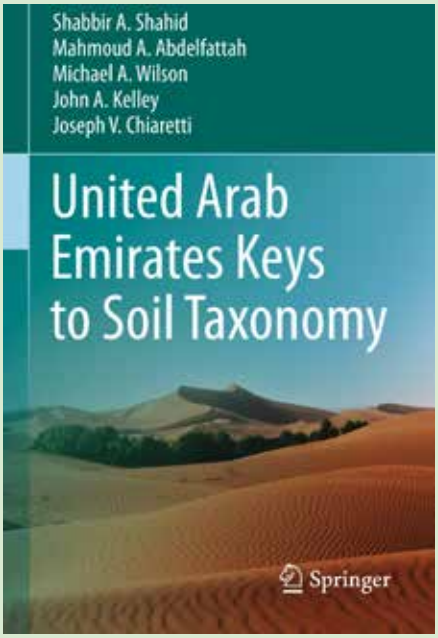
New publication:

The United Arab Emirates Keys to Soil Taxonomy

ICBA and the Environment Agency - Abu Dhabi (EAD), announce the publication of the *United Arab Emirates Keys to Soil Taxonomy*. This publication – a result a joint cooperation between ICBA, EAD, and United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) provides information for keying out the soils of the United Arab Emirates and the arid Gulf Cooperation Council countries into separate classes and to provide a guide to associated laboratory methods.

"*The book specifically addresses soil taxonomy in the UAE; however, it is equally good for use in the GCC, which have major common soil orders, (Aridisols and Entisols)*" said Dr Shahid principal author of the publication, who added "*I believe soil researchers in future will benefit from this valuable resource in their endeavor to assess soil resources in the UAE and the Gulf Region. This will lead to transfer of technologies established on similar soils and environmental conditions in the region where such soils may exist, and accordingly save significant investment.*"



Strengthening partnerships - University of Sydney, Australia, signs a memorandum of understanding with ICBA

On the 5th of March 2014, ICBA and the Faculty of Agriculture and Environment at the University of Sydney signed a Memorandum of Understanding (MoU), a significant milestone in the partnership between the two organizations.

The intent of signing the MoU between the University of Sydney and ICBA is to facilitate joint visits of academic and scientific staff for the purpose of participating in teaching and training; joint research and the exchange of scientific materials and other information. This partnership is in line with ICBA's new mission, which is 'to work in partnership to deliver agricultural and water security solutions in marginal environments'.

"*The signature of the MOU with Sydney University from Australia is very important for ICBA. It opens up opportunities for collaborations on different aspects related to agriculture in marginal environments*" said Dr. Ismahane Elouafi, Director General of ICBA. She added "*The University of Sydney is one of the oldest universities in the world; it has very strong knowledge on the genetic and crop modeling and crop production side and ICBA as well has a lot of strength to implement research projects throughout the countries in which we work be it in Central Asia, Middle East, North Africa, and Sub-Saharan Africa*". Dr. Elouafi considers the signing of the Memorandum of Understanding a milestone for ICBA and testimony to the engagement with University of Sydney over the past year.

Photo credits: Ghazi Al-Jabri, ICBA

Left to right: H.E. Pablo Kang, Australian Ambassador to the UAE; Dr. Ismahane Elouafi, Director General of ICBA; Prof. Mark Adams, Dean of Agriculture and Environment at University of Sydney; Mr. Gerard Seeber, Australian Consul - during the MoU signining between ICBA and University of Sydney

"*The MoU is an important symbol of a partnership that has been building over the last couple of years. The University of Sydney has been a visitor now to ICBA for several years and a lot of good work has been done and today is really a culmination of that*" said Prof. Mark Adams, Dean of Agriculture and Environment at the University of Sydney. Who added "*The MoU is really just the beginning; having done all this good groundwork to establish the basis for collaboration the next few years is about putting it into practice. What would be the projects that we will work together on? What would be the outcomes that we are looking for?*" Professor Adams expressed his delight of ICBA's focus on delivering real interventions for farmers, "*interventions that can make a difference*".

Collaboration between Masdar Institute with ICBA

The Masdar Institute of Science and Technology and ICBA, announced on Monday, 20 January 2014, to work together in delivering agricultural and water scarcity solutions in marginal environments.

Masdar Institute and ICBA have agreed to lay the foundation for further cooperation on ways to develop greater understanding of the water, agricultural production and climates of the Gulf Cooperation Council countries and the wider Middle East North Africa region, as well as conduct research and educate professionals in this field.

Dr Ismahane A. Elouafi, Director General, ICBA, and Dr Fred Moavenzadeh, President, Masdar Institute, signed an agreement during the seventh edition of the World Future Energy Summit.

ICBA is already involved in research activities with Masdar Institute. As a specific example, Dr. Taha Ouarda, head of Masdar Institute's Center for Water and Environment and Professor of Water and Environmental Engineering, has been collaborating with researchers from ICBA for the past two years on research activities related to the use of gels and water retainers in the soil to reduce the amount of water used in agriculture and increase the yield by reducing the water stress on plants. Professor Ouarda has been using the facilities at the International Centre for Biosaline Agriculture for joint research efforts in this field.


Photo credits: Masdar

Dr. Ismahane Elouafi, DG of ICBA, signing MoU with Dr. Fred Moavenzadeh, President of Masdar Institute

ICBA's MAWRED project signs three new memorandums of understanding

Managing the challenges of water and food security in arid Middle East North Africa requires careful management supported by good data provision. Against a background of declining aquifer levels and growing demand for water across many economic sectors decision-makers need to manage a careful balance to protect future supplies. Given the large share of water used in agriculture it is important to understand the state of the water resource and crop systems and where and how much irrigation is taking place. This data is limited in many countries with often out-of-date or inaccurate information available. The Modeling and Monitoring of Agriculture and Water Resources Development (MAWRED)'s project aim is to support the region's decision-makers by helping fill this gap using satellite imagery and lead-edge water, climate and crop modeling.

ICBA in coordination with USAID's Office of Middle East Program (OMEP) and NASA's Goddard Space Flight Center are developing new data sets that will be used directly by key countries (Iraq, Yemen, Palestine and Tunisia) ministries and other decision-makers including for crop mapping and modeling – new maps of crop groups, irrigation areas, and estimates of yield for key crops water mapping and modeling – regular data on groundwater, surface water, soil moisture, irrigation water use and evapotranspiration.

A key milestone in the MAWRED project was the signing of MOUs with three new partners who are joining the project – the Palestinian Water Authority (PWA), represented by H.E. Dr. Shaddad Attili, Minister and Head of PWA; the Palestinian Hydrology Group (PHG), represented by Dr. Abdul Rahman Saleem Alamarah, Director General of PHG; and the Agricultural Research and Extension Authority (AREA) in Yemen, represented by Eng. Ahmed Almuaallem on behalf of Dr. Mansour Alaquil, Chairman of AREA.

Dr. Rachael McDonnell, head of the MAWRED project at ICBA, said that her team was looking forward to working with Palestine in the MAWRED project; this will prove to be a great opportunity to accelerate the project and validate the data gathered by MAWRED team regarding Palestine.

Photo credits: Charbel El Khouri, ICBA

Dr. Ismahane Elouafi, DG of ICBA, signing memorandum of understandings with H.E. Dr. Shaddad Attili, Minister and Head of Palestinian Water Authority

In addition, Dr. McDonnell said that the partnership with AREA on the MAWRED project is very important for its success in Yemen. The AREA team will gather ground data, which will be used to validate the new crop and irrigation maps produced from satellite imagery data. Dr. McDonnell concluded, "*I am thankful to all the partners of ICBA that made this project a reality and particularly USAID's Office of Middle East Program (OMEP) and NASA's Goddard Space Flight Center. We look forward to working with more countries on this project.*"

Photo credits: Charbel El Khouri, ICBA

Dr. Ismahane Elouafi, DG of ICBA, signing memorandum of understandings with Dr. Abdul Rahman Saleem Alamarah, Director General of Palestinian Hydrology Group

Conference on the use of treated wastewater in agricultural production in the Arab World: current status and future prospective

The opening ceremony of the conference on the 'Use of Treated Wastewater in Agricultural Production in the Arab World: Current Status and Future Prospective'

The conference on 'Use of Treated Wastewater in Agricultural Production in the Arab World: Current Status and Future Prospective' was held in Dubai from 14-16 January 2014 under the patronage of H. H. Sheikh Hamdan Bin Rashid Al Maktoum, Deputy Ruler of Dubai and Minister of Finance.

During the conference 120 experts from the Arab region together with leading international experts shared global, regional and local experiences and lessons learned regarding the use of wastewater (WW) and treated wastewater (TWW) for agricultural production.

Although indirect WW reuse has been going on throughout history, the past few decades witnessed the spread of formal and planned WW and TWW reuse for agricultural production. This growing trend of planned reuse enables governments and stakeholders to mitigate the environmental and health hazards associated with the reuse of WW. The MENA region includes many countries reusing both WW and TWW for agricultural production, and the trend is expanding with TWW now included in the water budget of several Arab countries.

Public perceptions towards TWW reuse, and farmers concerns and unwillingness to switch from irrigating with "free" fresh groundwater resources were cited as key challenges that need to be addressed. Lack of knowledge about the risks, and lack of trust in authorities were identified as main reasons contributing to the resistance of farmers and the public. Nevertheless, experience in many Arab countries demonstrated that severe water scarcity greatly facilitates farmers' acceptance and usage of TWW and even WW.

As water becomes scarcer in the Arab region, reuse of WW will no longer be an option but a necessity, accordingly there is a need to: examine the benefits and costs of WW reuse and build future expansion programs based on the results of these socio-economic-health analysis; develop comprehensive management practices and tools for irrigation with WW and TWW to minimize risk and hazards; establish national and regional TWW reuse monitoring systems; develop national and regional laws, regulations and standards pertaining to TWW reuse.

Concurrently, there is a need to establish accountable institutes within the countries of the region that are responsible for monitoring and enforcement to ensure the highest standards of health and safety. Additionally, there is a need for a regional platform that leads these efforts and acts as a facilitator that brings together institutions and experts to share results, information, lessons learned, and best practices.

Farmers' field schools in Egypt

ICBA in collaboration with the Desert Research Center conducted a seminar and workshop on "Farmers' Field Schools for Rural Family Empowerment through Optimization of Forage and Animal Production" in Cairo from 2-4 December 2013.

This workshop was part of the regional project "Adaptation to Climate Change in WANA Marginal Environments through Sustainable Crop and Livestock Diversification", which is sponsored by the International Fund for Agricultural Development, Arab Fund for Economic and Social Development, Islamic Development Bank, and the OPEC Fund for International Development. The objective was to develop a model for farmers' field school on integrated forage-livestock systems under the utilization of marginal quality water resources that could be replicated in all partner countries. The aim of the workshop was to enhance the capacity of rural families, particularly women, in feed preparation and processing, hygienic milk processing and storage and methods to enhance economic return. In addition the program seeks to train extension facilitators to carry out in-country farmers' field schools targeting rural families.

Ghazi Al-Jabri (left), training coordinator at ICBA, Hassan Al Shaer, project coordinator for Egypt, and Jamal Al Khouli, one of the participating farmers

Keynote speakers at the seminar included H.E. Dr. Ayman Farid Abou Hadid, Minister of Agriculture and Land Reclamation of Egypt, Dr. Raafat Khidr, President of the Desert Research Center, Dr. Abdullah Al Dakheel, Regional Coordinator of the ACC project, and Dr Hassan Al Shaer ACC National Coordinator in Egypt.

International science forum: Quinoa as a new crop in the Middle East and North Africa

Quinoa has great potential in the food and feed industry being gluten-free and highly nutritious as well as being a crop that can thrive in marginal environments.

Dr. Ismahane Elouafi and H.E. Eng. Saif Al Sharaa visiting the 'Tour of the Year of Quinoa travelling exhibition', held at ICBA, Dubai

ICBA hosted an international science forum 'Quinoa as a New Crop in the Middle East and North Africa' on 23 February 2014. The event was attended by distinguished guests from regional and international organizations, research centers, universities, and the UAE Ministry of Environment and Water.

H.E. Eng. Saif Al Sharaa, Undersecretary for Agriculture and Animal Affairs at the UAE Ministry of Environment and Water, inaugurated the event. In his remarks, Eng. Al Sharaa emphasized the nutritional benefits of quinoa and its increasing adoption across the world. He encouraged the ongoing experiments in the UAE on identifying the various potentials of quinoa in terms of adaptation to the climate conditions, productivity and economic benefits.

Visiting the Quinoa field experiment at the International Center for Biosaline Agriculture during the International Science Forum "Quinoa as a new crop in the Middle East and North Africa" – 23 February 2014

Dr. Ismahane Elouafi, Director General of ICBA, said that the prospects for quinoa are promising and with further testing there is a prospect for a wide scale adoption and production in the region. ICBA has initiated work with partners to improve food security and nutrition security through a substantial increase of quinoa production. ICBA, with partners, is also evaluating the potential of quinoa as an alternative food and feed crop for salt-affected areas in selected countries of the Middle East, most affected by salinity and water scarcity and where agriculture and agri-food sector contribute significantly to the national GDP.

Preliminary studies at ICBA research station and on-farm trials in the Western region of Abu Dhabi have demonstrated quinoa's potential as an alternative crop for marginal environments characterized with poor soils and low quality irrigation water. ICBA in partnership with the Ministry of Environment and Water of the UAE, Abu Dhabi Farmer's Service Center, and the Peruvian organizations Instituto Nacional de Innovacion Agraria, and Universidad National Agraria La Molina is currently evaluating the performance of several quinoa varieties for their productivity on a range of soils using different qualities of irrigation water in order to identify high yielding salt- and heat-tolerant quinoa lines/varieties.

ICBA successfully organizes a training for Abu Dhabi Farmers' Service Center

ICBA in collaboration with the Abu Dhabi Farmers' Service Center (ADFSC) organized a specialized training course on "Biosaline Agriculture Technologies" on 10-12 March 2014. The course was attended by 35 staff/extension officers of the Agriculture Centers from Al Ain and other Abu Dhabi regions.

The program covered irrigation management and water productivity in field and forage crops, diagnostics of irrigation induced soil salinity and its management, and alternative crops and production systems for salt-affected areas and plant propagation methods. In the hands-on training at ICBA Research Station, the participants learned more about water and soil properties that affect crop growth, and the field measurements that are simple and provide solutions to common problems.

Group photo of the participants in the 'Biosaline Agriculture Technologies' training at ICBA training auditorium during the certificates distribution ceremony.

ICBA at the Global Forum for Innovation in Agriculture

ICBA stand in the GFIA Exhibition in Abu Dhabi

Innovation agriculture is at the core of ICBA's Strategy 2013-2023. Therefore it was a natural fit with the program of the Global Forum for Innovation in Agriculture (GFIA) 2014. ICBA was engaged with the GFIA over a number of areas. The Center was a member of the Steering Committee that organized the forum; exhibited its various research and innovations during the two days exhibition and hosted a roundtable discussion on saltwater agriculture. In addition, ICBA organized a post-forum field trip for GFIA participants to visit the ICBA research facilities to meet with ICBA scientists and to discover and discuss the various challenges and projects that are underway in the Center.

Post-forum field trip for GFIA participants to visit the ICBA research facilities in Dubai

GFIA is considered as one of the world's largest showcase of innovations in sustainable agriculture. The key theme of GFIA was 'driving innovation for an agricultural revolution'. GFIA highlighted the sustainable agriculture initiatives being planned and deployed around the world; it facilitated knowledge transfer and demonstrated available investment opportunities. The program included exhibition and conference with keynote sessions, panel discussions, an African Ministerial discussion, and 150 presentations.

Towards a sustainable food production on marginal saline lands in Aral and Caspian Sea basins

Farmers from five districts (Samarkand, Syrdarya, Andijan, Khoresm and Bukhara) took part during a teleconference debates, moderated by Dr Akmal Karimov (IWMI-CAC)

To build capacity of local farmers ICBA, within the framework of *'Towards a sustainable food production on marginal saline lands in Aral and Caspian seas basins'* and in collaboration with Samarkand State University, the Khokimyat and Farmer Association of the Samarkand Region, Ecological Movement of the Republic of Uzbekistan and CGIAR PFU (ICARDA, IWMI, CIP) for Central Asia and Caucasus, co-organized a training seminar in March 2014 for farmers to present and discuss technological innovations and policy in agriculture and food security.

The main objectives of the training seminar were:

- Disseminate achievements and best practices on improvement productivity of marginal lands through conservation and management of irrigated, rain fed and rangelands agro-ecosystems;
- Knowledge sharing and familiarization with farmers demands and constraints through a teleconference with farmer associations of Syrdarya, Khoresm, Andijan and Bukhara regions;
- Debate development of institutional framework (legislation basis) on sustainable utilization and management of marginal resources.

The seminar was held at the Samarkand State University and attended by about 180 participants (farmers, animal breeders, extension officers, scientists, policymakers, private sector, students, international consultants and governmental leaders). The training course covered topics on biosaline agriculture, agronomy, irrigation and soil salinity management. Organized through the Farmers Service Association, the participants learnt about salinity challenges, non-conventional crops and irrigation management and improved their knowledge on the sustainable use of salt-tolerant crops/forages, soil and water in the arid and semiarid environments. The importance of marginal quality water in agriculture and food security by ensuring agro-biodiversity conservation was well received at the seminar. Farmers from five districts (Samarkand, Syrdarya, Andijan, Khoresm and Bukhara) took part during the teleconference debates, moderated by Dr Akmal Karimov (IWMI-CAC). Farmers have shown great interest in transferring of innovations in agriculture, modern technologies in plants growing on degraded and marginal lands, effective methods of water use, adoption of conservation agriculture technologies, and integrated pest control on main crops including vegetables. They also mentioned about the positive contribution and important role of international programs in agriculture development and food security.

ICBA Business Plan 2013-2016

Based on the ICBA Strategy 2013-2023, approved by ICBA's Board of Directors in March 2013, ICBA has developed a Business Plan for the period 2013-2016. Starting from ICBA's mandate and long term vision, the inputs to the Business Plan 2013-2016 include an understanding of stakeholder requirements from many consultations; further defining of our priorities; developing research activities aligned with our five Research Innovations; and leveraging ICBA's core knowledge strengths.

Download the ICBA Business Plan 2013-2016 from the following URL: http://www.biosaline.org/pdf/ICBA-Business-Plan-2013-2016.pdf

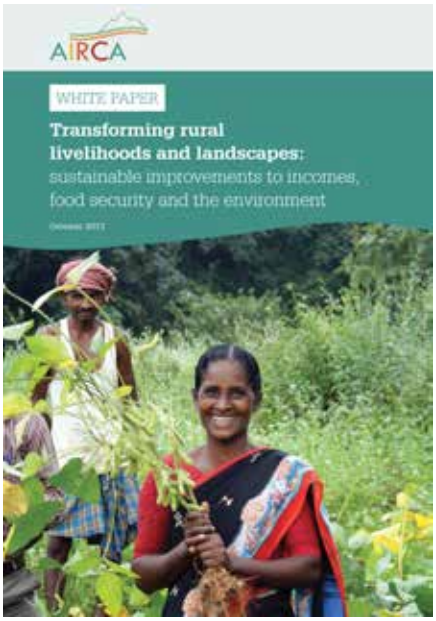
The Business Plan 2013-2016 seeks to strengthen ICBA's role as a global center of excellence by further defining our priorities and recognizing the anticipated funding and competitive environment. There will be increased emphasis on strong monitoring and evaluation and communication and the Plan will align ICBA's activities across the center.

White paper on transforming rural livelihoods and landscapes: sustainable improvements to incomes, food security and the environment

As climate change increases the pressure on agriculture, trade-offs among different land uses will intensify, as will competition for arable land, water, minerals and other natural resources. The identification and optimization of these trade-offs can best be achieved by considering the landscape in an integrated way in order to develop land use plans that strike an appropriate balance between social, environmental and economic concerns.

AIRCA, a nine-member alliance focused on increasing global food security and promoting healthy, sustainable and climate-smart landscapes, is adopting an integrated approach to problem solving at a system level and is building partnerships with countries and regional networks to achieve practical solutions and sound policy.

Their White Paper 'Transforming rural livelihoods and landscapes: sustainable improvements to incomes, food security and the environment' sets out the rationale for healthy landscapes and the required steps to support sustainably diverse crops, animals and people in the long term.



The AIRCA White Paper is available for free download on the following URL: http://www.airca.org/images/pdf_files/AIRCA_Working-paper_final_online_mid-res.pdf

AIRCA members

AVRDC	The World Vegetable Center
CBAI	CAB International
CATIE	Tropical Agricultural Research and Higher Education Center
CFF	Crops for the Future
ICBA	International Center for Biosaline Agriculture
ICIMOD	International Center for Integrated Mountain Development
icipe	African Insect Science for Food and Health
IFDC	International Fertilizer Development Center
INBAR	International Network for Bamboo and Rattan

A new look and feel for ICBA

In 2013 ICBA launched its new 10 year strategy. The Strategy reflects ICBA's growing commitment to finding and testing solutions for food, water and income security in marginal environments. As the Center launched its new vision and mission, it has reflected on the brand image that the Center has enjoyed for the past thirteen years. This has served the Center well and has brought recognition to ICBA and its work. However as ICBA looks forward it recognizes the need to refresh the brand to take into account its future looking agenda.

In March of this year, ICBA launched its new look and feel and is excited to be sharing this widely among staff and partners.

The new brand reflects ICBA's commitment to searching out and implementing promising solutions for agriculture and food security in marginal environments using marginal water resources. ICBA's brand is revolved around its core values:

1. Professionalism and integrity
2. Partnership and teamwork
3. Excellence and innovation
4. Our people

To ensure that ICBA brand is well equipped to be aligned with the new strategy, mission, vision, and values, we consulted with our stakeholders, the ICBA board and staff in the development of the center's new look and feel.

The new logo is one important element of the new branding. ICBA's new logo represents the promise of a greener tomorrow and the calligraphy in the motif reflects the Arabic origins of the center, while the dominance of the Latin characters in the name and tagline reflects the international nature of the center. The introduction of vibrant and bright colors represents the young and positive spirit of ICBA that looks at a bright future for tomorrow's agriculture.

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ICBA
AGRICULTURE FOR TOMORROW

The new ICBA logo; also available in all white and all black versions

New chairman for the ICBA board of directors

ICBA management and staff welcome Professor Abdulrahman Sultan Alsharhan, as the new Chairman of the ICBA Board of Directors. Prof. Alsharhan, an Emirati, received his secondary education in the UAE then completed his Bachelor of Science in Geology in Cairo. In 1983, he received his Masters of Science in Geology from the University of South Carolina, where he also received his PhD in Geology two years later.

Prof. Alsharahan has had a long and illustrious career. He has held various teaching positions within the Geology Department of the UAE University between 1980 and 1995. He has held managerial positions in the Ministry of Petroleum and Mineral Resources (1978-1980); Head of Petroleum and Mineral Resources Section, Desert and Marine Environment Research Center at UAE University (1987-1990); and Director of the Desert and Marine Environment Research Center (1990-1996). During (1992-1994), he was Assistant Dean for Scientific Research at the Faculty of Science of the UAE University. Then in (1994-1995) he became Assistant Deputy Vice Chancellor for Academic Affairs; following which he was Dean of the Faculty of Science at the UAE University (1995-2003), where he is currently a Professor of Geology. In addition, Prof. Alsharhan has held the position of Vice-President of the American Association of Petroleum Geologists Middle East Region (2003-2007) and is a member of the Higher Committee for the Zayed International Prize for Environment (1999-Present).

Dr. Ismahane Elouafi, ICBA DG, welcoming Prof. Abdulrahman Sultan Alsharahan, the new ICBA Chairman

Biosalinity news survey results and action

The Biosalinity News editorial team would like to thank all those that have participated in our latest survey that was sent out with the last issue of Biosalinity News and by emails. We had a good response rate with very encouraging and insightful feedback.

Our analysis of your responses indicate that the section on 'Research Updates' is most widely read followed equally by the 'Events & Training' and '@ICBA '.

We find that the majority of our readers are asking to add more content to 'Research Updates'. It is gratifying to see that 85% of our readers would like to see Biosalinity News published more than twice a year with the majority looking forward to four issues per year. An electronic version of the newsletter would be welcomed (84.8% of the readers requested this).

Our readers expressed a high satisfaction level with Biosalinity News. And although this is encouraging we don't want to rest on our laurels and will take the feedback we received very seriously.

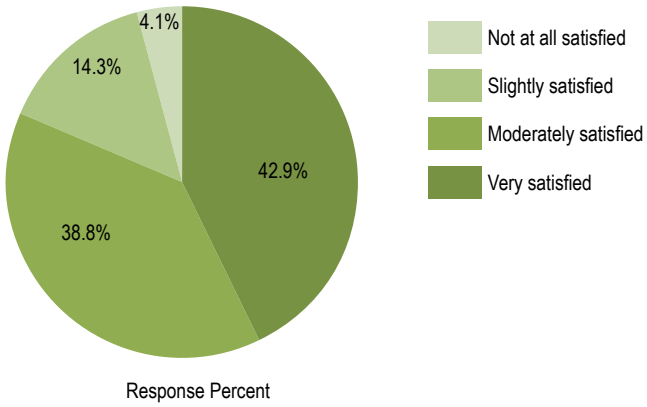
The editorial team has decided to increase the number of publications of Biosalinity News from two per year to three for 2014 and to reach four publications per year as of 2015 onwards. In addition, there will be an increase in the number of research articles in every issue to a minimum of three. As well as, ICBA will invest in a better online version of Biosalinity News, one which makes it easy to read, track and share. Since the survey showed that the overall satisfaction is very high, we will maintain the current structure in addition to the previously mentioned additions.

We encourage you to stay in touch and do provide us with your feedback through emailing: c.elkhouri@biosaline.org.ae

Charbel El Khouri, Communications Coordinator, ICBA, Dubai

What type of news are you most likely to read?

How satisfied are you with Biosalinity News?



Statistics based on survey conducted by ICBA on Biosalinity News readers between January and February 2014

ABOUT ICBA

ICBA's work addresses the closely linked challenges of water, environment, income, and food security. The Center's applied research for development aims to address the agricultural challenges in marginal environments including assessment of natural resources, climate change adaptation, crop productivity and diversification, aquaculture and bio-energy and policy analysis. ICBA is working on a number of technology developments including the use of conventional and non-conventional water (such as saline, treated wastewater, industrial water, agricultural drainage, and seawater); water and land management technologies and remote sensing and modeling for climate change adaptation. Building capacity and sharing knowledge is an important part of all ICBA does. ICBA's work reaches countries, including least developed countries, in Central Asia and the Caucasus, the Middle East and North Africa (MENA), South and South East Asia, sub Saharan Africa and Gulf Cooperation Council countries.

ICBA's strategy 2013-2023 takes innovation as a core principle. Applied research is directed to innovative solutions to food, nutrient, and water security in marginal environments, applying new technologies including biotechnology, developing multiple uses for wastewater and seawater, becoming a pioneering knowledge hub, and extending its partnerships. With the help of its partners ICBA innovates, builds human capital, and encourages the learning that is fundamental for change.

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