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@ICBA

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$1 Million Dollar Competition for Arab Women Scientists in Agriculture

ICBA in collaboration with CRDF Global will launch a joint research grant competition for young Arab women scientists and U.S. researchers in agricultural science. The aim of this initiative will be to facilitate long-term international research partnerships between Arab women scientists and U.S. researchers. The competition will be open from March 8, to June 15, 2016.

The competition will be accepting proposals in following research areas: (a) breeding/genomics around important food crops and (b) soil and nutrient management. ICBA and CRDF Global will select 10 research proposals. Teams chosen through a competitive application process will receive up to $100,000 each in support of one to three-year projects.

Eligibility:

The competition will be open to teams of scientists employed in the Middle East and North Africa (MENA) and the U.S.

Teams from the MENA region must be led by a female principal investigator who is working as an early-career scientist, who has received her highest degree of education within the past five years.

Participating MENA countries: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestinian territories, Qatar, Saudi Arabia, the United Arab Emirates, Yemen; Mauritania, Morocco, Algeria, Tunisia, and Libya.

For more details visit **www.biosaline.org**

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Word from ICBA Director General

In keeping with our mission, during the last quarter of 2015 we continued our work to boost agricultural productivity in marginal environments and help smallholder farmers.

As part of our efforts to diversify crops cultivated by smallholder farmers, our scientists continued experiments on best-bet crops and practices at our research stations. In the United Arab Emirates, they tested selected crops in the net house conditions to enhance protected agriculture. These crops showed promising results and proved their ability to withstand the dry climatic conditions in the Emirates.

At our station in Uzbekistan, our researchers also set up several on-farm demonstration trials to study the effective management of marginal (low quality) land and water. More importantly, their efforts resulted in the release of a new high-yielding stress-tolerant sorghum variety called "Keshen". The new sorghum variety will help to diversify agro-biodiversity resources and improve local livestock feeding and farming production systems.

As collaboration cuts across all our work, we also formed new partnerships with world-class research centers, national institutions and government agencies to boost agricultural production in the Middle East and North Africa region. We signed agreements on boosting protected agriculture with the Food and Agriculture Organization of the UN, the International Center for Agricultural Research in the Dry Areas and the Ministry of Environment and Water in the UAE; on salinity management with the Palestinian National Agricultural Research Center; on research on non-conventional water resources and salt-tolerant plants with Al Ain Municipality; and on generating data and applications on remote sensing in agriculture with Tehran University.

Our center also joined world researchers, government representatives and leaders in signing the "Declaration on Agricultural Diversification". The declaration aims to build agricultural resilience and food security for future climates and will underpin the Global Action Plan for Agricultural Diversification (GAPAD) to be developed during 2016. I would like to encourage you to sign this declaration at: www.gapad.org

Finally, we wish to thank all our donors and stakeholders for their unwavering support for our work. Over the many years their support has been crucial in helping people in some of the most vulnerable areas around the world.

Ismahane Elouafi

in this issue...

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Helping small-scale farmers in West Asia and North Africa produce and earn more

Farmers in marginal environments face more threats to agricultural production than their peers elsewhere do. Lack of water, extreme weather events like drought, falling soil fertility, and decreasing precipitation pose regular risks to crop yields. However, adding to the problem in the West Asia and North Africa (WANA) region are also growing salinity and water logging as more than 25% of agriculture is irrigation-based.

More resilient and alternative crops, as well as better land and water management practices, can all help to improve the lot of resource-poor farmers in the region.

This thinking has driven a collaborative initiative by researchers from the International Center for Biosaline Agriculture (ICBA) and the International Fund for Agricultural Development (IFAD). Funded by the IFAD, the OPEC Fund for International Development, and the Islamic Development Bank, the initiative aimed to introduce resilient forage crops, and diversified crop production and land management systems in Jordan, Egypt, Oman, Tunisia, Palestine, and Yemen.

"The close collaboration with local farmers and extension services was the driving force behind the progress we have achieved. The adoption of these new crop species and agricultural systems by relevant administrations in these countries helped us move from experimental centers to wide participation of farmers," said Dr. Abdullah Al-Dakheel, project coordinator and head of crop diversification and genetic improvement section at ICBA.

Farmers in Egypt enjoy more benefits from diversified crops

Working together with national partners, researchers developed integrated management packages for crop production at the farm level.

Researchers found that yield gaps were very big in many cropping systems in partner countries due to gaps in the management of drainage and farm, planting methods, and fertilization programs. Around 45 experiments were set up to increase cereal forage yields by 70% and grain yields by 30%, with recommendations and policy options being submitted to key decision-makers.

"I was approached by a group of scientists. They asked me to test a sample of water and soil and then they gave me 20 kg of wheat grains that I planted in an area of 2,000 m^2 and the harvest was successful," said Khaldoon Salem, a farmer in the Zarqa area of Jordan.

Based on the evaluations, farmers' preferences and field performance, each country identified a list of winter and summer annual and perennial salt-tolerant forages and field crops that can help to secure forage resources throughout the year for multiplication and distribution to farmers.

As part of this collaboration, members of the research team, representatives from partner organizations and national partners - around 250 people - met in Cairo in September 2015 to discuss the project development and research outcomes.

As October 16 marks World Food Day, it is worth remembering that small-scale farmers might hold the key to ending hunger and poverty in rural areas. All they need is just better tools to deal with challenges they face every day and a little more support from policymakers.

Using marginal lands for increased incomes for farmers, and more feed for livestock in Uzbekistan

Large areas near the Aral Sea in Uzbekistan are affected by a very high degree of land degradation. Intensive soil salinity, rising water table, and falling rangeland productivity all have a damaging impact on farming.

As a result, local communities, who are largely agro-pastoralists, are faced with a lack of good quality forage for winter and low grazing capacity of desert pastures.

All this considerably reduces the incomes of rural populations and causes out-migration, leading to loss of local traditional knowledge and experience of land and water use.

To deal with these problems, ICARDA and ICBA started a research initiative on increasing livestock productivity in 2015. Scientists set up several demonstration trials on farms in Karauzyak district in Karakalpakstan, Uzbekistan.

The research initiative is aimed at studying effective management of marginal (low quality) land and water, production of non-conventional crops as forage for cultivation of non-conventional crops grown with the effective use of marginal water in Uzbekistan livestock and other alternative uses. And initial results show that many salt-loving species (halophytes) and salt-tolerant non-traditional crops can produce good quality forage and grain under the conditions of high soil salinity and water-logging.

The most valuable crops tested include sorghum (3 lines), perennial sorghum, triticale, pearl millet (2 lines), sesame (1 line), fodder beet (2 lines), forage and vegetable legumes (6 lines), Jerusalem artichoke (2 lines), Indigofera (1 line), Atriplex (3 lines), Kochia (2 lines), sunflower, sweet clover, sainfoin, salt-tolerant alfalfa, amaranth – all as high potential sources for forage.

Non-conventional crops are planted using marginal water (drainage mineralized and artesian), resulting in effective use of low-quality water. This also helps to conserve water quality, supporting ecosystem function and creating economic benefits for households.

As part of this work, a series of field training seminars were organized in Koybak, Karakalpakstan, from 20 to 29 October 2015, to introduce new forage crops to farmers (about 16 cultivars and improved lines from ICBA).

During the seminars, Drs. Kristina Toderich, head of ICBA's regional office, and Zulfiya Sultanova, of the Nukus Branch of Tashkent State Agrarian University, explained the characteristics of each crop, its use for forage, food, oil production, and nutritional values.

The seminars resulted in establishing a rural women learning alliance, the first of its kind to work with women farmers who look forward to diversifying their household incomes. What is more, the new alliance will be led by Almash Adambetova, a local woman farmer.

Farmers in Uzbekistan are learning to grow non-traditional crops using marginal water

Dr. Choukr-Allah explores potential of net-house farming in UAE

Selected varieties of widely consumed crops in the UAE were subject to a series of experiments at the ICBA research station under net house conditions. The purpose of the experiments was to advise farmer service associations on crops that could be cultivated in protected farming systems and thereby diversify their lines of production.

Initial results showed that the net house model can produce good quality yields in a timely manner and is an easy model for farmers to adopt and implement in their fields.

Dr. Redouane Choukr-Allah, a senior horticulture scientist at ICBA and leader of the research team, talks about the advantages and disadvantages of net house that farmers should be aware of while cultivating the new crops on their farms.

What are the crops you are growing inside the net house?

We are currently growing cucumber, cherry tomato, round tomato, strawberry, sweet melon, sweet pepper, green bean.

Why did you select these particular crops?

These crops are widely consumed in the UAE and they are valuable, suitable for protected agriculture systems. We will continue to test the performance of other varieties such as *solanaceae*, *cucurbitaceae*, berries and legumes to learn about their potential under net-house conditions.

What type of the technology have you used?

We are conducting our experiments inside the net house which is supported by an insect-proof net that reduces the use of insecticide. It is equipped with a mist system used for cooling and a shade net to reduce radiation during the summer season. The use of shading and mist allows us to reduce temperature by 6 degrees during the summer.

What are the initial results of your experiment?

This experiment proved the sustainability of the net house as a high productivity agricultural system with certain advantages. Crops could grow faster, yield more and in a healthier manner because the net house provides an ideal climate. For example, cucumber grown in the net house yielded 30% higher than that in the greenhouse during the winter. In comparison with greenhouse, we noticed that net house can perform better during the winter season (October-May) as the weather in the UAE is mild and optimal for the growth of most crops. Furthermore, our former experiment carried out from April to August showed that the net house consumes one fourth of the water and 95% less energy.

Any specific disadvantages/weaknesses you have observed in your experiments?

Net house cannot protect crops from weather conditions. Although heavy rainfall does not occur frequently in the Gulf Cooperation Council countries, we had to do preventive treatments against fungous development after occasional rain showers. On the other hand, damages related to heat cannot be easily avoided either during the summer (July-September). Extreme high temperatures and sand storms could have considerable damages on some crops, such as tomato varieties, affecting mainly the flowering and fruit set.

What recommendations would you propose to fellow researchers interested in net-house cultivation?

We think that an appropriate pest and disease management program (preventive

Dr. Redouane Choukr-Allah

treatment, insect traps, integrated pest management) should be adopted to ensure that crops could yield in a healthy manner. The insect proof net and the mist system should be cleaned once or twice a year. We believe that planting between October and May would give best results due to mild weather temperature that helps most crops to grow. Crop species and varieties should be carefully chosen and it is necessary to consider plant sensitivity and tolerance to heat.

We also noticed that a big number of farmers nowadays are moving to adopt the net house due to its low cost. However, better results could be achieved if windbreaks are installed around the net house to prevent sand storm and hydroponic planting system is adopted inside to cut down on water consumption.

Cherry tomatoes are grown under net house conditions at ICBA

Cucumber is cultivated in a net house with different substrates

New high-yielding, stress-tolerant sorghum variety released in Kazakhstan

Agriculture in the arid areas of Southwestern Kazakhstan is challenged by the poor quality of soil and shortage of water resources. Agricultural production is further constrained by intensive irrigation that is leading to soil erosion, loss of organic matter, salinization and waterlogging. These problems also cause shortage of fodder for livestock, an important element of rural life in Kazakhstan.

To find a solution to these problems, an international research team from the International Center for Biosaline Agriculture (ICBA), the International Center for Agricultural Research in the Dry Areas (ICARDA) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has been assessing ways and benefits of integrating pearl millet and sorghum into local livestock feeding and farming production systems in diverse agro-ecological zones.

Researchers have studied ways to diversify agro-biodiversity resources that enhance agricultural production and increase the income of rural communities. Both crops were considered due to their ability to provide sustainable grain production and fodder supply. They can also prevent soil erosion in saline and drought-prone areas.

The research team evaluated highly productive populations of improved lines from ICRISAT and local varieties in Uzbekistan. The result was a new promising sorghum variety named 'Keshen' which proved to be high-yielding, salt-tolerant,

Several years of research results in the release of new high-yielding sorghum variety "Keshen" at the National Center for Biotechnology of the Republic of Kazakhstan. Photo credit: Dr Rauan Zhapaev, Institute of Plant Husbandry, Almaty, Kazakhstan

and rich in sugar stem. It was tested during 2010-2015 at the experimental station of the Kazakh Rice Research Institute in Kyzylorda. This variety was approved by the State Variety Testing Commission of Kazakhstan in December 2015 for wide-scale adoption by farmers in the marginal lands of the country's southwestern areas.

'Keshen' can be grown in various conditions: early spring or as a second crop in pure stands, mixed with different salt-tolerant legumes after winter wheat harvest, or in rice rotation systems. Its period of vegetation (from seed germination until seed maturation) varies from 128 to 146 days depending on the agro-climatic and soil salinity conditions. Plant density observations indicated that 'Keshen' grows and produces viable seeds on medium saline soils. It can also thrive on highly sulfate-chloride type soils, as found in experiments in the Syr Darya river basin areas in Kazakhstan. Furthermore, experiments with small ruminant animals showed that 'Keshen' has fairly good digestibility and palatability.

The research team looks forward to wide adoption of the new variety because it fills gaps in the crop-livestock feeding systems in the dryland areas of Central Asian countries. However, since it is relatively a new grain crop, it has limited markets. Thus, producers should secure marketing opportunities prior to large-scale cultivation.

'Keshen' was developed as a result of collaboration between the Kazakh Rice Research Institute, the Uzbek Scientific Production Center for Agriculture, ICBA, ICRISAT and ICARDA with financial support of the Islamic Development Bank.

Keshen grows on medium saline soils and sulfate-chloride type soils

ICBA launches regional drought management system within UAE Innovation Week

ICBA hosted officials from the Ministry of Energy during the UAE Innovation Week

As droughts continue to plague most Middle East and North Africa (MENA) countries, researchers at the International Center for Biosaline Agriculture (ICBA) have been working to develop a regional system to monitor droughts and help to manage their impact.

ICBA launched the new system at an event on November 23, 2015, as part of the UAE Innovation Week. The system is a result of long-running collaboration between ICBA, NASA, the University of Nebraska – Lincoln, FAO and other partners. It aims to provide data on climate, water resources, and crops and help to devise policy options for managing drought impact.

Speaking at the event, Dr. Ismahane Elouafi, Director General of ICBA, said: "We are excited to launch today one of our latest innovation-based initiatives, which is the Regional Drought Management System, within the UAE Innovation Week. We have been tackling issues related to the food-water-energy nexus through developing and testing innovations such as integrated aqua-agriculture systems (Aquaponics).

To this end, we look forward to enhancing our collaboration with the government to develop innovative policy and technological options for improved management of water resources."

The past decades have seen a worrying increase in the frequency, intensity, and duration of droughts in the MENA region.

As the region already suffers from recurring water shortages, and population growth is putting an additional strain on scarce water resources, droughts can seriously undermine efforts to ensure food and water security, and agricultural sustainability.

Dr. Rachael McDonnell, head of Climate Change Modeling and Adaptation Section at ICBA, said: "The outcome of this regional initiative will be a unique capability for national and regional partners for the effective management of drought through science- and society-based programs leading to a unified platform. It will serve as a model for other regions in preparing for drought and managing its impacts."

During the event, attended by a high-level delegation from the Ministry of Energy led by H.E. Eng. Fatima Al Foora Al Shamsi, Assistant Undersecretary for Electricity Affairs, and representatives from international organizations, Dr. McDonnell also explained how this new initiative could support policy-making and thus help to guide farmers through critical periods of drought. The collaboration with NASA, the University of Nebraska – Lincoln and FAO adds to ICBA's regional expertise to monitor water resources and produce relevant maps.

Dr. Mohammad Al-Mulla, Chief Expert at the Ministry of Energy, said: "We see a big opportunity for the Ministry of Energy and ICBA to develop a collaborative program within the water-energy nexus. Water scarcity is a natural phenomenon in this part of the world. Therefore, we have to look for innovative ways to manage our scarce water resources and here science, research and management meet. And this corresponds to ICBA's mandate."

ICBA is already generating data for several countries of the region. This data will help policymakers to develop more efficient strategies on water and food security.

Restoring landscapes through climate-smart agriculture

The Global Landscapes Forum brought together more than 3,000 stakeholders to discuss a new climate deal in Paris, France

As world leaders gathered in 2015 to agree on Sustainable Development Goals and a new climate deal, the Global Landscapes Forum used this historic opportunity to bring together more than 3,000 stakeholders from forestry, agriculture, water, energy, law and finance, among others, with the aim of shaping the world's development agenda for decades to come.

For the first time, the Association of International Research and Development Centers for Agriculture (AIRCA) participated in this event as an Implementing Partner, and organized a discussion forum with the title "Restoring Landscapes through Climate Smart Agriculture".

Dr. Dyno Keatinge, AIRCA Chair and DG AVRDC; Dr. Ismahane Elouafi, Deputy Chair AIRCA and DG ICBA; Dr. Trevor Nicholls, CEO CABI; Dr. José Joaquín Campos, DG CATIE; Dr. Hans Friederich, DG INBAR and Dr. Eklabya Sharma, Director of Programme Operations ICIMOD presented examples of how AIRCA members have developed different aspects of climate-smart agriculture (CSA) and how this has contributed to healthy landscapes and improved livelihoods in Africa, Asia and Latin America.

All agreed that climate-smart agriculture is an essential component of rural landscapes, aiming at sustainable rural development under changing conditions and low carbon emissions. The two approaches (CSA and landscapes) complement each other where the landscape approaches proposed are helping to create the enabling conditions for CSA implementation. However, the success and out-scaling of these approaches depend on the degree to which collective intelligence is being identified, applied, and linked to appropriate technologies. This poses many challenges and it requires collaborative partnerships to address all the challenges.

The combination of centers involved in the AIRCA initiative ensures a combined expertise that addresses directly at least 10 of the 17 SDGs, allowing for a holistic approach to rural development, aiming at food security under changing conditions and lowering carbon emissions while seeking inclusiveness, maintaining life on lands, reduced poverty, access to clean water and sanitation, decent work and economic growth, clean energy and responsible production and consumption.

Recommendations made during the session include the need to work inter-sectorally, inter-institutionally and in partnerships that support CSA. Any strategies or approaches taken should be affordable and replicable as well as acceptable by people, looking for the balance between development, mitigation and adaptation. Agricultural diversification is an essential element of sustainable, healthy landscapes and for this to be achieved cooperation is vital with the education sector, consumers and other sectors of the economy. Policies and strategies should be talking about healthy lifestyles while supporting farmers to meet a diversified demand for food.

Furthermore, successful implementation requires local adjustments that make them affordable and effective under local conditions, as well as a good understanding of the mechanisms for decisions and the analysis of the consequences of these decisions for future livelihoods.

AIRCA members also organized and participated in a number of other events around the GLF and COP21, for example the Launch of the Paris Declaration on Agricultural Diversification, and the Regional Declaration to promote Climate Smart Agriculture in Latin America.

Scientists, leaders sign declaration on agricultural diversification at Paris climate change talks

Ms. Setta Tutundjian reiterated ICBA's commitment to provide innovative solutions and diverse crops to improve rural livelihoods in marginal environments

The Declaration on Agricultural Diversification was launched and signed in Paris on December 7, 2015 by world-renowned scientists and leaders during the recent meeting of the United Nations Framework Convention on Climate Change (UNFCCC) COP21. The declaration, which aims to build agricultural resilience and food security for future climates, will underpin a Global Action Plan for Agricultural Diversification (GAPAD) to be developed during 2016.

The declaration recognizes that global agriculture must provide greater food and nutrition security, minimize environmental harm, alleviate poverty and support the better use of land.

Commenting on the importance of signing this declaration, Prof. Sayed Azam-Ali, Chief Executive Officer of Crops for the Future (CFF) said: "We can no longer depend on maize, wheat, rice and soybean to feed the world. By 2030, the world will need 50% more food and energy and 30% more fresh water. The Declaration on Agricultural Diversification calls upon states, intergovernmental organizations and the non-government sector to work together to develop and implement the necessary actions worldwide to diversify agriculture."

The Declaration on Agricultural Diversification will stand alongside the UNFCCC COP21 Agreement as a historic document and will be the main agenda item at the COP13 CBD meeting in Cancun, Mexico, in December 2016. It is based on the following actions:

1. Develop a Global Action Plan for Agricultural Diversification (GAPAD).
2. Convene an International Conference on Agricultural Diversification under the auspices of UNFAO.
3. Agree at the CBD COP13 (Mexico 2016) on a process to formulate a "Protocol on Agricultural Diversification" to the Convention on Biological Diversity, 1992.

The Declaration was signed in the presence of Former Malaysian Prime Minister Tun Abdullah Ahmad Badawi. Founding signatories included Dr. Trevor Nicholls of the Centre for Agriculture and Bioscience (CABI), Dr. David Molden of the International Centre for Integrated Mountain Development (ICIMOD), Dr. Jose Joachim Campos of the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Prof. Meine Van Noordwijk of the World Agroforestry Centre (ICRAF) and representatives from the Association of International Research and Development Centers for Agriculture (AIRCA), Food and Agriculture Organization of the United Nations (FAO) and Global Alliance for Climate-Smart Agriculture (GACSA).

Speaking at the event, Ms. Setta Tutundjian reiterates ICBA's commitment to provide innovative solutions and diverse crops to improve the status-quo of marginalized environments. Ms. Tutundjian, who is the Director of Partnerships and Knowledge Management at the International Center for Biosaline Agriculture (ICBA), reiterated the Center's commitment to providing innovative solutions and diverse crops to combat the agricultural challenges faced by some 1.4 billion people living and working in marginal environments. She said: "ICBA's management and staff fully support this declaration as we are convinced of its common benefit for all of us and we look forward to collaborating with CFF and our AIRCA partners on the next critical steps and we join the other voices in this room today to encourage everyone to support this important declaration."

ICBA to support salinity management in Palestine

As part of its continued efforts to boost food and water security in the Middle East through collaborative initiatives, the International Center for Biosaline Agriculture (ICBA) has concluded a new cooperation agreement with the Palestinian National Agricultural Research Center (NARC).

The agreement is expected to give a renewed impetus to research collaboration between ICBA and NARC in a number of areas.

During a ceremony at the ICBA head office in Dubai, UAE, on December 9, 2015, Dr. Ismahane Elouafi, ICBA's Director General, and Dr. Soufian Sultan, Palestine's Minister of Agriculture, signed the memorandum of understanding to support agricultural research, management of marginal water resources, and improve the livelihoods of rural communities in the West Bank and Gaza Strip.

Speaking of the positive impact of this cooperation and ICBA's contribution over the years to fighting salinity, Dr. Sultan said: "Saline areas in Palestine stretch over 30,000 ha. The major problem here is the salinity of surface and ground water that we rely on for irrigation purposes. Therefore, we need solutions for the salinity problem to grow new salt-tolerant varieties. ICBA has great expertise in salinity management and we aim to duplicate some of the successful trials in Palestine."

According to the agreed technical program, ICBA will provide technology-based solutions to tackle soil erosion, soil and water salinity, water scarcity, desertification, and climate change in Palestine.

Dr. Elouafi said: "We are pleased to continue our support to the agricultural sector in Palestine and help small-scale farmers increase their production. This time we will be working together with local researchers to promote the use of marginal water and best-bet salt-tolerant varieties that grow in marginal environments. Our scientists have been studying these issues for years and have ready-to-use outcomes to support Palestine's agriculture agenda."

Both centers will establish a shared database that would benefit future research. Furthermore, a joint research team will approach potential donors with research programs on the management of marginal land and water and will promote their work through regional and international research networks.

Signing a new memorandum of understanding. Left to right: Mr. Izzidine A.M. Abuarqub, Director General of International Relations (Palestine); Dr. Soufian Sultan, Minister of Agriculture (Palestine); Dr. Ismahane Elouafi, Director General of ICBA; and Professor Abdulrahman Sultan Al Sharhan, Chairman of ICBA Board of Directors

New agreement to support protected agriculture in UAE

Signing an agreement to support protected agriculture in the UAE. Left to right: Dr. Abdulaziz Belgacem (ICARDA), Dr. Ismahane Elouafi (ICBA), H.E. Abdelrahim Mohammed Abdullah Al Hammadi (MoEW), and Dr. Mehdi Drissi (FAO)

The International Center for Biosaline Agriculture (ICBA) has signed a new memorandum of understanding (MOU) with the Ministry of Environment and Water (MoEW), the International Center for Agricultural Research in the Dry Areas (ICARDA) and the United Nations Food and Agriculture Organization (FAO). The agreement aims to enhance cooperation to secure adequate infrastructure for new protected agriculture systems and implement projects on modern agricultural innovations and techniques.

This will provide the framework for a joint team of researchers to implement projects for three years at the Agriculture Innovation Centre (AIC), which is established by the MoEW. The team will test the quality of the planted crops and the costs and efficiency of energy and water used in these trials. These projects will provide important knowledge to public and private agencies about the economic feasibility of the best-bet design of new greenhouses.

Speaking at the signing ceremony on December 16, 2015, Dr. Ismahane Elouafi, Director General of ICBA, said: "This agreement is important for ICBA as it supports our program on protected agriculture that we started a few years ago. Our researchers are developing protected agriculture-based solutions that are adapted to desert conditions in the UAE and Gulf Cooperation Council countries. We will have now greater opportunities to achieve more with our international partners and with the support of the Ministry of Environment and Water."

ICARDA and FAO will be in charge of designing a training program for AIC staff on how to manage research experiments and latest technologies used in protected agriculture. They will also provide one prototype of hydroponic greenhouses alongside a cost-profit estimate of the new generation of greenhouses.

On ICARDA's role, Abdulaziz Belgacem, the organization's UAE regional coordinator, said: "We will benefit from the expertise of the international partners and this will add value to the training events we will organize. In addition to ICARDA's thorough knowledge in the region, ICBA has expertise in the management of soil and water salinity alongside planting salt-tolerant species. FAO has the largest international experience on greenhouses and will be supported by the Ministry which will facilitate our work in the UAE."

On FAO's role, Mehdi Drissi, the organization's representative to the UAE, said: "We have allocated USD 337,000 to build a new generation of greenhouses and cover a mission of experts. However, the scientific contribution of our partners is the most important here because it will bring together innovative ways to implement project outcomes in the UAE which is the biggest supporter of innovation in the Arab world."

MoEW will take the lead in coordinating the activities of the involved partners to fully execute the MoU. It will also supply AIC with necessary technical professionals and will provide infrastructure to the site such as electricity, water, buildings, etc.

Mohammad Mousa Al Amiri, Director of Agricultural Research Directorate at the MoEW, said: "The Ministry embraces innovation in the field of protected agriculture and strives to preserve the scarce water resources in this dry region. Therefore, we have signed this MOU to implement new systems through joint programs with our three international partners and we aim to transfer new information to our farmers."

ICBA, Al Ain Municipality ink cooperation agreement

The International Center for Biosaline Agriculture (ICBA) and Al Ain Municipality have signed a new memorandum of understanding to boost collaboration on, among other things, research into non-conventional water resources and salt-tolerant plants.

During a ceremony to sign the agreement with Dr. Matar Mohammed Al Nuaimi, General Manager of Al Ain Municipality, on October 26, 2015, Dr. Ismahane Elouafi, Director General of ICBA, said: "Signing today this agreement with Al Ain Municipality is very important for our center."

The memorandum provides a framework for cooperation for the period of 2015-2020 in such areas as research and knowledge-sharing. The research component will be focused on collecting and exchanging agricultural data on non-conventional water resources, marginal environments, and salt-tolerant plant species. ICBA researchers will also work with their counterparts from Al Ain Municipality on implementing plans and initiatives to optimize use of water resources and provide consultations to evaluate the current state of water and soil.

Dr. Matar Mohammed Al Nuaimi, General Manager of Al Ain Municipality, and Dr. Ismahane Elouafi, Director General of ICBA, sign a new cooperation agreement

Scientists at ICBA and Al Ain Municipality will jointly conduct experiments and build the capacities of local researchers and farmers.

Dr. Ismahane Elouafi commented: "Within ICBA we are trying our best to work with different partners and particularly with local organizations within the UAE that could be users of the research outcome we are developing at ICBA. We look forward to implementing the MoU that actually talks about several areas of collaboration."

The agreement is in line with ICBA's continued efforts to enhance impact of its research on the ground and ensure that more farmers and other practitioners benefit from it. It is hoped that the agreement will contribute to increased water and land use efficiency in the municipality.

ICBA, Tehran University sign agreement to boost research cooperation

The International Center for Biosaline Agriculture (ICBA) continues to expand its cooperation with research institutions across the Middle East and beyond to ensure sustainable agricultural production in marginal environments.

As part of its continued efforts to build and enhance scientific partnerships in the region, ICBA signed a five-year Memorandum of Understanding (MoU) with the University of Tehran, Iran, on 7 October 2015 to collaborate on contributing to global knowledge on salinity, soils, and agriculture.

The agreement will help to carry out a wide range of joint activities, and aims to leverage resources and facilities towards developing data, applications of remote sensing in agriculture, and proposing policy options for sustainable agriculture in marginal environments.

"International collaboration is very important for the implementation of projects and for the exchange of scientific expertise because it adds value for both sides. In Iran, we have specific climatic conditions, soil type, and ecological footprint and we believe that our research findings could be beneficial for ICBA and vice versa," said Dr. Sayed Kazem Alavipanah, a remote sensing specialist at the Department of Physical Geography, the University of Tehran.

Dr. Kyumarth Yazadanpanah (University of Tehran) and Ms. Setta Tutundjian (ICBA) exchange copies of a new agreement

ICBA and Tehran University will jointly develop proposals in areas of mutual interest and will endeavor to secure support for collaborative research-for-development initiatives. Both institutions agreed on the regular exchange of information and research materials. For their part, ICBA researchers are optimistic about replicating their successful research findings in Iran, Turkey, Iraq, and Syria, as well as other countries.

For example, the MAWRED project is already helping to increase knowledge about climate change effects in the region and to formulate adaptation strategies."This cooperation with the Faculty of Geography at the University of Tehran focuses on mapping and the use of remote-sensing images. We can together improve the interpretation and analysis of methods to identify marginal areas and provide this information to decision-makers and implementers to identify the areas in need of solutions," said Dr. Richard Soppe, a marginal water management specialist at ICBA.

PUBLICATIONS

The Contribution of Human-Induced Climate Change to the Drought of 2014 in Southern Levant Region

The impacts of drought in the MENA region are only all too apparent for us to witness with short and often long-term consequences for people's health, livelihoods, and the environment. Loss of crops and animals, seed banks, and depleted groundwater systems mean food and water sources and income are affected over a number of years, impacting even the most resilient of communities. For example the consequences of the drought in the Levant between 2006-2010 were devastating for so many leading, to large –migrations of people and more than a million falling below the poverty line.

It is hypothesized that droughts over the Levant region can be linked to three types of synoptic regimes. The regimes include (1) an expansion of the subtropical high over the majority of the Mediterranean Basin, (2) a pronounced stagnant ridge/block, and (3) an intrusion of lower-level continental polar air. The 2014 drought, affecting parts of Jordan, Lebanon, and Palestine was characterized by extremes in low rainfall, the extent of the long dry periods, and three exceptional rainfall events that interspersed these.

The drought itself was thought to be due to a large-scale winter blocking event that prevented weather systems from reaching the region.

The motivation for this study is twofold: (1) due to the instability in the Levant region, stresses such as meteorological extremes can often lead to enhanced public and political tensions. (2) There is a clear bias in the literature for looking at extreme events over industrialized countries - this study provides an example in an alternative geographic region.

Authors: K. Bergaoui, D. Mitchell, R. Zaaboul, R. McDonnell, F. Otto, M. Allen

Special Supplement to the Bulletin of the American Meteorological Society. Vol. 96, No. 12, December 2015

Publisher: Bulletin of American Meteorological Society.

Salt and drought stresses in safflower: a review

Safflower is one of the oldest cultivated crops, usually grown at a small scale. Safflower is grown for flowers used for coloring, flavoring foods, dyes, medicinal properties, and livestock feed.

Safflower is underutilized but gaining attention due to oil yield potential and the ability to grow under high temperatures, drought, and salinity.

Salinity and drought have negative effects by disrupting the ionic and osmotic equilibrium of the plant cells. The stress signal is perceived by membranes then transduced in the cell to switch on the stress responsive genes.

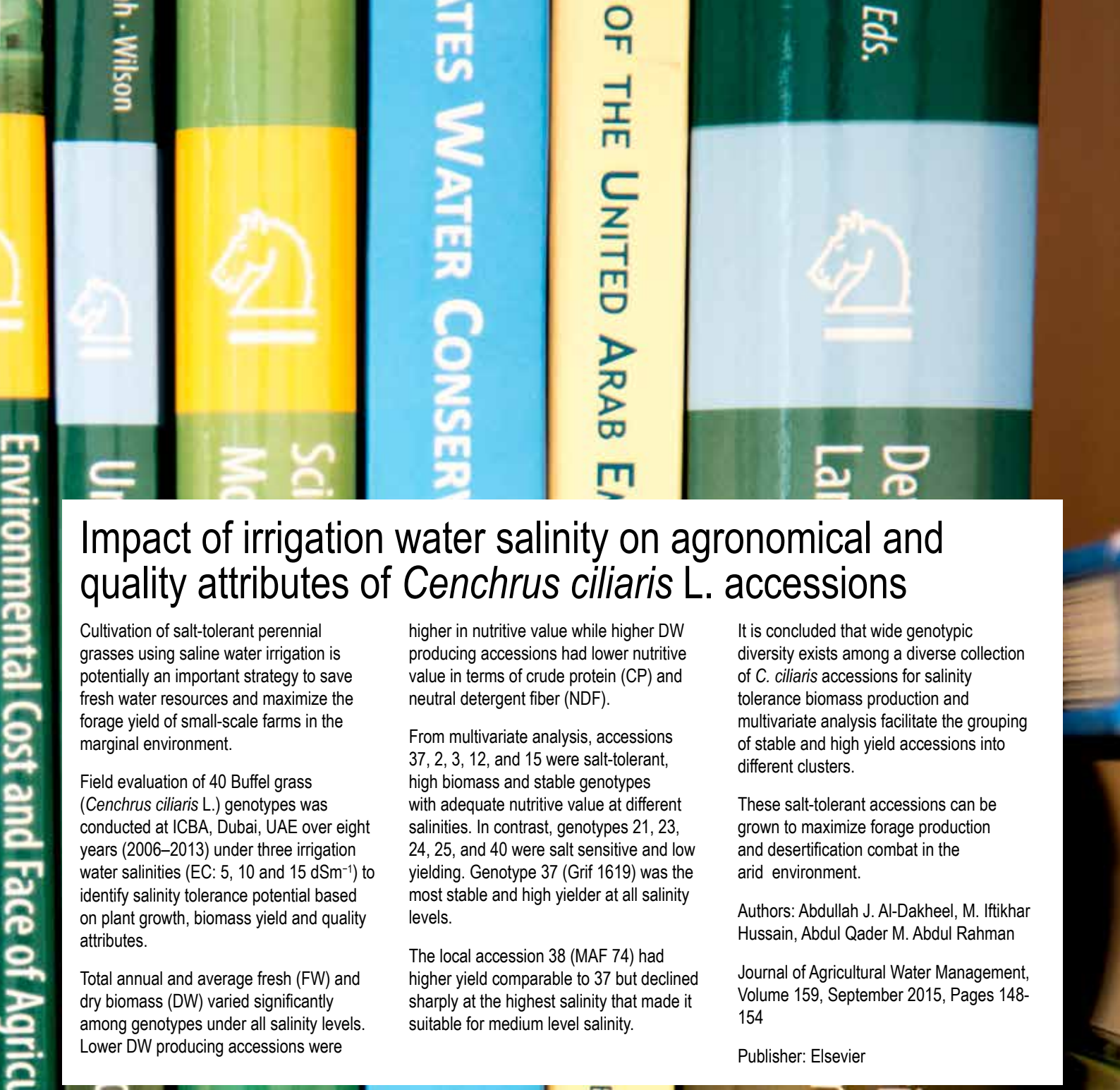
This review discusses stress tolerance mechanisms in safflower. Strategies are proposed for enhancing drought and salt resistance in safflower.

Authors: M. Iftikhar Hussain, Dionyssia-Angeliki Lyra, Muhammad Farooq, Nikolaos Nikoloudakis, Nauman Khalid

Journal of Agronomy for Sustainable Development

First online: 21 December 2015

Publisher: Springer



Impact of irrigation water salinity on agronomical and quality attributes of *Cenchrus ciliaris* L. accessions

Cultivation of salt-tolerant perennial grasses using saline water irrigation is potentially an important strategy to save fresh water resources and maximize the forage yield of small-scale farms in the marginal environment.

Field evaluation of 40 Buffel grass (*Cenchrus ciliaris* L.) genotypes was conducted at ICBA, Dubai, UAE over eight years (2006–2013) under three irrigation water salinities (EC: 5, 10 and 15 dSm^{-1}) to identify salinity tolerance potential based on plant growth, biomass yield and quality attributes.

Total annual and average fresh (FW) and dry biomass (DW) varied significantly among genotypes under all salinity levels. Lower DW producing accessions were higher in nutritive value while higher DW producing accessions had lower nutritive value in terms of crude protein (CP) and neutral detergent fiber (NDF).

From multivariate analysis, accessions 37, 2, 3, 12, and 15 were salt-tolerant, high biomass and stable genotypes with adequate nutritive value at different salinities. In contrast, genotypes 21, 23, 24, 25, and 40 were salt sensitive and low yielding. Genotype 37 (Grif 1619) was the most stable and high yielder at all salinity levels.

The local accession 38 (MAF 74) had higher yield comparable to 37 but declined sharply at the highest salinity that made it suitable for medium level salinity.

It is concluded that wide genotypic diversity exists among a diverse collection of *C. ciliaris* accessions for salinity tolerance biomass production and multivariate analysis facilitate the grouping of stable and high yield accessions into different clusters.

These salt-tolerant accessions can be grown to maximize forage production and desertification combat in the arid environment.

Authors: Abdullah J. Al-Dakheel, M. Iftikhar Hussain, Abdul Qader M. Abdul Rahman

Journal of Agricultural Water Management, Volume 159, September 2015, Pages 148-154

Publisher: Elsevier

New ICBA website in Arabic

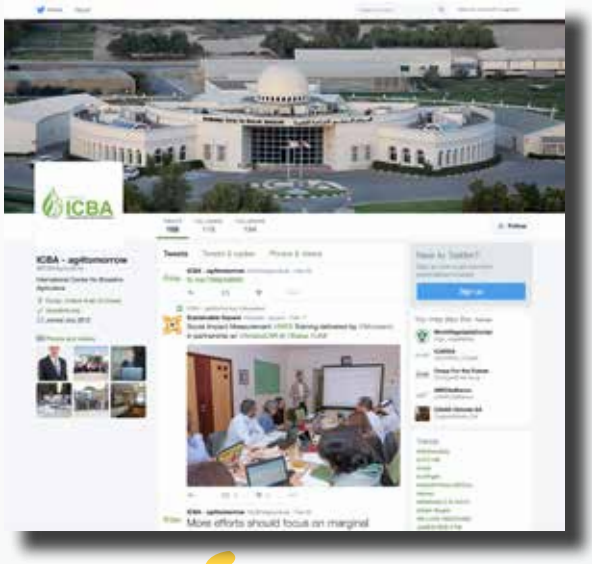
To reach out to more readers, ICBA launches its website in Arabic.

ICBA's new social media pages

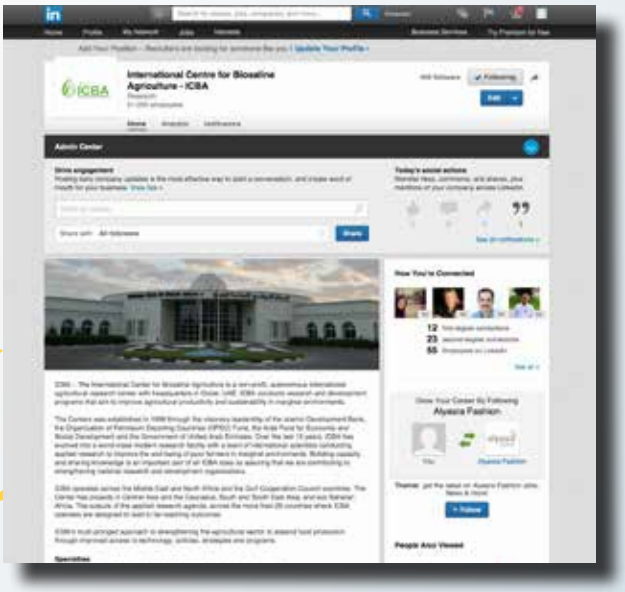
The International Center for Biosaline Agriculture (ICBA) aims to spread knowledge generated by the Center's researchers and its partners among national researchers, policymakers and farming communities around the world. To this end, ICBA is pleased to announce the launch of social media pages to get more engaged with its community of readers. We welcome your feedback and comment.

YouTube: ICBAAgriculture

Facebook: ICBAAgriculture



Twitter @ ICBAAgriculture



LinkedIn: ICBAAgriculture

ICBA scientist wins award for irrigated agriculture research

Dr. Makram Belhaj Fraj and ICBA researchers celebrate the award

Dr. Makram Belhaj Fraj, a senior scientist at the International Center for Biosaline Agriculture (ICBA), was presented the award in the category 'The most interesting project' during the first congress by the Middle East and North Africa (MENA) Network for Water Centers of Excellence on November 9, 2015, in Muscat, Oman, for the project 'Application in real-time monitoring systems for irrigated agriculture'.

This project is a collective effort that involved the International Center for Biosaline Agriculture (ICBA) in the UAE, the National Center for Agricultural Research (NCARE) in Jordan, Sultan Qaboos University (SQU) in Oman, and the National Institute of Research for Rural Engineering, Water and Forestry (INGREF) in Tunisia.

The project aims at improving irrigated production systems to combat water scarcity which is anticipated to worsen over the coming years. To do that, researchers deployed technology in the form of sensor systems to get near-real-time remote monitoring of water and its flow in soils and through plants and to transmit data and information wirelessly.

Usually, farmers depend on the feel of soil and clarity of the sky to decide on irrigation. This study, however, generates accurate information that helps decision-makers implement sound policies and better manage the existing water resources.

Commenting on this important achievement, Dr. Belhaj Fraj, said: "This project is an interesting example of field research involving scientists and the private sector: instrumentation manufacturers and agribusinesses. State-of-the-art instrumentation was tested on technology platforms in over 11 agro-ecological zones encompassing seven climates, ranging from desert to sub-humid and 10 soil classes. Furthermore, the technology has been deployed in real production situations involving 28 plots in 16 agribusinesses that represent 2,500 ha of staple and annual and perennial cash crops."

As a result, guidelines will be developed in close cooperation with local NGOs and agricultural extension services for capacity building of the farmers for the maintenance of a high tech system.

Dr. Makram Belhaj Fraj

New ICBA members

Susan Robertson, PhD
Agricultural Economist

Abdumutalib Begmuratov
Senior Publications and Editing Specialist

Elsy Melkonian
Journalism and Media Outreach Specialist

Muhammad Junaid, PhD
Post Doctoral Fellow

Ahmed Karim
IT Specialist

Ereny Tawadrous
Administrative Assistant

Nazir Ahmed
Driver

Michael Bruder
Corporate Services Consultant

How AIRCA can help to achieve SDGs

THE GLOBAL GOALS
For Sustainable Development

The new Sustainable Development Goals (SDGs) were adopted at the United Nations Sustainable Development Summit 2015 in New York. They replace the Millennium Development Goals which have achieved substantial changes in some, but not all areas. The 17 SDGs and 169 targets were developed in a process of consultations involving governments, civil society and many other stakeholders from around the globe, including AIRCA Centers such as AVRDC which played an active role in the formulation of SDG2.

The Association of International Research and Development Centers for Agriculture (AIRCA, www.airca.org), is pleased to see that agriculture, food and nutrition security have a prominent place on the new sustainable development goals agenda, and its nine member organizations are committed to helping our partner countries in achieving these goals.

Supported by more than 60 member countries, which make up over 70% of the world's population, AIRCA members have activities in all major geographic regions and ecosystem types. All have a proven track record of research, development and implementation, working closely with farmers, extension systems, national research institutes, non-governmental organizations (NGOs) and the private sector across a wide range of crops and ecosystems.

The priorities and expertise of the AIRCA centers contribute directly to ten of the SDGs (below) and can help partner countries meet these goals as part of the national sustainable development action plans that countries are now developing.

Many of the ambitious goals and targets are linked and interdependent, for example, protecting biodiversity and food and nutrition security (SDGs 2 and 15), which for many countries cannot be separated. The landscape approach, to which AIRCA is committed as one of its founding principles, can provide a solution: it takes into account the diversity of interactions among people and the environment, agricultural and non-agricultural systems, and other factors that represent the entire context of agriculture.

SDG1: Eradicate poverty

75% of the world's poor live in rural areas, and the majority of them depend on agriculture for their livelihoods. Research has shown that overall GDP growth originating in agriculture is, on average, at least twice as effective in benefiting the poorest half of a country's population as growth generated in nonagricultural sectors.

SDG2: Food security and nutrition

AIRCA's mission is "putting research into use by strengthening capacities for sustainable improvements to incomes, food and nutrition security in healthy landscapes". Large scale impact can be achieved with AIRCA's combined innovations that help smallholder farmers grow more and lose less, like soil fertility, seed health, integrated pest management and crop storage among others, as well as crop diversification which contributes to improved nutrition. New approaches to capacity building and technology, like the use of plant clinics and mobile communications, enable smallholders to increase their incomes, purchase food and improve family nutrition and livelihoods.

SDG4: Quality education and lifelong learning

Education and learning are an integral part of AIRCA members' mandates, and many of them have since their inception been involved in capacity building of individuals as well as institutions, all over the globe. Nurturing particularly young people's interest and careers in agriculture is a vital part of tackling food security in a wider context. All nine AIRCA members are involved in capacity building and contribute to improving access to formal and informal education, from farmer to postgraduate level, and have literally reached millions of people.

SDG6: Sustainable management of water and sanitation

Several AIRCA members work on "integrated watershed management" that support the SDG targets 6.5 and 6.6, a

very important contribution linked to our landscape approach. A variety of successful innovations were developed by AIRCA members, which for example increase water use efficiency and productivity, as well as the use of non-traditional types of water like treated wastewater and saline water for agricultural production. Sustainable water management, including proper use of fertilizer with drip irrigation systems and methods that reduce soil erosion and groundwater pollution are also developed and promoted. Many of these approaches have been included in national policies.

SDG7: Sustainable energy

Renewable energy sources are also part of AIRCA's experience, both at household and industrial levels. AIRCA members are active in research, development and promotion of a variety of opportunities to reduce the consumption of energy from non-renewable sources.

For example production of tree-based biomass-energy on highly marginalized areas for sustainable energy production can also help countries to move ahead in providing clean and sufficient energy for all.

Underutilized crops also provide opportunities for biomass production in a variety of conditions, for example in increasingly marginal environments.

SDG11: Sustainable cities and communities

AIRCA members' expertise also directly supports SDG11, for example using bamboo for climate-smart rural housing and construction, for thousands of years in many of the world's regions.

Bamboo houses are strong but flexible, and affordable. There are many cases of bamboo's ability to withstand climate-induced natural disasters such as landslides or floods, better than stone or concrete. Affected by earthquakes in Latin America, for example bamboo structures remain intact, where concrete housing is largely destroyed. For carbon sequestration, estimates show that building a bamboo house produces just 60% of the emissions of an equivalent sized masonry home.

SDG12: Sustainable consumption and production patterns

Strengthening of scientific and technological capacity is required in order to manage natural resources in a more sustainable way, which is a part of AIRCA members' mandates.

This for example includes projects that build local agribusiness capacity with farmers and small-scale entrepreneurs. AIRCA also encourages companies to adopt sustainable practices throughout the agriculture value chain and to integrate sustainability into their production systems.

SDG13: Climate change

AIRCA's interventions aim both at climate change adaptation (for example through improved seeds, cropping systems and methods, water utilization) and mitigation through the recommendation of appropriate eco-system based policies and practices like Nationally Appropriate Mitigation Actions in the agricultural sector, as well as Low Emission Development Strategies. Our research helps understand future conditions of climate, water resource availability and possible changes in crop production and can influence policies and investment frameworks.

SDG15: Land use

Increasing the amount of land dedicated to agriculture cannot be easily accomplished and could have significant global impacts on biodiversity and ecosystem services, particularly water resources, terrestrial carbon and climate change mitigation. One of many examples in AIRCA is the promotion of bamboo, which is used by many INBAR member states to prevent erosion at riverbanks and lakeshores, while also providing an excellent source of fodder and food. Using marginal lands for agricultural production can also offer a solution to sustainable use of land resources.

SDG 17: Partnerships for the goals

The formation of AIRCA was stimulated by the need for integrated action to deliver sustainable agricultural intensification at the landscape scale, and has grown into a strong partnership of like-minded organizations. AIRCA has the capability and track record to address complex problems at a broad geographic scale across several sectors, including across boundaries, to increase income and improve nutrition in a sustainable way.

We believe that AIRCA's mission to produce more food on the same or less land in a way that minimizes negative impacts on air, water, soils and biodiversity, will contribute to the SDGs. When combined with rural income diversification, off-farm income can be used to provide capital to support improved farming practices, reducing unsustainable land use in pursuit of increasing food production.

AIRCA members are committed to combining their experience of successful approaches, opportunities and challenges in moving farmers from a subsistence to a business basis and their communities from poverty to prosperity.

In line with our mission to use research and knowledge to strengthen capacities for sustainable improvements to incomes, food and nutrition security in healthy landscapes, AIRCA is poised to support the global effort to turn the United Nations' Sustainable Development Goals into a reality.

By: AIRCA communications team, contact: mdieling@airca.org

ABOUT ICBA

International Center for Biosaline Agriculture - ICBA is an international, non-profit agricultural research center established in 1999 that carries out research and development programs focused on improving agricultural productivity and sustainability in marginal and saline environments.

ICBA takes innovation as a core principle and adopts a multi-pronged approach to addressing the closely linked challenges of ensuring water, environment, income, and food security. ICBA's research innovations include assessment of natural resources, climate change adaptation, crop productivity and diversification, aquaculture and bio-energy and policy analysis. The Center 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.

Improving the generation and dissemination of knowledge is an important strategic objective of ICBA and the Center is working to establish itself as a knowledge hub on sustainable management and use of marginal resources for agricultural production and environmental protection in marginal environments. With the help of its partners, ICBA innovates, builds human capital, and encourages learning that is fundamental to change.

ICBA's work reaches many countries around the world, including the Gulf Cooperation Council countries, the Middle East and North Africa, Central Asia and the Caucasus, South and South East Asia, and sub-Saharan Africa.

ICBA is mainly supported by three core donors: the Ministry of Environment and Water of the United Arab Emirates, the Environment Agency - Abu Dhabi, and the Islamic Development Bank. We gratefully acknowledge their contributions as well as that of many other bilateral and multilateral agencies, which have helped us to carry out our mission over the years.

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