ICARDA

Science for resilient livelihoods in dry areas

The Arab Fund and ICARDA

Joining forces for resilient dryland livelihoods under a climate crisis

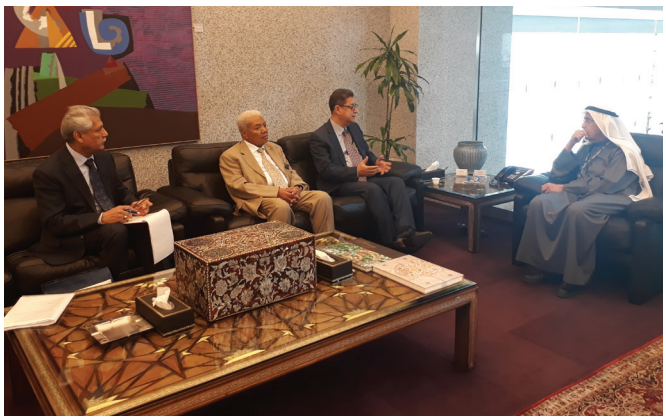
For over four decades, the Arab Fund for Economic and Social Development (AFESD) has generously supported ICARDA's work to improve rural livelihoods by building vital research capacities and executing innovative agricultural projects across Arab countries. Words alone cannot express the value of this commitment, not only to ICARDA, but especially to the vulnerable rural communities who every day live under severe challenges and shocks such as an intensifying climate change and the current COVID-19 pandemic. Through its long-standing support to ICARDA and national research programs projects, the Arab Fund is one of the most trusted and revered supporters of research for development (R4D) in Arab countries. Its contribution is crucial to our shared mission of alleviating poverty, enhancing food security, and promoting economic and social development in the Arab countries.

Key to this support, is the Arab Fund's critical assistance to ICARDA's decentralization, enabling us to successfully relocate our research platforms to strategically selected locations. This ensures that ICARDA stands today at the forefront of R4D in dryland agriculture to generate improved technologies, through well-equipped, state-of-the art facilities, uniquely experienced staff, and is able to attract globally renowned agricultural scientists.

I would like to pay tribute to Mr. Abdlatif Yousef Al-Hamad, the Director General and Chairman of the Board of Directors of the Arab Fund since 1985. The fruitful partnership between ICARDA and the Arab Fund is a reflection of his vision, courage, and passion for delivering economic and social development. It is with bittersweet feelings that I send my best regards and well wishes for the future as he steps down from his role as the Arab Fund's Chairman. I think fondly of the numerous productive meetings and discussions we shared, and I am eternally grateful for his support and guidance over the years.

I remain sure that together, ICARDA and the Arab Fund will continue to provide the innovative solutions required to maintain and increase agricultural productivity in the face of challenges. Together we will maximize the adoption of new and innovative approaches, increasing the resilience of rural livelihoods, and contributing to the economic and social development of Arab countries. This booklet highlights the many achievements, key factors, and impacts of this successful and enduring partnership. For this, we sincerely thank Mr. Abdlatif Yousef Al-Hamad and the Arab Fund, and we look forward to working with his successor over a long and fruitful collaboration.

Aly Abousabaa
Director General, ICARDA



Mr. Abdlatif Yousef Al-Hamad, Director General of Arab Fund for Economic and Social Development (AFESD) welcomes Mr. Ali Abdel Hamid Abousabaa, ICARDA Director General and his Assistant for International Cooperation, Dr. Kamil Shideed

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Impacts of Arab Fund support: Highlights

Impact on national and institutional capacities

- 17,332 national scientists trained in dryland research since 1978.
- AFESD-ICARDA Fellowship Program: 40 MSc and 62 PhD students since 2012—over half women.
- Advanced biotechnology research capacity strengthened in 10 Arab states.
- Partnerships between ICARDA and national research programs widened and strengthened.

Impact on productivity and rural incomes, and the efficient management of scarce resources

- 10% of Egypt's total wheat area—125,000 hectares—using improved mechanized production technologies, saving 25% of water and increasing yields by 30%.
- In the Arabian Peninsula, improved technologies for greenhouse production of high-value crops reduce the use of limited groundwater resources by 200–300%, increasing yields by 30–80%. Improved production of forages reduces water use by 50% and increases the production of feed by threefold.

Impact at scale: Technology transfer and adoption by farmers

- A community-based approach to drylands development, involving agreed Community Development Plans, was piloted with 12 communities in eight Arab countries. Besides benefiting the communities involved, the approach was subsequently adopted by national development programs and international development agencies.
- Hundreds of pilot testing and demonstration sites established across Arab countries provide the basis for further out-scaling of results through farmer-to-farmer extension.
- Farmers received essential guidance in producing improved seed varieties, reducing the constraints of shortages of certified seed, and fast-tracking their distribution.

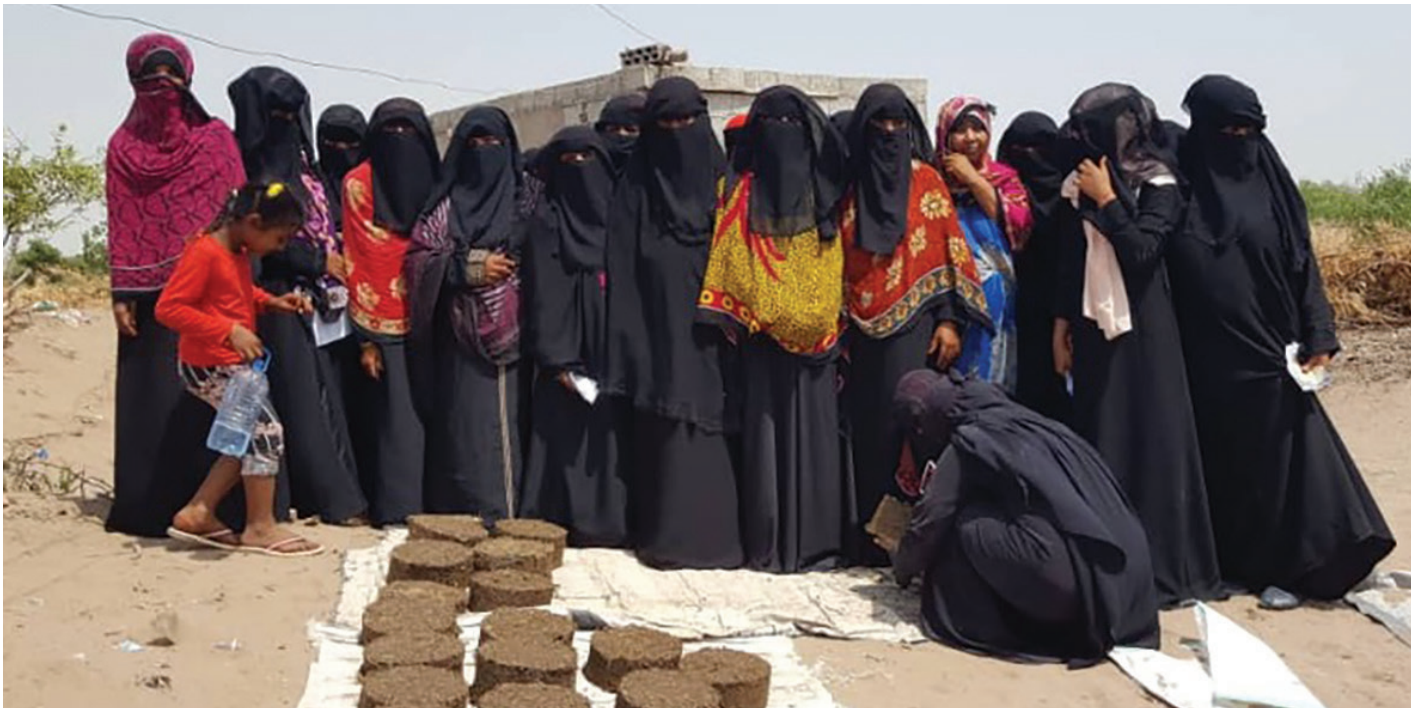
Impact on policymakers

- Introduction of policies and incentive measures to drive widespread adoption of ICARDA technologies.
- As a result of subsidies in the United Arab Emirates (UAE), more than 1,500 farmers have adopted ICARDA recommended greenhouse production practices.
- Egypt launched a national campaign to expand wheat production using ICARDA recommended technologies. By 2023, more than 800,000 hectares of wheat in Egypt are expected to be produced using ICARDA innovations resulting in increased net returns of US$4.5 billion that benefit over one million farmers.

A successful and enduring partnership

The success of the partnership between the Arab Fund and ICARDA and its achievements in facilitating the economic and social development of Arab countries is due to several factors.

- **Evolving together.** From providing support to ICARDA's capacity-building activities and specific regional projects, to the Fund's recent support of decentralization which has strengthened ICARDA's capacity to evolve, support and work with Arab countries in R4D.
- **Capacity building as a shared priority.** For over four decades, the Arab Fund has supported ICARDA's core training program. The regional projects supported by the Fund also include a crucial element of human and institutional capacity building.
- **Projects that match countries' priorities and the Fund's strategic objectives.** ICARDA works closely with its national research partners and the Fund's technical staff in formulating regional projects.
- **The Arab Fund promotes inter-Arab cooperation,** primarily funding regional projects in the Arab world. ICARDA designs and implements these projects to facilitate inter-country collaboration, including regional research networks on issues of common interest. Based on the comparative advantages of each national program, such an approach builds partnerships and reduces duplicative research in each country.
- ICARDA has adopted a **common project management structure** for regional projects in which all collaborating scientists participate in annual regional research coordination and planning meetings. Each country designates one of its scientists as a National Coordinator who, together with ICARDA and donors' representatives, are members of the Project Steering Committee, which reviews, amends and approves annual work plans and budgets. This structure contributes to building partners' capacity in research and project management.
- The Arab Fund has maintained a crucial **continuity of funding** for key projects, supporting the timeline required to transform research results into use: from upstream research to adaptation and testing of interventions with farmers, the design of methods for linking research to extension systems to scale out results, and the development of enabling institutional and policy measures to ensure adoption and impact.
- Finally, as the major multilateral Arab aid organization, the **Arab Fund's support has mobilized substantial additional resources** from other private and public sources to support ICARDA's collaborative projects in Arab countries.



Training women farmers in Yemen on fodder production

Achievements and impacts of collaborative projects

Capacity development

Raising the capacity of agricultural researchers and institutions is a chief goal shared by the Arab Fund and ICARDA since the Center's foundation in 1977.

Number of participants in ICARDA capacity development, 1978–June 2020

Type of training	Total	Supported by Arab Fund (Arab countries)
Post-Graduate (MSc & PhD)	1,010	679
Individual non-degree training	2,541	1,907
Training courses	22,649	14,746
Total	**26,200**	**17,332**

Investing in the future: The partnership with the Arab Fund specifically targets young researchers, recognizing them as essential for the future of resilient agricultural enterprise. A successful **AFESD-ICARDA Fellowship Program** began in 2012 in which 102 students from Arab countries have since enrolled—40 MSc and 62 PhD students—of which 55 percent are women.

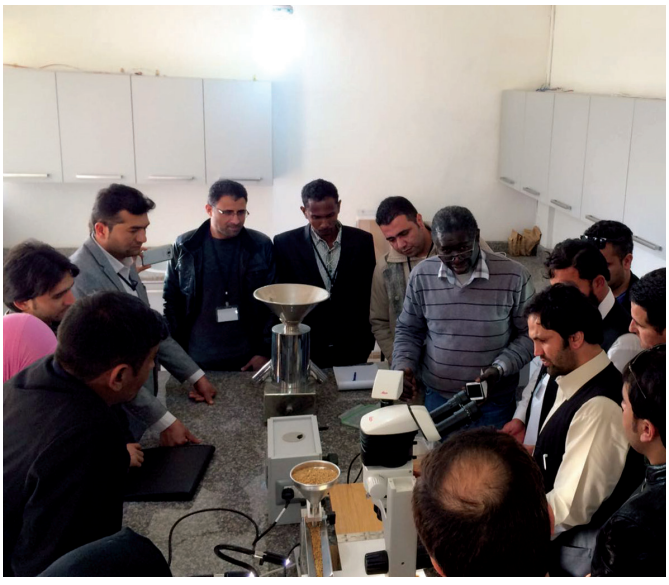
This support contributes to the effectiveness of Arab research institutions at the national, regional, and international levels. Several alumni now hold leading positions in their home countries, as scientists, heads of institutions, and national decision-makers.

Strengthening biotechnology research in Arab states

Biotechnology research in agriculture is a priority for many countries as a means to increase productivity and food security. However, this can be hindered by a lack of trained staff, suitable laboratory facilities, specialized equipment, and technical expertise. ICARDA, through the support of the Arab Fund, has overcome these challenges by significantly developing the capacity of national programs to use biotechnological research tools.

From 1998 to 2001, ICARDA strengthened national crop improvement programs by assisting ten Arab countries to establish laboratories and providing training in advanced biotechnology tools and techniques. When lab facilities were available, ICARDA provided training and technical assistance to national researchers to exploit biotechnology tools in their crop breeding programs. In some countries, the project established national biotechnology laboratories and research programs. The collaboration between the Fund and ICARDA has driven a wide adoption of biotechnology tools within cooperating national agricultural research systems, that address specific problems in crop production.

Global biotechnology research continually evolves so the Fund and ICARDA have continued to strengthen national efforts. With the introduction of international biosafety regulations for the safe development, introduction and use of genetically modified crops, in 2007 the Arab Fund supported further improvement through the development of a containment facility at ICARDA. This provided the basis for advanced research and testing of genetically modified crops in the Arab world. By doing so, Arab countries can harness and contribute to the most globally advanced genomic and genetic engineering tools for crop improvement.



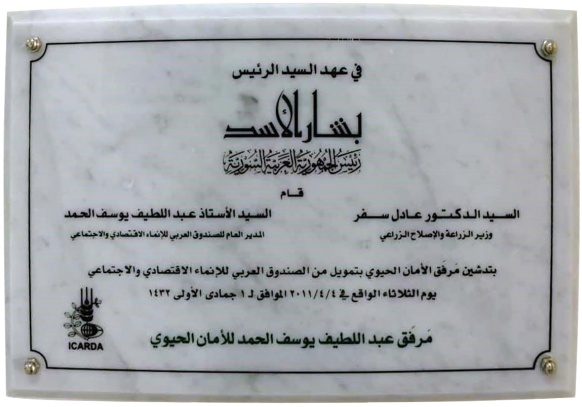
Seed quality-control training

Developing a community-based approach to drylands development

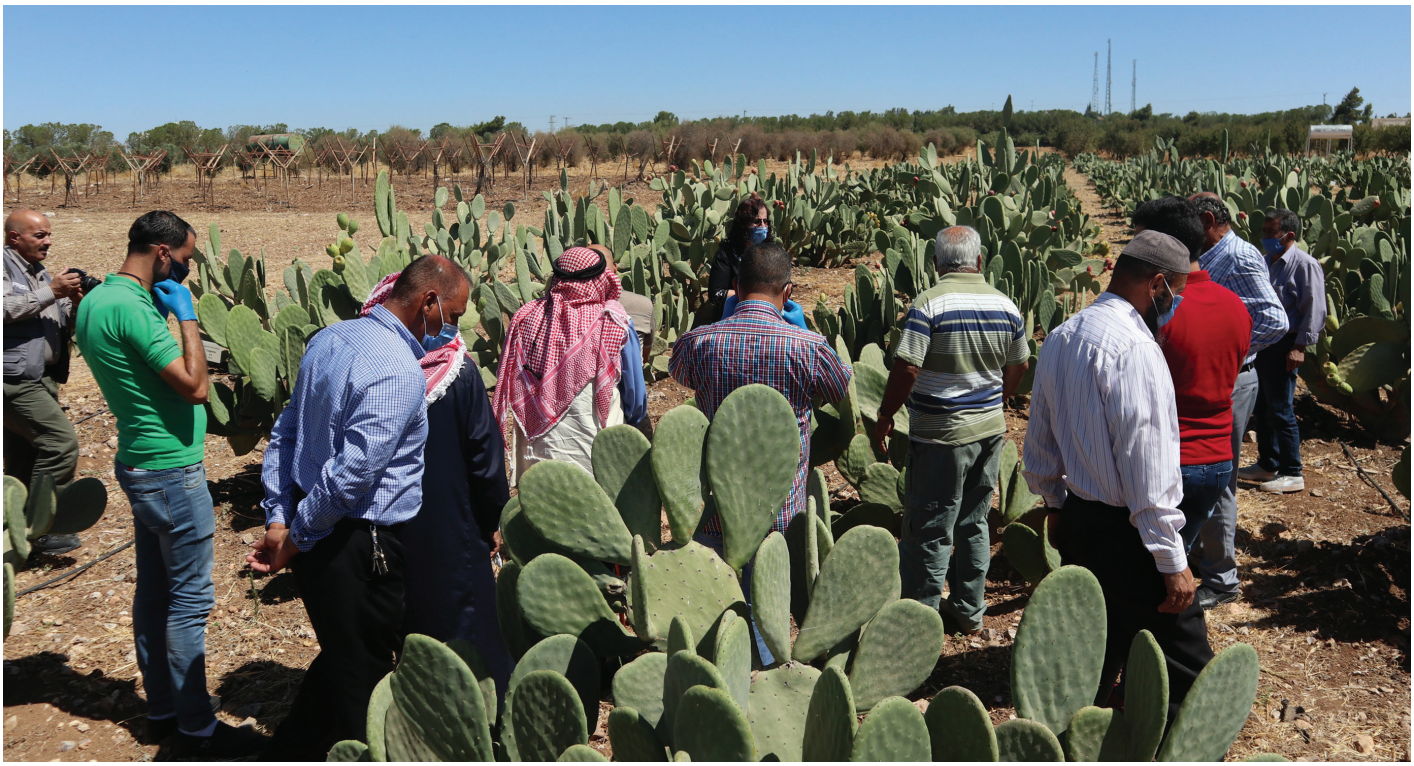
A series of projects funded by the Arab Fund and the International Fund for Agricultural Development (IFAD) supported an adaptive research program for the development of integrated crop-livestock production systems in low-rainfall areas of the Mashreq and Maghreb regions. The program increased on-farm feed production, provided alternative feed resources, enhanced the productivity of sheep and goats, improved the quality of dairy products, and fostered an enabling policy and institutional environment.

As the program progressed, it shifted to a whole-farm or community level of technology adaptation and testing and broadened its scope to include policy and institutional issues to support wider adoption of improved production and resource management strategies. By the third phase, the program collaborated with twelve communities in the eight Mashreq and Maghreb countries (Algeria, Iraq, Jordan, Lebanon, Libya, Morocco, Syria, and Tunisia), together with national research institutions, extension services, and development agents. The resulting **Community Development Plans** consist of packages of "best-bet" technical, institutional, and policy options for implementation at the community level. All stakeholders were involved in developing these community action plans, encompassing both indigenous and research-based knowledge. Farmer participation was essential, ensuring strong community support for project activities.

The experience gained by ICARDA and its partners within the project promoted a community-based approach to drylands development—some countries now use this approach in their national development programs, and IFAD has adopted it in its development projects in the region.



A memorial plaque for the biosafety facility at ICARDA headquarters in Syria which was built with financial support from AFESD



Field visit to the cactus pear genebank

New technologies for the Arabian Peninsula

The Arabian Peninsula is the most arid region of the Arab world, posing unique challenges to agricultural production. ICARDA's Arabian Peninsula Regional Program, a research and technology transfer program that addresses the complex challenges in the region, is implemented in partnership with the national agricultural research and extension systems of seven counties: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE United Arab Emirates, and Yemen.

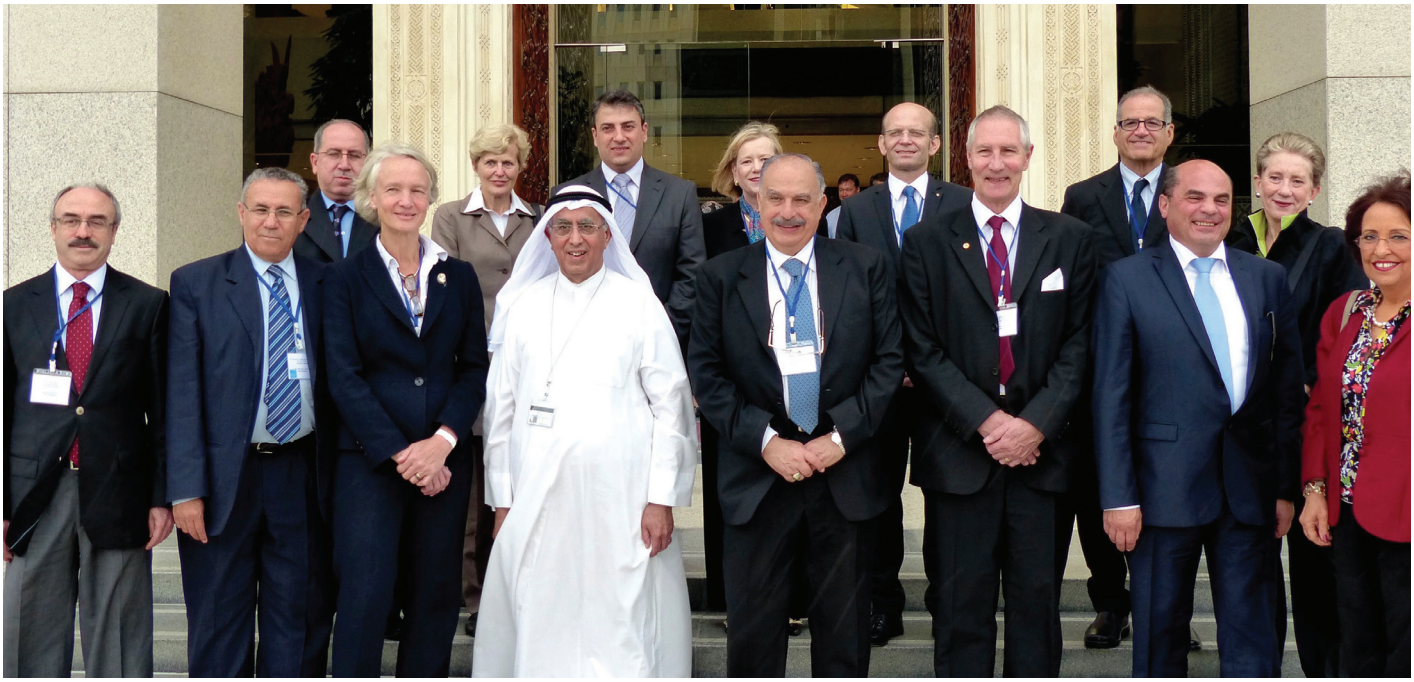
The program aims to contribute to sustainable food security in the Arabian Peninsula while conserving limited water and rangeland resources. It focuses on improving livestock production systems—by enhancing the productivity and availability of fodder and rehabilitating rangelands—and the productivity of high-value cash crops in greenhouse production, while reducing demands on limited water resources.

The program has established over **650 pilot testing and demonstration sites** that test technologies under real-world farm conditions and farmer management. These provide the basis for further out-scaling of results: ICARDA expects these pilot sites will demonstrate the innovative technologies to a further **10, 000 end-users** through a farmer-to-farmer extension system.

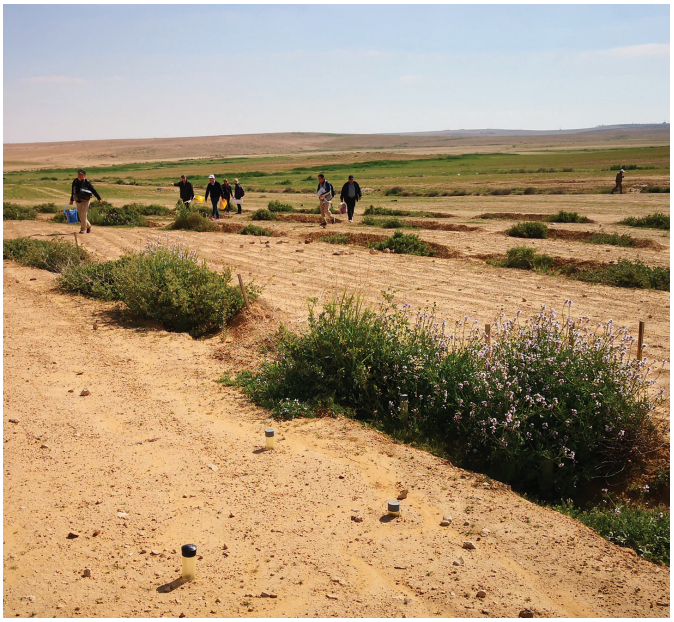
The program is testing new methods for the restoration and rehabilitation of degraded rangelands, including protection, water harvesting, and reseeding, on 20,000 hectares. In fodder production, growing indigenous forage grasses instead of exotic species reduces the use of irrigation water by 50 percent while increasing the production of feed almost threefold. Each ton of dry matter produced saves about 850m^3 of groundwater.

The use of soilless and integrated production and protection management (IPPM) technologies in cucumber and tomato production in greenhouses reduces costs and water use and increases net returns: reductions in water use vary from 200–300 percent, yields are increased by 30–80 percent, and net returns have been doubled.

These results have influenced the policy and agricultural development strategies of the Arabian Peninsula countries. For instance, the the Emirate of Abu Dhabi in the UAE introduced measures to replace introduced forage species with indigenous species to save water and provided farmers with favorable loans to speed up the adoption of the program technologies. Oman, UAE, Qatar, and Bahrain have adopted incentives to encourage farmers to adopt IPPM and shift from conventional soil culture to soilless production systems. As a result of subsidies in the UAE, more than 1,500 farmers have adopted the technology.



Group photo during ICARDA BoT meeting in Kuwait. In the center is Mr. Abdlatif Yousef Al-Hamad



Demonstration site for sustainable rangeland management in arid regions

Enhancing food security in Arab countries

No other crop better demonstrates the concerns over food security in the Arab region than wheat. As a staple crop of most Arab countries, it constitutes a vital element of food security. With limited arable land or irrigation available, the key to increasing food production is improving productivity per unit of land and water—or producing *"more with less"*, a key ICARDA goal.

Initiated in 2011, the project on *Enhancing Food Security in Arab Countries*, supported by the Arab Fund and coordinated by ICARDA, is enhancing the productivity of food crops, especially wheat, across ten Arab countries: Algeria, Egypt, Iraq, Jordan, Morocco, Palestine, Sudan, Syria, Tunisia, and Yemen. Adopting a participatory approach, the project tests, validates, and disseminates proven innovations and technologies with farmers—including improved wheat varieties, sustainable crop management practices, and the more efficient use of scarce water resources.

To increase collaboration between national agricultural research systems and ICARDA and attract the required financing to expand the activities of the project, in 2014, the Arab Fund hosted **a joint ministerial meeting on food security in Arab countries**. Arab agriculture ministers and Arab national and regional financial institutions attended the meeting and at its conclusion a declaration was issued confirming the Arab countries' continued interest in and support for future phases of the project and in expanding its implementation to other areas. The program has now entered its third phase.

The project has established 80 pilot sites across the ten countries. The number of demonstration plots in these sites increased rapidly to almost 3000 plots, greatly expanding the number of farmers exposed to the project's activities. More than 85,000 participants have now benefited from a range of capacity building initiatives.

Key impacts of the project on Enhancing Food Security in Arab Countries

- Overall, the average increase in wheat yields in demonstration plots ranged from 25 to 34 percent, with an average **maximum increase of between 60 and 70 percent**. These yield increases have translated into clear economic gains for farmers. Analysis conducted during the first phase of the project estimate that the initial **US$5.3 million** investment **generated combined profits of US$54 million for farmers in Egypt, Tunisia, and Jordan**.
- Adoption studies conducted during the second phase of the project in four countries—Egypt, Jordan, Sudan, and Tunisia—show that the top three technology components have been adopted on at least 352,000 hectares, which is 27 percent of the total wheat area, leading to an **additional wheat supply of 147,969 tons and net returns of US$28.8 million**.
- Mechanized raised-bed planting—planting crops on ridges and applying irrigation water to furrows where it is most needed—revolutionized the production of wheat in Egypt's Al-Sharkia governorate, by **saving 25 percent of irrigation water, increasing yields by 30 percent** and **significantly reducing labor and fuel costs**. The successful experience in Al-Sharkia governorate led to the incorporation of the technology in a national campaign. By 2017 the total area devoted to raised-bed sown wheat was estimated to be 125,000 hectares—some 10 percent of Egypt's total wheat area.
- ICARDA estimates that by 2023, more than 800,000 hectares of wheat in Egypt will be produced using the raised-bed technology. In addition to the production gains, farmers benefit from reduced costs. As a result, from 2009, adoption of the technology will result in increased net returns of **US$4.5 billion benefiting some 1 million farmers**.

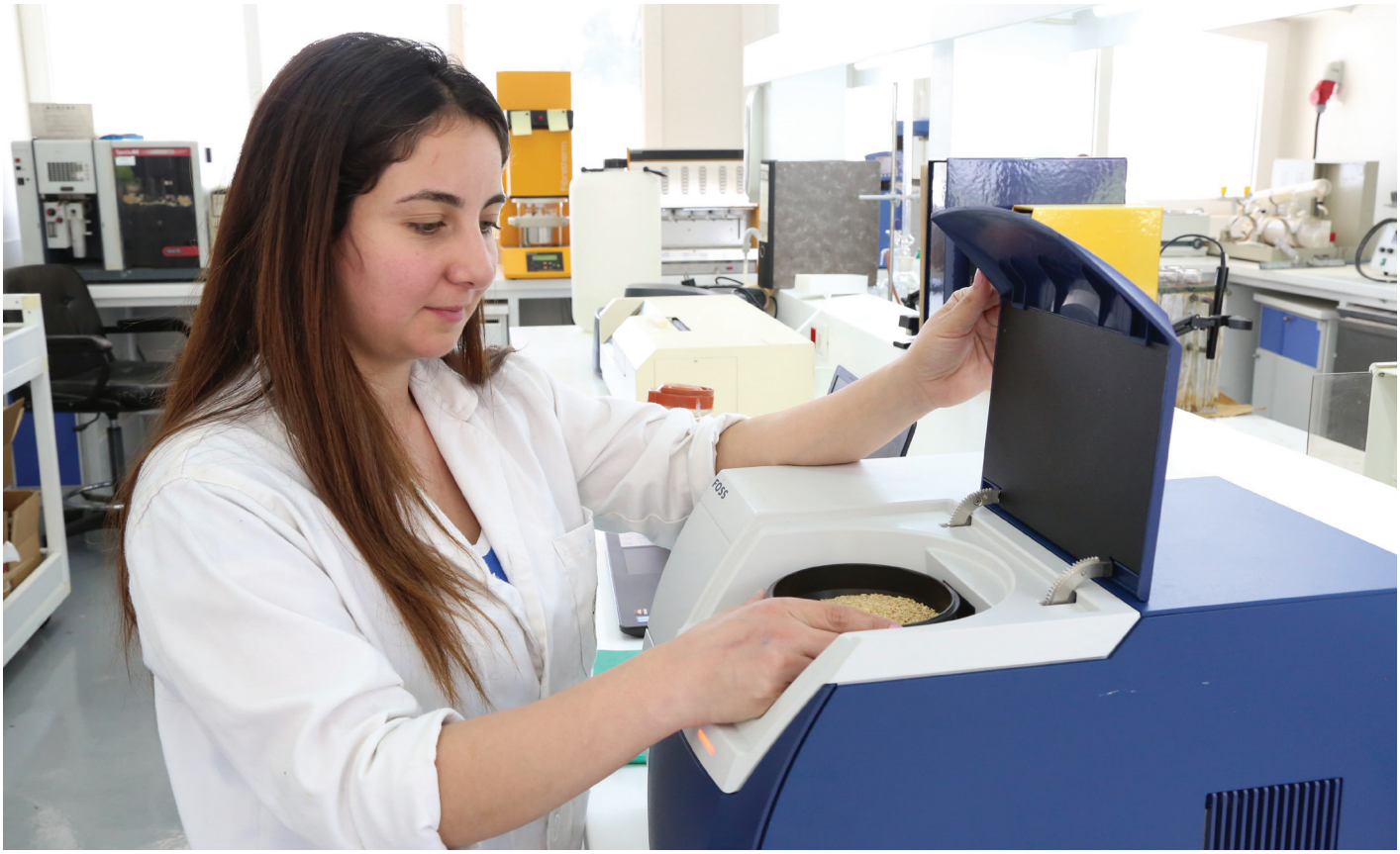
- The reduction in water used in irrigation is of national economic importance. Raised-bed wheat production used, on average, 25 percent less water. If applied across the potential area of 800,000 hectares under raised-bed production, full expansion of the system would save **1.05 billion m³ of irrigation water annually**, significantly reducing agriculture's demand for scarce water resources.

Fast-track seed distribution

A shortage of certified seeds constrains the adoption of improved varieties, so the project addressed this by informally mobilizing and organizing farmers to produce their own seed, with guidance from project staff through the whole seed production process. This approach is also an effective tool in transferring improved production practices to farmers and creating awareness of new varieties.

- Over 679 tons of seed was produced by Jordanian farmers, of which farmers themselves used 54 percent, while 33 percent was sold on to the government.
- An informal seed network established in Tunisia produced 475 tons of improved wheat seed.
- In Sudan, two farmers successfully initiated a seed production business, becoming a major seed distributor to neighboring areas.
- In Palestine, four "Seed Production Groups" were established and produced more than 290 tons of certified seeds.

Demonstration plot for an improved variety of bread wheat at harvesting stage



An engineer from LARI-Lebanon analyses fodder materials as a part of a project funded by AFESD

Supporting ICARDA's decentralization

Events in ICARDA's host country, Syria, had critical implications for the future of the Center's research and capacity development programs. ICARDA was obliged to evacuate its headquarters and principal research station at Tel Hadya, Aleppo, in 2012. By relocating to other countries, ICARDA's scientists lost access to the state-of-the-art facilities and equipment at its headquarters, established over more than 35 years. With the Arab Fund's crucial support, ICARDA re-assessed and modified its structure and organization, adopting a decentralized approach, and building on its strong historical partnerships with country partners across the region.

The Arab Fund has been instrumental in facilitating ICARDA's decentralization by helping to invest in the establishment of five research sites in Arab countries. These include a new gene bank in Lebanon; state-of-the-art laboratories in Morocco serving as ICARDA's platform for the intensification and diversification of rainfed cereal-based production systems; a platform for high-input irrigated agricultural systems and biotechnology research in Egypt; a platform in Sudan focusing on heat-tolerance in wheat and food legumes; and a site in Jordan for research on building resilience in marginal lands.

With the Fund's vital support, ICARDA has now established and upgraded the research facilities in these locations. Almost 80 percent of its scientists are currently located in these five regional centers, continuing to develop national capacities and strengthening collaboration between Arab national research programs across the region.

Delivering results throughout the region

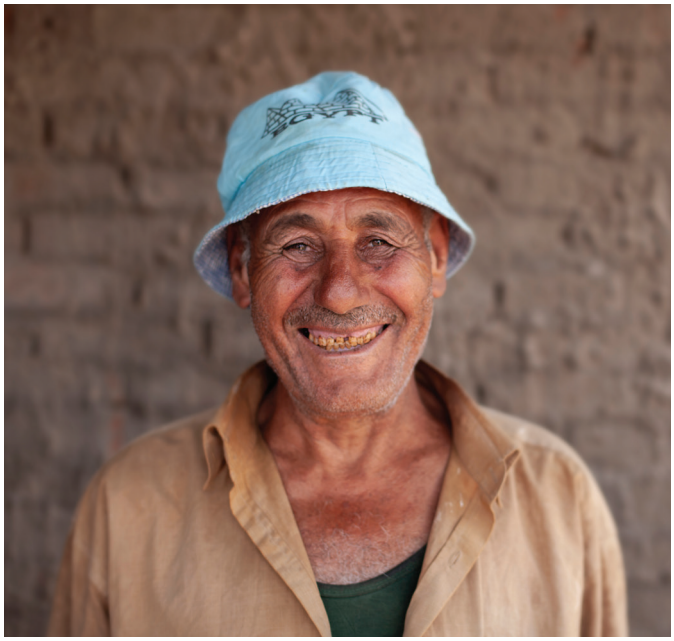
Crop improvement: Diverse climatic conditions in the region offer complementing conditions for breeding cereals and food legumes for resistance to various biotic and abiotic stresses. Because ICARDA's Terbol research station is based in Lebanon, a country with two cropping seasons, an on-season/off-season shuttle breeding program for cereals and legumes is carried out, substantially reducing the breeding time for new varieties. The prospect of success for the new, improved varieties is made more robust due to the similar climatic conditions in other target Arab countries.

The platform in Egypt represents irrigated agricultural production systems. Activities focus on collaborative research on irrigated wheat improvement and faba bean, and the platform also hosts ICARDA's biotechnology staff at the Agricultural Genetic Engineering Research Institute (AGERI).

Sudan's ICARDA program is distinct for its research in high temperatures and short seasons, especially important under intensifying climate change. Research targets the breeding of heat-tolerant early season varieties of wheat and food legume crops and builds on the collaboration with the Agricultural Research Corporation (ARC).

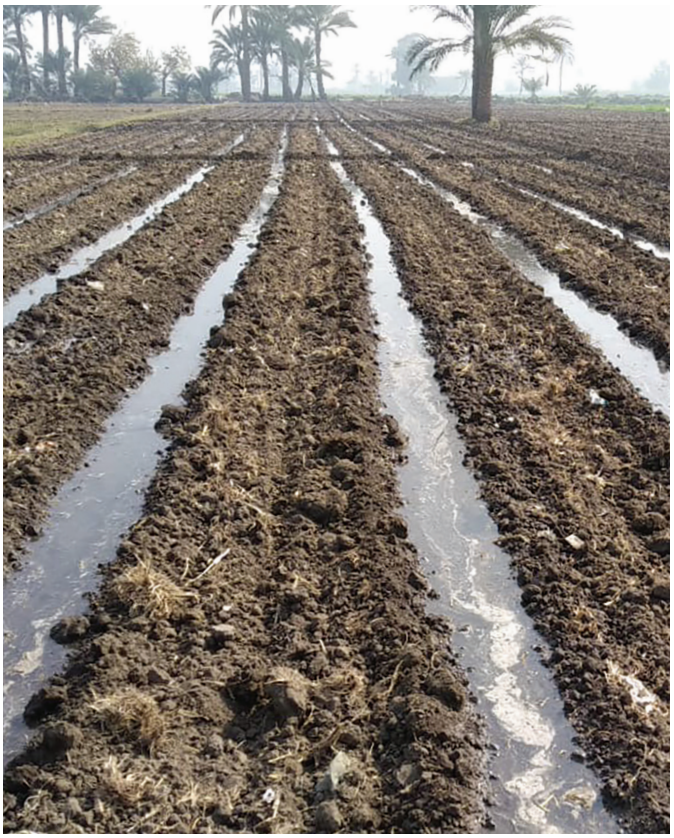
Generation and distribution of international nurseries from Lebanon: In collaboration with national partners in Lebanon, ICARDA has established an integrated facility for quality seed production. The facility has been operating for the past seven years, distributing on average, 1,500 sets of international nurseries per year of more than 2,000 genotypes from ICARDA's seven mandate crops to more than 125 cooperators in about 50 countries.

Conservation of genetic resources in Morocco and Lebanon: Two new gene banks in Lebanon and Morocco were established in 2016, enabling the acceleration of the collection, conservation, and characterization of ICARDA's germplasm in collaboration with national partners in both countries.



An improved variety of municipal beans that is resistant to Holoparasites

Integrated land and water management in Egypt and Jordan: ICARDA continues its research on irrigation systems management at the existing benchmark site in Egypt, and on rangeland restoration, conservation agriculture, and water harvesting in Jordan.



Livestock and feed: A pastoretum has been established in Jordan to preserve and characterize rangeland and forage germplasm, together with a cactus field gene bank with more than 100 accessions collected from different parts of the world. ICARDA plans to multiply its germplasm for dissemination to national partners.

In Lebanon, ICARDA conducts joint research projects on breeding, reproduction, nutrition, and milk production on its nucleus flock of elite Awassi sheep, the most dominant breed in the region.

Continuing to build on an innovative and effective partnership

ICARDA is the only CGIAR center headquartered in the Middle East, accruing over four decades of unique dryland agricultural experience, and a deep understanding of the challenges faced by the rural farming communities who live there. Combined with the regional partnerships and networks we have created, and the real-world testing of the solutions we develop, ICARDA is in the best position to deliver successful and innovative approaches to transform agriculture and achieve sustainable development in the region.

But Arab countries must continue to keep abreast of advances in scientific research. Our research is proven to increase the selection and adoption by farmers of better adapted, higher yielding crop varieties, increase the productivity and quality of crops and livestock, and improve the efficiency of land and water use. As part of a larger CGIAR initiative, the Fund's continued support will enable ICARDA and its national partners to provide effective, practical and vital support to rural communities.

Given the complexity of dryland farming systems and the scale of the challenges that face countries in the dry areas, such as climate change and limited natural resources, synergy and partnership are critical. In its new decentralized structure, ICARDA's research continues to be planned, implemented, and monitored in collaboration with national agricultural research systems and a range of other partners to make sure the approaches and results are effective and sustainable.

ABOUT THE ARAB FUND AND ICARDA

The Arab Fund for Economic and Social Development (AFESD) was established to assist the economic and social development of Arab countries by financing investment projects, encouraging the investment of private and public funds in Arab projects, and providing technical assistance in various fields of economic development. The Arab Fund's technical assistance grants offer institutional support to member states, enhancing efficiency in project implementation, and conducting technical and financial studies related to economic and social development.

In line with the priorities outlined in the first Arab Economic and Social Development Summit held in 2009, which emphasized the need to enhance Arab food security, the Arab Fund has directed its technical assistance toward strategic objectives such as food and water security.

The International Center for Agricultural Research in the Dry Areas (ICARDA) was established in 1977 to develop and deliver science-based innovations for sustainable agricultural development in the non-tropical dry areas of the developing world. ICARDA's mission is to reduce poverty and enhance food, water, and nutritional security and environmental health in the face of global challenges, including climate change.

Headquartered in the Middle East, ICARDA has focused on the West Asia and North Africa region as a platform for its research, the results of which apply both to Arab countries and across the Center's global mandate for the non-tropical drylands.

The Arab Fund and ICARDA thus share a joint mission of alleviating poverty, enhancing food security, and promoting economic and social development in developing countries.

"A great many of the Arab Fund-financed projects, in addition to those in the agriculture and water sectors, are targeted directly or indirectly towards supporting and improving the ability of Arab countries to realize their food security objectives."

ICARDA's Board Chair presenting Mr. Abdlatif Yousef Al-Hamad with a silver ICARDA commemorative plate at ICARDA's Board meeting in 2013

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