

IFAD and ICARDA

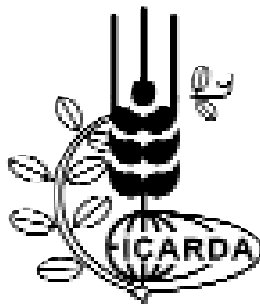
Ties that Bind



International Center for Agricultural Research
in the Dry Areas

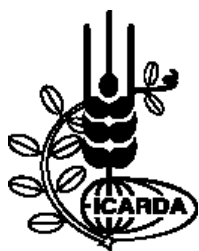
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**Ties that Bind
No. 19**



**International Center for Agricultural Research in the Dry Areas
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About ICARDA



Established in 1977, the International Center for Agricultural Research in the Dry Areas (ICARDA) is governed by an independent Board of Trustees. Based in Aleppo, Syria, it is one of 16 centers supported by the Consultative Group on International Agricultural Research (CGIAR).

ICARDA serves the entire developing world for the improvement of lentil, barley and faba bean; all dry-area developing countries for the improvement of on-farm water-use efficiency, rangeland, and small-ruminant production; and the Central and West Asia and North Africa region for the improvement of bread and durum wheats, chickpea, and farming systems. ICARDA's research provides global benefits of poverty alleviation through productivity improvements integrated with sustainable natural-resource management practices. ICARDA meets this challenge through research, training, and dissemination of information in partnership with the national agricultural research and development systems.

About IFAD



IFAD (<http://www.ifad.org/>) was established in 1977 to assist developing countries to combat rural poverty by mobilizing and providing financial resources on concessional terms for agricultural and rural development projects. Its mandate is unique among international financial institutions: to fund rural development projects that will improve the nutritional level and living conditions of the poorest populations in developing countries.

IFAD membership is open to any state that is a member of the United Nations or any of its specialized agencies, or of the International Atomic Energy Agency. The Fund's highest authority is its Governing Council, on which all 163 Member States are represented by a Governor and an Alternate Governor. Sessions of the Governing Council are held annually and special sessions may be called when necessary.

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Cover: In the Dilingat village of Bahaira Governorate in Egypt, farmers proudly display their faba bean crop full of healthy pods, grown without using fungicide sprays to protect the crop from the chocolate spot disease.

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IFAD and ICARDA

Introduction

The collaboration between the International Fund for Agricultural Development (IFAD) and ICARDA dates back to their inception in 1977, and their activities have been intertwined ever since.

IFAD has been a key supporter of ICARDA's research targeting the poor, and, as a result, much has been accomplished that would otherwise have been impossible. ICARDA's research funded by IFAD has helped resource-poor farmers by increasing crop yields in their fields, providing improved measures for crop protection, and preventing environmental degradation in the dry areas.

IFAD has not only supported ICARDA's research projects but also the establishment of its infrastructure. In the 1980s, when ICARDA was looking for financial support to construct its main-station buildings at Tel-Hadya, near Aleppo, Syria, IFAD generously provided financial support to the Center to establish its own home. Thus, ICARDA sees IFAD as one of its founding partners.

Some examples of the IFAD-ICARDA collaboration and achievements are given below.

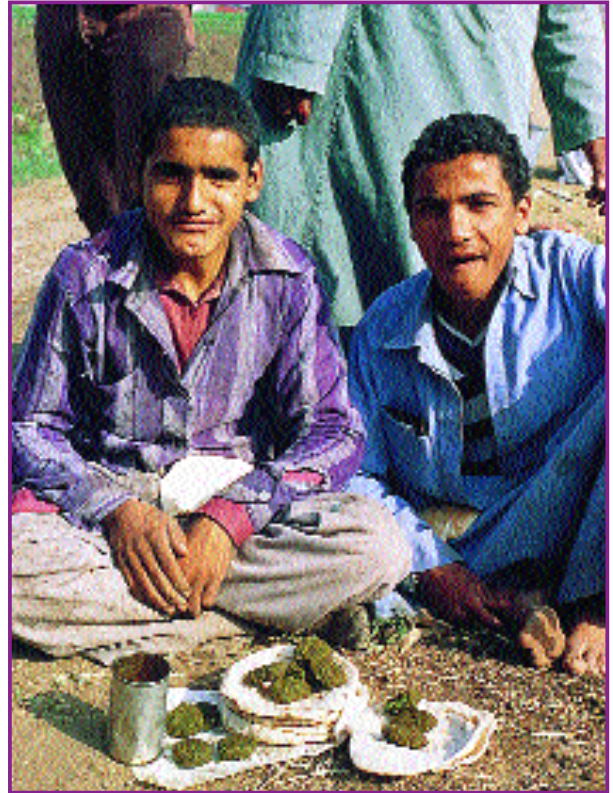
The Nile Valley and Red Sea Region

Nile Valley Faba Bean Project

Faba bean is an important source of protein for people around the world. Just over half the world's faba bean is produced in China, which is one of ICARDA's partner countries. But the role of this crop as a key source of protein is especially significant in the West Asia and North Africa (WANA) region, where a common breakfast dish is cooked faba bean—*fiil*—served with salad and deep-fried faba bean patties—*falafel*—used for making sandwiches. Faba bean is an extremely important source of low-cost, high quality protein for the poor people in the region who cannot afford meat.

ICARDA has a global mandate for faba bean improvement. Some of its most productive work on this crop has been through its Nile Valley Project (NVP) covering Egypt and Sudan. The project was established in Cairo, Egypt in 1979 with funding from IFAD.

The objective of the NVP was to initially focus on improving faba bean productivity, and expand it to other cool-season food legumes, including lentil, another crop for which ICARDA has a global mandate, and which is also an important source of protein in the diet of the poor. Before the inception of the project, Egypt produced around 241,000 tonnes of faba bean a year. In 1983, four years after the start of the project, Egypt achieved self-sufficiency, with 295,000 tonnes. By 1996, production had reached 445,000 tonnes a year and farm-level yields were up by 43%.



Falafel is delicious! Among fast foods, falafel sandwiches are particularly popular.



Nile Valley Faba Bean Project was initially funded by IFAD for both on-farm and on-station research.

These achievements were made through NVP's partnership with the national research programs. NVP and the national programs developed joint work plans and national scientists conducted the research activities, while the NVP provided technical advice and institutional strengthening, which is one of the project's objectives. From 1979 to 1988 NVP/IFAD sponsored 10 national researchers for PhD and 12 for MSc degrees.

The NVP partner-researchers successfully tackled the main production constraints to faba bean and developed improved cultivars and production packages.

For example, an improved production package dealt with a parasitic weed, *Orobanche* or broomrape. Broomrape infested up to 66% of the faba bean area in one governorate in the Delta, causing losses of up to 19,000 tonnes a year. Smaller but still significant losses were seen in Morocco, Portugal, Spain, Syria and Tunisia. The improved production package developed by NVP and Egyptian national scientists was applied in Minia Governorate in Middle Egypt and included recommendations on seed rate, planting date, fertilizer application, irrigation and aphid control. The new package reduced *Orobanche* infestation by 34% in farmers' fields, and provided 14% more seed and 16% more straw than the traditional practices.

In the Dilingat village of Bahaira Governorate in Egypt, farmers proudly display their faba bean crop full of healthy pods, grown without using fungicide sprays to protect the crop from the chocolate spot disease. Hundreds of farmers in the Upper Egypt to Delta participated in large-scale demonstrations of the newly released high-yielding and disease-resistant varieties of faba bean, and improved production practices that brought them higher profits. These demonstrations were organized by ICARDA's Nile Valley and Red Sea Regional Program, with support from IFAD.



Another example is the use of disease-resistant cultivars which reduced herbicide application. This, combined with reduced fertilizer use, provided valuable environmental benefits. There are also economic benefits from a reduction of inputs. In Minia, the package gave farmers a profit of 254% compared with 186% using traditional practices. This is important, because any technology developed for farmers must be economically attractive to them.

The improved faba-bean cultivars that made the package viable have been distributed to national programs in Egypt, Morocco, Spain, Sudan, and Tunisia. Nine such cultivars have been developed by the Project for specific regions. Egypt has a high land-use intensity, and a new cultivar must fit into the complex farming system. For example, 'Giza 716' is an early-maturing variety designed to precede cotton in the Nile Delta. It is resistant to chocolate spot and rust, and has shown a yield increase of 31% over the local landrace. Another cultivar, 'Giza 402,' is an *Orobanche*-resistant cultivar for Middle and Upper Egypt and it outperforms the local variety by 36%.

Six more cultivars have been developed under NVP for Sudan. An example is, 'Basabeer,' which produces stable, high yields, is designed for specific areas, and outperforms the local landrace by 20%. The new cultivars have enabled the extension of faba bean cultivation in non-traditional areas, south of Khartoum, where land and water are plentiful. This has resulted in a significant increase in production of faba bean in Sudan.

The Nile Valley Faba Bean Project has also developed cooking techniques for reducing the levels of vicine and convicine, anti-nutritional factors in faba bean that can cause a blood disorder in some people.



Field demonstration of faba bean production technology in the Gezira scheme led to the expansion of the crop to non-traditional areas, south of Khartoum, in Sudan.

IFAD's contribution effectively leveraged considerable support from other donors, including the European Union, Italy, The Netherlands and Sweden. The program has now expanded into the NVRSRP (Nile Valley and Red Sea Regional Program) and includes Egypt, Eritrea, Ethiopia,



Improved varieties and production technologies have helped to increase wheat production in Sudan.

Sudan, and Yemen. The program has established research networks across the countries to address biotic, abiotic and socioeconomic constraints to the production of wheat, barley and cool-season food legumes. There has been real success with wheat; using heat-tolerant cultivars developed through the CIMMYT/ ICARDA Wheat Program, the crop is now viable for the first time south of Khartoum. It is the third attempt to grow it there this century, but previous efforts were defeated by the climate.

Meanwhile, in Egypt, improved wheat cultivars and packages of agronomic practices devised by NVRSRP and the Egyptian national research program have helped production keep pace with a rapidly-growing population—a task which looked impossible 20 years ago.

In 2003, IFAD provided a new Technical Assistance Grant (TAG) for a *Program for Enhancing Food Security in the Nile Valley and Red Sea Region: Technology Generation and Dissemination for Sustainable Production of Cereals and Cool-Season Food Legumes*, which builds on the research initiated by the NVRSRP networks.

As said before, winter cereals (wheat and barley) and cool-season food legumes (faba bean, chickpea and lentil) are important food crops in Egypt, Ethiopia, Sudan, and Yemen. They provide a major part of the daily diet of the population. Wheat is the main cereal consumed throughout the region, while in Ethiopia, barley is also an important food especially among the poorest sections of the population who cannot afford animal protein. Pulses provide a small but valuable source of

protein, especially among the poorest sections of the population who cannot afford animal protein. However, the production of these crops is not adequate to satisfy domestic demand. Production of wheat in the four countries meets just over half of the average annual demand. As a result, substantial amounts are imported to meet the deficits. Improvement in the domestic production of wheat and pulses would contribute to food security.

The recent IFAD-supported project aims to develop and transfer improved technologies that enhance the productivity and yield stability of cereals and food legumes to the farmers in the region. Identified sources of resistance to biotic and abiotic stresses are incorporated and new cultivars and associated technologies are shared with farmers in cooperation with the extension system.

There is a growing involvement in research on the management of natural resources such as soil and water. This has included some recent work on water resources in the Nile Delta. Socioeconomic research is also being incorporated to ensure that technology is properly directed; for example, through NVRSRP, ICARDA scientists are helping to monitor the long-term sustainability of agriculture in Egypt's New Lands.

IFAD's investment in NVP - one of its earliest projects - has paid off handsomely.

The Mashreq-Maghreb (West Asia and North Africa) Region

Development of Integrated Feed & Livestock Production Systems

Since 1995, IFAD, along with AFESD (Arab Fund for Economic and Social Development) has supported a regional adaptive research program for the development of integrated crop/livestock production in West Asia and North Africa through the "Mashreq/Maghreb" project.

The Mashreq region comprises Jordan, Lebanon, Palestine, and Syria, extending eastward into Iraq. This region was the cradle of civi-

lization; it was also the area where agriculture began about 10,000 years ago. ICARDA has a regional program - the West Asia Regional Program - based in Amman, Jordan, to promote agricultural research in the Mashreq region.

The Maghreb region includes Algeria, Libya, Morocco and Tunisia. ICARDA, since its inception, has a North Africa Regional Program to serve this region.

The objective of the project is to improve the income and welfare of farmers and pastoralists in the semi-arid and arid areas of both the Mashreq and Maghreb regions, meet national demands for small ruminant (sheep and goats) products, and conserve the natural resource base by developing productive and sustainable small ruminant production systems built on the integration of crop and livestock production.

In the low-rainfall areas of the Mashreq-Maghreb region, small ruminants represent the principal economic output and contribute to a large proportion of the income of farmers and nomadic or semi-nomadic herders. A generation ago, natural pastures and rangelands satisfied a large proportion of the feed needs of the small ruminant population but, today, cultivated grains (barley), crop residues and supplemental feeding of



Palatable shrub species native to the steppe are particularly enjoyed by the sheep and, therefore, favored by the Bedouin farmers. Managed with care, they are capable of reestablishing large areas of rangeland from just a 10% seeding start.

concentrates have to meet a far greater proportion of those demands. Feed resources have been reduced by overgrazing, cultivation of rangelands for crop and tree production, and removal of vegetation for fuel wood which results in soil erosion. Recent prolonged drought in many countries has also had a severe effect on agropastoral communities which have limited coping strategies and few sources of alternative income.

Research has identified available, or potential, technologies and management strategies for developing improved crop-livestock production systems, based on the integration of local (on-farm) feed production; more efficient use of alternative feed sources; and the improvement of livestock management, health, nutrition and reproduction. However, the adoption of such technological innovations has been slow. Technical interventions alone will not solve the problems and the development of productive and sustainable livestock-based systems requires action on several fronts. It was against this background that the project developed a program of adaptive research that integrates research on policy and institutional alternatives with research on technologies and management practices. This will provide the policy and institutional support for the wider adoption of improved production and resource management practices.

The Mashreq/Maghreb project has been built around the following activities:

- Research and technology transfer to improve pasture, crop and livestock productivity, and the development of sustainable systems of land use in low-rainfall areas
- Amendment of agriculture-sector policies and policy distortions so as to improve incentives for farmers to invest in technology that will increase productivity of local sources of livestock feed
- Changes in property rights and/or in local and public institutions that regulate use of rangelands, to create incentives for farmers to invest in pasture-improvement technologies and to regulate grazing intensity

The research on policies and property rights is conducted in partnership with the International Food Policy Research Institute (IFPRI). One of the key components of the project methodology is to build



Two-way traffic: ICARDA and Syrian national researchers program swap notes with farmers.

links among national scientists so they can swap ideas, technical expertise and germplasm, and to provide them with opportunities for training and professional development. The Mashreq/Maghreb project activities are conducted by national scientists themselves with technical support from ICARDA.

The Mashreq/Maghreb project has developed a community-based approach intended to produce packages of "best-bet" technical, institutional and policy options with the participation of various stakeholders. Considerable progress has been made in the development and delivery of technological packages related to alternative feed sources, on-farm feed production, and improvement and management of small ruminants. Farmers have adopted new varieties of barley, oat, vetch and triticale that are adapted to harsh environments, and fodder shrubs and cactus are widely used to augment feed resources.

Small ruminant management practices, including the introduction of improved breeding stock, practices to enhance fertility and lambing rates, and early weaning have become popular with farmers. Feed blocks produced from agro-industrial by-products have become an integral part of the feed calendar of small ruminants in most countries



Feed-blocks ready for distribution in Iraq.

of the region and this alternative feed source has also spurred interest from NGOs and the private sector. In Iraq and Jordan, feed blocks are produced entirely by the private sector, while in Morocco a feed block production unit, funded by a Moroccan NGO, is managed by a community cooperative.

Rangeland rehabilitation has focused mainly on planting fodder shrubs (e.g., *Atriplex*) and cactus (*Opuntia* spp.) on private land. Farmers plant this fodder on their own fields. Other technology options that require high levels of investments or collective action are unlikely to be widely implemented without the removal of constraints or the

development of appropriate local institutional support. Property rights (tenure rights, use and access to land resources) have emerged as a critical factor for investment in resource management.

The Mashreq/Maghreb project has developed a range of tools and methodologies that are used by government institutions and other projects

operating in the dry areas. Multidisciplinary national teams have been established and have developed expertise in participatory community-based approaches and experience in negotiating plans for community action through day-to-day experience and trial and error.

A substantial amount of knowledge has been accumulated from different communities in the region that will be useful in guiding future research and development efforts. The coordinated regional approach of the project has facilitated the exchange of knowledge and experiences between national teams. Individual countries have taken the lead in developing specific methodologies, technologies and institutional options that are being rapidly transferred to other national teams in the project. The development of the community approach, together with the strengthened capacity of NARS in the use of different participatory approaches and methodologies, has generated a wide array of decision-making tools that will help focus and increase future technical, institutional and policy options.

The results and outputs from the Mashreq/Maghreb project provide the basis for a new project on *Developing Sustainable Livelihoods of Agropastoral Communities of WANA*. The project aims to scale up the community-based approach developed by the Mashreq/Maghreb project by institutionalizing the approach in national agricultural research and extension programs, and scale out the approach through its use in development programs in the dry areas. The program will be an important interface between research and development.



A plantation of spineless cactus in North Africa to improve the feeding capacity of the steppe.

Completion Review Mission Report of TAG No. 385- ICARDA: Programme for the Development of Integrated Crop-Livestock Production in Low Rainfall Areas of Mashreq and Maghreb, Phase II, conducted in 2002

The Mission consisted of a review of documents, progress reports and related literature, and extensive field visits and interviews with farmers, herds-men, technical and administrative staff and policy makers, planners and executives during visits to six of the eight participating countries.

The Review Mission's main conclusions and recommendations were:

"Phase II of the M&M programme has evidently achieved most of its objectives as a research programme despite the logistic and operational constraints encountered during its implementation.

Governments have shown increasing interest and enthusiasm in the approach and its applied strategy. They have been particularly encouraged by the wide acceptability of the approach by the stakeholders. The demand for replication and continuity expressed by several communities is in itself an indication of the good opportunities for horizontal and vertical expansion."

"An impressive achievement of the programme has been the organized participation of women, not only in the adoption of technological packages, but also in their keen interest in a variety of income-generating activities."

"The regional dimension of the programme is one reason for its success. Inter-regional cooperation and inter-country interaction and exchange of experiences resulted in a fast transfer of new technology and widened the scope of researchers and farmers involved in the programme. Therefore, the integrity of the regional component should be maintained and strengthened.

It was clear to the Review Team from the visits and discussions held with the stakeholders in the national programmes that they own the project and that they were planning to use the approach and methodologies in developing other similar activities."

The experience gained by ICARDA and its NARS partners within the Mashreq/Maghreb project has been utilized by IFAD in supporting some of its development projects. For example, ICARDA and the North African NARS are providing technical assistance through a grant for *Accelerated Project Performance in North Africa*; and the Tunisian Project team has provided technical assistance to an IFAD project for agropastoral development in the Governorate of Tataouine and to PRODESUD - Agro-pastoral Development and Local Initiatives Promotion Program in the South-East of Tunisia.

Combating Water Scarcity

In 1997, IFAD sought ICARDA's assistance in providing technical assistance to its development projects, especially those concerning water resource management in Egypt, Jordan, Sudan, Syria, Tunisia, and Yemen through a *Technical Backstopping Support Program to Ongoing IFAD-Financed Projects in the Near East and North Africa*. ICARDA staff visited the projects and provided technical advice as well as training courses and workshops for project staff.

More recently, IFAD has provided a new grant for a program on *Community-Based Optimization of the Management of Scarce Water Resources in Agriculture in WANA Region*. With the full participation of rural communities, the project will develop and test water management options that increase water productivity, optimize water use, and are economically viable, socially acceptable and environmentally sound. The project focuses on specific opportunities for three agroecological systems: supplemental irrigation for the rainfed areas, water harvesting for the drier environments (*badia*) and increased water-use efficiency in fully irrigated areas. A wide range of technologies for efficient water use is already available. Three benchmark sites will be established, one in Morocco for rainfed agriculture, one in Jordan for the *badia*, and one in Egypt for irrigated environments, to study water use at the household, community, watershed and policy level.

Durum Wheat Improvement

Durum wheat is one of the most important food crops in the dry areas of the CWANA region. It has great potential for added-value income if farmers can produce such products as pasta themselves, instead of selling the entire harvest in the market. Developing such sources of income is one of the key objectives of ICARDA. The West Asia and North Africa Dryland Durum Improvement Network (WANADDIN), supported by IFAD, is part of this effort.

The objective of WANADDIN is to improve the productivity and sustainability of durum wheat in the dry areas of WANA by:

- Increasing the adoption of existing improved cultivars by encouraging the rapid transfer of technology, particularly among smallholders and resource-poor farmers
- Developing more productive, stable-yielding genotypes by exploiting the comparative advantage of the different partners in the network
- Improving the research infrastructure and skills in the national programs through technical, material and training support

Results from WANADDIN are being extended through a second TAG for a *Program to Foster Wider Adoption of Low-Cost Durum Technologies for Increased Income and Improved Household Food Security of Smallholders in Less-Favored Areas of West Asia and North Africa*. This project aims to provide opportunities for farm households in less favored areas to improve their agricultural income by fostering the use of better adapted and productive durum wheat varieties with improved grain quality and appropriate low-cost crop management practices. It will also provide opportunities for broadening the income base of smallholder households, particularly for women, by developing income-generating activities from post-harvest and on-farm processing of durum.

The project will devise innovative mechanisms to speed up seed production and distribution of newly released durum varieties. In view of substantial economies of scale and similarities of problems associated with seed production and distribution of key crop species cultivated in less-favored areas, activities will not be limited to durum wheat but will be extended to the newly released varieties of other species, especially other winter cereals (bread wheat and barley) and food legumes.

Central Asia

Elements of the Mashreq/Maghreb project have been transferred to other regions through a TAG for *Integrated Feed and Livestock Production in the Steppes of Central Asia*.

While many other regions in the developing world are maintaining or improving their agricultural productivity and, in many cases, achieving economic growth and reductions in poverty, the countries of Central Asia and the Caucasus have witnessed rapid declines in agricultural output and an unprecedented increase of poverty. In Central Asia, livestock production in particular underwent a



Many different breeds of sheep—including local types crossed with imported Merino strains—make up the flocks in the new republics of Central Asia. These breeds are being improved and matched to the most suitable market niches under the new collaborative project.

severe crisis following the dissolution of the Soviet Union and the transition of some countries to an open economy.

Livestock production plays an important role in the economies of the Central Asian countries and particularly in sustaining the livelihoods of a large number of people. The Central Asian region once had highly developed livestock industries producing wool, pelts, hides and meat. Wool and pelts were exported to Soviet markets but these industries and markets collapsed with the dissolution of the USSR. With the fragmentation of the large state-owned enterprises and the privatization of holdings, today it is estimated that nearly all livestock are held in small herds on smallholdings. In remote areas, such as in the highlands of Tajikistan, Kyrgyzstan and the mountainous areas of the Caucasus, livestock production represents the only means to sustain the livelihoods of marginal and resource-poor farm households.

Completion Review Mission Report of TAG No. 245- Integrated Feed/Livestock Production in the Steppes of Central Asia, 23 September - 6 October, 2003

"The programme was conceived as a regional collaborative effort in adaptive research expected to incrementally develop, adapt and accelerate the dissemination of improved arable and range-based feed and livestock production technologies. It was also expected to have an important institutional strengthening role through two components:

- Adaptive research on the sustainable rangelands management technologies
- Training, capacity building and information exchange

The project was, therefore, designed with a deliberate approach that would link farmers to researchers in a process of assessment of problems and market opportunities simultaneously with the testing of suitable technologies in accordance with bottlenecks and market options.

This was an ambitious design and the Review Team has been impressed by the courage of ICARDA to commit itself to embark on such a networking approach in a region that had had no prior tradition of collaboration between small-scale farmers and research scientists. It has to be noted that the results, and interviews conducted by the Review Team of participating national scientists and the farmers visited clearly vindicate the value of the approach."

"The Review Team believes that the project has generated results of practical importance and accordingly, it recommends that IFAD should use the results of this project in identifying investment support opportunities in Central Asia."

"The Review Team believes that the results of the socioeconomic studies of the project have already identified potential technologies for at least community-based pilot development investments."

The project initiated an integrated adaptive research program in collaboration with the national research programs and farmers to re-orient smallholder livestock production to meet domestic food demands and to exploit emerging market opportunities. The project has provided a better understanding of the current status of the emerging production systems and the constraints they face, particularly the problems of winter-feeding and feed shortages, and the lack of markets for the traditional products of wool and pelts. Farmers face serious limitations in grazing their small flocks in the remote rangelands, which consequently are under-utilized while ranges around settlements are becoming degraded. The project has tested options for the rehabilitation of degraded ranges; options for increasing on-farm production of fodder; and flock management and feeding strategies to target market opportunities, e.g., through lamb fattening and milk production.



Central Asian farmers and scientists visiting the Sheep Unit at ICARDA's headquarters in Aleppo, Syria.

The project has linked directly with the Mashreq/Maghreb project through travelling workshops to West Asia for Central Asian farmers. For example, Mr Sapargulyev, a farmer from Turkmenistan, for the first time tried milking his ewes, which traditionally are kept only to produce pelts from lambs. Using methods learned in West Asia he transformed the milk into cheese, which earned him a significant income.

Arabian Peninsula

From 1995 to 2000, IFAD, along with the AFESD funded a program on *Strengthening Agricultural Research and Human Resource*

Development in the Arabian Peninsula. The program aimed to increase food security in the region by optimizing water-use efficiency, conserving natural vegetation, preventing soil degradation and strengthening the cooperation between participating countries and regional and international organizations. The program addressed three priority areas: rangelands, water and protected agriculture, which were determined by seven countries in the Arabian Peninsula (AP). Human resource capacity building was one of the major activities in this project, and this has contributed greatly to improved capacity for research in the region.

IFAD, AFESD, and the OPEC Fund provided financial support for a program on *Sustainable Management of Natural Resources and Improvement of Major Production Systems of the Arabian Peninsula* from 2000 to 2003. The program was designed to develop more productive and sustainable rangeland and irrigation production systems and to encourage the efficient use of water, energy, and indigenous plant species in the Arabian Peninsula.

Priority indigenous grass species have been identified in most countries of the AP. Shrub species have also been identified in the northern part of Saudi Arabia. Seed multiplication fields for indigenous grasses are now established in the Emirates, KSA, Oman, Qatar and Yemen.

A Weather Station Network for the AP has

been established. Eleven automatic weather stations have been installed at pre-specified locations. Most of these stations have been connected through telephone lines.

An Integrated Production and Protection Management (IPPM) program was developed and implemented by ICARDA in all the AP countries to provide green house growers with simple techniques for crop production, thereby reducing the use of hazardous chemicals.



Farmers identifying suitable species of rangeland at a meeting with scientists in Sharjah in May 1997.



Yemeni children, just back from school, with an elder in front of a newly constructed plastic greenhouse, where vegetables grown provide additional income to the family.

A newly developed Soilless Vertical Growing System for the production of strawberry was adopted in Kuwait, Saudi Arabia, and Oman. In this new system, production per m² was doubled and the production season was longer. It provides higher returns on the investment, as well as major savings in water, fertilizers and labor. The technology was transferred successfully to three growers in Kuwait.

Expert Systems (in Arabic) for crop protection in cucumber and the irrigation and fertigation management program for greenhouse crops were developed and made available on the internet.

To enhance farmer's income in the mountain terraces of Yemen, cultivation of cash crops in greenhouses was introduced. Three plastic houses were constructed in farmers' fields in Al-Mahweet, Yareem and Al-Turba. A participatory approach was applied to establish plastic houses in the three locations. The use of drip irrigation in plastic house was a new intervention of interest to farmers under terrace conditions because of scarcity of water.

From 1996 to 2002, ICARDA has trained around 420 individuals from various countries in the Arabian Peninsula. A successful seed technology unit was established in the UAE in 2002, and another one is under construction in Oman to promote the seed production of the indigenous forages.

Latin America

More recently, IFAD has provided ICARDA with support for a *Program for Strengthening Research and Development to Improve Marketing of Small Ruminant Products and Income Generation in Dry Areas of Latin America*. The arid and semi-arid areas of Brazil and Mexico are home to some of the poorest, most marginalized and vulnerable sectors of the population. Due to climatic constraints and variability, yields from traditional rainfed agriculture in these regions are low and unreliable. Livestock husbandry, especially of small ruminants, represents one of the few secure options for income generation in these areas. The traditional extensive livestock production systems in these areas are based on native vegetation and rangelands, but the poor management of livestock and the continued overgrazing of communal land is leading to the degradation of rangeland resources. Livestock health problems are considerable and the quality of livestock products does not meet current consumer demands.

A number of the technologies and management practices for improving small ruminant productivity that have already been developed and tested within ICARDA's projects with IFAD have a direct application in the arid and semi-arid areas of Latin America. These include the efficient and sustainable use of native rangeland vegetation supplemented by strategic feeding using conventional and non-conventional feed resources, improved herd management practices, technologies to improve both the production and quality of livestock products, and the transformation of primary products (e.g. milk) into value-added derivatives that will generate income as well as local employment opportunities.

Other Cooperation

ICARDA participated in the development of IFAD'S Strategy for Agricultural Research and Transfer of Technology in the Near East and North Africa (NENA) region by hosting the Regional Consultation Meeting in Aleppo in May 2000. ICARDA also participated in the *NENA Regional Rural Poverty Assessment and Strategic Opportunities Workshop* organized by IFAD in Beirut, 8-9 May 2002, which sought the views of local partners regarding IFAD's proposed regional strategy for rural poverty reduction in NENA.

An ICARDA staff member was contracted by IFAD's NENA Division as a consultant in 2001 to conduct an Impact Assessment Study of IFAD's TAG Projects in the NENA Region. ICARDA hosted a "Validation Workshop," in Aleppo in February 2002 and also participated in the evaluation of IFAD's TAG Program for Agricultural Research, undertaken by IFAD's Office of Evaluation and Studies.

ICARDA hosted IFAD's Consultation Meeting on Technical Advisory Notes (TAN) for WANA in Aleppo in February 2000, with a view to strengthen the dissemination of the results from the TAGs. Since then, ICARDA and its NARS partners have provided a number of TANs, primarily from the Mashreq/Maghreb project.

Barani Village Development Project

At IFAD's request, ICARDA was contracted to provide technical assistance to the Applied Research Component of the Barani Village Development Project (BVDP) in Punjab Province, Pakistan, supported by an IFAD loan programme.

The objective of the Applied Research Component is the development of adaptive research and the identification of improved technologies for integration of crops, rangelands and livestock production and the establishment of specific pilot on-farm activities for demonstrations. This aims to provide resource-poor farmers with appropriate technologies that increase their income. Emphasis is on strengthening the linkages among researchers, extensionists and farmers through extensive on-farm research.

ICARDA is working in close cooperation with the implementing agencies and has established an Applied Research Implementation Unit in Rawalpindi, comprising a National Professional Officer and support staff. Three integrated research sites have been established.

ICARDA has made available to the project proven technologies already developed in similar agro-ecologies in the West Asia and North Africa (WANA) region, including:

- technologies in water harvesting, supplementary irrigation and watershed/land management
- germplasm of ICARDA's mandate food crops and appropriate crop management practices
- germplasm of forage legumes and other sown pasture species together with appropriate crop management techniques for on-farm feed production
- technologies associated with alternative feed crops, including forage shrubs and cactus (*Opuntia* spp.)
- techniques for rangeland rehabilitation and management
- technologies for utilizing alternative feed sources such as crop residues and agro-industrial by-products
- technologies associated with improved livestock management, nutrition and productivity

This demonstrates how the research outputs from IFAD's grants to ICARDA can be transferred and utilized within IFAD's development projects.

Projects Supported by IFAD Through Technical Assistance Grants (TAGs)

Feed and Livestock Improvement

Title: TAG ICARDA-264: Regional Adaptive Research Program for the Development of Integrated Crop/Livestock Production in West Asia and North Africa

Collaborating Institutions: NARS of Mashreq (Iraq, Jordan, Lebanon and Syria) and Maghreb (Algeria, Libya, Morocco and Tunisia), and IFPRI.

Duration: 1995-1997

Funding: US\$ 1.2 million

Title: TAG ICARDA-385: Development of Integrated Crop/Livestock Production Systems in Low Rainfall Areas of the Mashreq and Maghreb Regions - Phase II

Collaborating Institutions: NARS of Mashreq (Iraq, Jordan, Lebanon and Syria) and Maghreb (Algeria, Libya, Morocco and Tunisia), and IFPRI

Duration: 1998-2002

Funding: US\$ 1.5 million

Title: Developing Sustainable Livelihoods of Agropastoral Communities of WANA (continuation of activities of the Mashreq/Maghreb Project)

Collaborating Institutions: NARS of Mashreq and Maghreb countries; IFPRI

Duration: Approved April 2004. 2004-2007

Funding: US\$ 1.3 million

Title: TUNISIE: Projet du developpement agropastoral du Gouvernorat de Tataouine

Collaborating Institutions: National program (M&M team),
Tunisia
Duration: 2001-2002
Funding: US\$ 28,000

**Title: TAG ICARDA-425: Integrated Feed and Livestock
Production in the Steppes of Central Asia**

Collaborating Institutions: ILRI, GL-CRSP, NARS of Central
Asia
Duration: 1999-2003
Funding: US\$ 1.5 million

**Title: Assistance in Developing Policies and Strategies to Improve
Livestock Production Systems in Central Asia and the
Caucasus**

Collaborating Institutions: NARS of Central Asia
Duration: 2003-2004
Funding: US\$ 55,000

**Title: TAG No. 659-ICARDA: Program for Strengthening Research
and Development to Improve Marketing of Small Ruminant
Products and Income Generation in Dry Areas of Latin
America**

Collaborating Institutions: NARS of Brazil and Mexico, and FAO
Animal Production and Health
Division
Duration: 2003-2006
Funding: US\$ 1 million

Durum Wheat

**Title: TAG 306: West Asia and North Africa Dryland Durum
Wheat Improvement Network (WANADDIN)**

Collaborating Institutions: National programs of Algeria,
Morocco, Syria, Tunisia, Turkey

Duration: 2002-2006
Funding: US\$ 1.3 million

Title: TAG 553: Program to Foster Wider Adoption of Low-Cost Durum Technologies for Increased Income and Improved Household Food Security of Smallholders in Less-Favored Areas of West Asia and North Africa

Collaborating Institutions: National programs of Algeria, Morocco, Syria, Tunisia, Turkey

Duration: 2002-2006
Funding: US\$ 1.1 million

Nile Valley & Red Sea

Title: TAG 578: Program for Enhancing Food Security in the Nile Valley and Red Sea Region: Technology generation and dissemination for sustainable production of cereals and cool-season food legumes

Collaborating Institutions: NARS of Egypt, Ethiopia, Eritrea, Sudan and Yemen

Duration: August 2002 - September 2005
Funding: US\$ 1,169,000

Arabian Peninsula

Title: TAG 331-ICARDA: Program for Strengthening Agricultural Research and Human Resource Development in the Arabian Peninsula

Collaborating Institutions: NARS of Bahrain, Kuwait, Qatar, Saudi Arabia, Oman, UAE and Yemen

Duration: 1997-1999
Funding: US\$ 750,000

Title: TAG 485-ICARDA: Sustainable Management of Natural Resources and Improvement of Major Production Systems of the Arabian Peninsula: Phase II

Collaborating Institutions: NARS of Bahrain, Kuwait, Qatar, Saudi Arabia, Oman, UAE and Yemen
Duration: 2000-2005
Funding: US\$ 920,000

Water

Title: Community-based optimization of the management of scarce water resources in Agriculture in WANA region.

Collaborating Institutions: NARS of WANA
Duration: 2004-2007
Funding: US\$ 1 million

Technical Backstopping

Title: TAG 334-B-ICARDA: Technical Backstopping Support Program to Ongoing IFAD-financed Projects in the Near East and North Africa

Collaborating Institutions: IFAD Development projects in WANA
Duration: 1997-2001
Funding: US\$ 375,000

Title: TAG 574-ICARDA: Accelerated Project Performance in North Africa

Collaborating Institutions: IFAD Development projects in North Africa
Duration: 2002-2004
Funding: US\$ 85,000

Title: Agro-pastoral Development and Local Initiatives Promotion Program in the South-East (PRODESUD)

Collaborating Institutions: Tunisian M&M team: technical assistance to IFAD development project
Duration: 2003-2004
Funding: US\$ 73,000 & US\$ 44,000

Other Joint Activities

NENA Regional Rural Poverty Assessment and Strategic Opportunities

Workshop: ICARDA participated in the workshop organized by IFAD in Beirut, 8-9 May 2002. The objectives of the workshop were to share and seek the views of local partners in the region regarding IFAD's proposed regional strategy for rural poverty reduction in the Near East and North Africa (NENA).

Evaluation of IFAD's Technical Assistance Grants Program for

Agricultural Research: This evaluation was undertaken by IFAD's Office of Evaluation and Studies. In March 2002 ICARDA completed a questionnaire on TAGs for agricultural research implemented by ICARDA and co-financed by IFAD. As part of this evaluation IFAD conducted field visits to selected CGIAR and non-CGIAR research institutions in various regions that have received grants under this Program. The purpose of these visits was to capture IFAD partners' experience with respect to their cooperation with IFAD in the field of agricultural research and to reflect their views and ideas for strengthening such cooperation in the future. An IFAD Senior Consultant visited ICARDA in June 2002 as part of this review.

Assessing the Impact of IFAD TAG-Program on Agricultural Research & Technology Transfer in the NENA Region (1980-1998):

ICARDA staff member was contracted by IFAD NENA Division (Dr A. Slama) as a consultant for four months (January - April 2001) to conduct an Impact Assessment Study of its funded TAG Projects in the Near East and North Africa (NENA) Region. ICARDA hosted the "Validation Workshop," in Aleppo in February 2002.

IFAD's Strategy for Agricultural Research and Transfer of Technology in the NENA Region: ICARDA participated in the development of IFAD'S Strategy for Agricultural Research and Transfer of Technology in the NENA Region. ICARDA hosted the Regional Consultation on the Strategy held in Aleppo in May 2000.

TANs (Technical Advisory Notes): ICARDA hosted IFAD's Consultation Meeting on Technical Advisory Notes (TAN) for WANA in Aleppo in February 2000. Since then, ICARDA and NARS partners have provided a number of TANs, primarily from the Mashreq/Maghreb project.

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