



International Cooperation

ICARDA collaborates with NARS, donors, and advanced research institutions worldwide, on agricultural research and training. This section outlines NARS-ICARDA partnership-building activities (meetings, capacity building, and other initiatives). Appendices 4, 5, and 6 provide a complete list of collaborative projects and networks; while research results are reported in the section on Mega-Projects.

ICARDA's research portfolio covers a wide spectrum of activities, from strategic to adaptive research to technology transfer. The Center promotes partnership with NARS through six Regional Programs across the CWANA region: North Africa, Nile Valley and Red Sea, West Asia, Arabian Peninsula, Central Asia and the Caucasus, and

Latin America. Problems of agriculture in high-elevation areas are addressed through a Highland Research Regional Network.



Regional Programs.

North Africa Regional Program

The North Africa Regional Program (NARP) coordinates activities in Algeria, Libya, Mauritania, Morocco and Tunisia, and is administered through ICARDA's regional office in Tunisia. Some NARP activities cut across into West Asia. The objectives are to contribute to poverty alleviation, natural resources conservation, enhancement of crop and livestock productivity, diversification of production systems and incomes, human resources and capacity building, and networking.

Collaborative projects

Seven collaborative projects were implemented during the year:

- SDC Maghreb: Sustainable management of the agro-pastoral resource base in the Maghreb, Phase II. Funded by

SDC. Algeria, Libya, Mauritania, Morocco, Tunisia

- IRDEN: Regional program to foster wider adoption of low-cost durum technologies. Funded by IFAD. Algeria,

Morocco, Syria, Tunisia, Turkey

- SDC-Mountains Maghreb
- Scarce water in WANA
- Assessing the potential of water harvesting and supplemental irrigation in WANA
- Mashreq and Maghreb (M&M) Project, Phase III: Developing sustainable livelihoods for



A pioneer on-farm seed producer (right) from Jemaat community, inspecting fields of new durum wheat varieties with INRA researchers in Morocco.

agro-pastoral communities of West Asia and North Africa. Funded by IFAD and AFESD. Iraq, Jordan, Lebanon, Syria in the Mashreq region; and Algeria, Libya, Morocco, and Tunisia in the Maghreb region

- Livestock health and market opportunities. Funded by IFAD, implemented in collaboration with ILRI.

There are also bilateral and multi-lateral projects in various countries, described below.

Five projects were implemented in **Tunisia**, four of them with funding from USDA: Medicinal plants in Tunisia, in collaboration with IRA Medenine; Small ruminants Phase II, with ILRI; GIS for watershed management in the arid regions of Tunisia Phase II; and an Oat and vetch project. A fifth project, on biological control of weeds, is being managed by ICARDA.

These projects have enhanced ICARDA's partnerships with research and teaching institutions in Tunisia (IRESA, INRAT, INAT, IRA Medenine) and beyond. Collaborators include the USDA Agricultural Research Services and several American universities: University of Minnesota, Purdue State University, Fort Valley State University - Georgia, and University of Mississippi.

In **Mauritania**, a bilateral project entitled "Rapid impact program on research and extension" entered its third year. Project staff worked with two rural communities in Brakna Province to identify constraints and opportu-

nities, and negotiated an action plan for technology transfer in each community. Field activities in 2004/05 covered livestock nutrition and health, water harvesting, introduction of cactus planting, seed treatment and storage, livelihoods characterization, and analysis of poverty profiles in the two communities. Plantations of spineless cactus were established at two research stations and in farmers' gardens. Technicians from research institutions and development projects were trained on cactus production and utilization as livestock feed. Eight NARS managers were trained in English language skills. Staff at several research institutions (DRFV, CNRADA, CNERV, and ENFVA) were provided training in communication and computing.

ICARDA also backstopped the AfDB-funded PADEL project on rangeland management and improvement of livestock in Mauritania. The work focused on participatory and community approaches, water harvesting, alternative feed resources, and rangeland management. Researchers helped test a "pastoral code" in a pilot zone in Kiffa, where the community developed and implemented rules for managing common resources.

In **Morocco**, INRA-Morocco and ICARDA began implementing a grants program, under which five new short-term projects were launched during 2004/05 on barley improvement, durum wheat improvement, genetic resources and genebank management, IPM in cereal-legume systems, and

INRM and conservation agriculture. The results were encouraging. In addition, INRA, ICARDA and ARS/USDA began a two-year project on medicinal plants.

Backstopping IFAD development projects in North Africa

ICARDA backstopped a major IFAD development project in North Africa, providing technical support for rural development in the mountains of Eastern Morocco (Taourirt Taforal). Activities included sociology, local institutions, and rangeland management research, promotion and marketing of mountain products, impact assessment, and a traveling workshop for research technicians. In addition, the M&M team in Tunisia, in collaboration with IFPRI, conducted field research on the empowerment of agropastoral communities in the Tataouine region.

Workshops and coordination meetings

The North Africa Regional Program organized a number of workshops and training programs. These included regional and international workshops on INRM, wheat technologies and rural development, training workshops on livestock and range management, regional planning meetings, as well as national coordination meetings in Algeria, Libya, Morocco and Tunisia to review research results and develop work plans for the next year. These meetings attracted a large number of national scientists, and helped develop several research proposals for submission to potential donors.

Nile Valley and Red Sea Regional Program

The Nile Valley and Red Sea Regional Program (NVRSRP) covers Egypt, Eritrea, Ethiopia, Sudan, and Yemen and operates through ICARDA's regional office in Cairo. The overall objective of NVRSRP is to increase the income of smallholder farmers in the region by improving productivity and sustainability of production systems, conserving natural resources, and helping to build national research capacity.

Collaborative projects

Several collaborative projects were in operation during the year:

- Egypt: Improvement of food legumes and cereal crops; Natural resources management project; Control of wild oats in cereals and other winter crops; Barley participatory breeding in Marsa Matrouh
- Ethiopia: Strengthening client-oriented research and technology dissemination for sustainable production of cool-season food and forage legumes
- Sudan and Ethiopia: Transfer of improved production packages for wheat and legumes
- ICARDA/AGERI project on identifying resistance genes to abiotic stresses in cereals and transformation in food legumes
- ICARDA/CLAES project on upgrading faba bean and wheat expert systems
- Technology generation and dissemination for sustainable production of cereals and cool-season legumes in the Nile Valley countries. Funded by IFAD.
- Eritrea: Integrated cereals diseases management (ICDM) project; Water and Food Challenge Program
- Community-based optimization of the management of scarce water resources in agriculture in WANA: a new project funded by AFESD and IFAD, in all NVRSR countries. A benchmark site on irrigated agriculture was established in Egypt, with satellite sites in Sudan and Iraq.

A series of traveling workshops in Sudan, Egypt and Yemen attracted over 300 scientists, farmers and extension staff. Participants visited on-station and on-farm trials, demonstration plots, and farmer field schools; and discussed the performance of a range of technology packages for wheat, faba bean and chickpea, as well as seed production schemes.



Participants of the 15th Coordination Meeting of the Nile Valley and Red Sea Regional Program, held at ICARDA.

Workshops and coordination meetings

ICARDA and its partners organized several workshops on horticulture, plant genetic resources, post-conflict rehabilitation of agriculture, as well as national coordination meetings in Ethiopia, Eritrea, Egypt, Yemen and Sudan, and the annual steering committee meeting for the regional program. A large number of national scientists participated.

Partners in these efforts included the World Vegetable Center, University of California at Davis, FAO, CGIAR Centers, and NARS.

Human resource development

Several training courses were conducted in 2005 to improve the skills of researchers and enhance regional cooperation. These were short courses tailored to meet specific NARS needs in various areas – farmer-participatory research methods, impact assessment, community seed production, greenhouse management, expert systems, small ruminant production and health, molecular markers, design and analysis of field experiments, weed management, electronic publishing, and publications assessment methods.



Regional traveling workshop in Egypt. Farmers, researchers and extension personnel from Egypt, Ethiopia, Sudan and Yemen participated.

The training courses attracted over 150 researchers from 12 countries – Afghanistan, Algeria, Egypt, Ethiopia, Iran, Kenya, Jordan, Morocco, Sudan, Syria, Tunisia, and Yemen.

Technical assistance

During 2005, ICARDA provided technical assistance to NARS partners in the sub-region.

- Support to the Matrouh Resource Management Project in Egypt: ICARDA staff visited the project to help select barley lines adapted to local conditions and design and plant trials and nurseries. Another

ICARDA team helped investigate the impact and sustainability of project outputs.

- ICARDA pathologists conducted a survey of rust diseases on wheat and barley crops in Eritrea and Yemen.
- In Eritrea ICARDA scientists worked with the National Institute of Agricultural Research to conduct the country's first survey on virus diseases of chickpea, supported by the Canada Fund for Africa. The field survey was followed by laboratory analysis; 6400 samples from 31 chickpea fields were collected and tested serologically against nine

viruses. Five Eritrean research assistants participated in the survey, and received extensive training in survey and analytical methods.

New grass pea variety released

The Ethiopian Agricultural Research Organization (EARO) announced the release of a grass pea variety 'Wasie', derived from ICARDA germplasm. This is the country's first low-neurotoxin variety of grass pea safe for human consumption. The new variety has broken the fear of paralysis among Ethiopians.

West Asia Regional Program

The West Asia Regional Program (WARP) promotes regional cooperation in research, capacity building and information dissemination in Cyprus, Iraq, Jordan, Lebanon, Palestine, Syria and the lowlands of Turkey. WARP, which operates from ICARDA's regional office in Amman, Jordan, continued to provide germplasm nurseries, technical support, and training to all countries in the region, including Iraq and Palestine, despite difficult political conditions. Several promising lines of barley, bread wheat, durum wheat, lentil, chickpea, and vetch were selected by national programs, and are awaiting release. In addition, more than 13 regional or bilateral projects were implemented in collaboration with NARS.

WARP organized several coordination and steering committee meetings to monitor and plan for ongoing projects and develop new initiatives (e.g. Phase III of the M&M project). An FAO/ICARDA workshop on plant genetic resources attracted delegates from 14 countries in West Asia and the Arabian Peninsula. From November 2005, the WARP office in Amman became the host of the secretariat of AARINENA, the umbrella body for coordination of agricultural research in the region.

In Jordan, in recognition of ICARDA's efforts, His Majesty King Abdallah II awarded the Center's Director General, Prof. Dr Adel El-Beltagy, the Al-Istiklal medal, the highest honor in the country. ICARDA also won three

other awards from the University of Jordan and the National Center for Agricultural Research and Technology Transfer (NCARTT) in recognition of its contributions to promoting agriculture in Jordan and the West Asia region.

New Memorandums of Understanding (MOUs) were signed with the University of Jordan and the Jordan University for Science and Technology. Another MOU was drafted between ICARDA and the Higher Council for Science and Technology to enhance collaboration with the Badia Research and Development Centre. Four field

Collaboration with Iraq is being expanded, in response to requests from the Ministry of Agriculture. These requests, expressed at a series of donor meetings, involve support for various projects aimed at rehabilitating agriculture in the country. ICARDA has succeeded in securing funds from Australia to increase production of field crops in Iraq.

Similarly, in Palestine, the Ministry of Agriculture has requested ICARDA's assistance to rehabilitate agriculture and specifically to reorganize activities at the National Agricultural Research Center. An MOU was signed between ICARDA and the UNDP for joint development efforts in Palestine.



Iraqi delegation with researchers from Australia and ICARDA during their visit to ICARDA for the Iraq project planning meeting in September 2005.

days, organized by the dryland agrobiodiversity and water harvesting projects, helped promote technologies to rehabilitate degraded rangelands in the Badia. The participatory barley breeding program at NCARTT was extended to include wheat and food legumes.

West Asia Dryland Agrobiodiversity project

The West Asia Dryland Agrobiodiversity (WADA) project concluded in 2005. This 6-year project helped develop and promote strategies for *in situ* (on-farm) conservation of agrobiodiversity in

dryland areas in the region. In its final year, activities focused on documentation and dissemination of technologies generated, and preparation of “exit strategies” that would ensure sustainability of conservation activities.

Several reports and databases were produced: documentation of local agrobiodiversity (and major threats) in different areas, drafts of national agrobiodiversity policies and legislation, community development plans and natural habitats management plans at pilot sites, and field guides for the identification of *Lathyrus* and *Medicago* species.

The project succeeded in introducing biodiversity conservation

in school curricula in Palestine and Syria and in establishing an MSc program on biodiversity conservation at the Jordan University of Science and Technology.

In April 2005, ICARDA organized the first international dryland agrobiodiversity conference in Aleppo, attended by 152 participants from 21 countries. ICARDA organized a ministerial meeting in Amman in June 2005, attended by the Ministers of Agriculture of Jordan, Lebanon, Palestine and Syria, as well as representatives from UNDP, ACSAD, IPGRI and AOAD. The four countries signed an MOU to promote agrobiodiversity conservation and exchange of genetic resources.

The final project evaluation was presented at an end-of-project meeting in Amman. Targets were met or exceeded. There is already evidence of impact on capacity building, public awareness, and institutional changes, but impact on agrobiodiversity will become measurable only in the longer term. All NARS representatives in the project steering committee – and participants at the international agrobiodiversity conference – acknowledged the achievements of the project. They recommended that, rather than being concluded, efforts should be extended to other countries in the CWANA region. A draft concept note has been prepared for a new project focusing on knowledge sharing and dissemination aspects, for possible GEF funding.

Arabian Peninsula Regional Program

The Arabian Peninsula Regional Program covers seven countries: Bahrain, United Arab Emirates (UAE), Kuwait, Oman, Qatar, Saudi Arabia and Yemen. The administrative office is located in

Dubai, UAE. Activities include on-farm water management, irrigated forage and rangeland management, and high intensity production system (protected agriculture). The emphasis is on

strengthening national institutions, enhancing human resource capacity, technology development and transfer, and promoting information technology and networking. The program is funded by AFESD, IFAD, and the OPEC Fund.



Indigenous forage crops grown with minimum water in farmers' fields in the United Arab Emirates.



A farmer in Yemen produces high quality cucumbers using IPPM.



Cactus management training at Rumais Station, Sultanate of Oman.



Participants in the training course on molecular markers for fingerprinting date palm varieties in the United Arab Emirates.

Collaborative research

Soilless culture is an intensive production system for the production of high-quality cash crops. NARS-ICARDA teams are implementing on-farm trials to transfer this technology to private growers. In Oman, farmers who lost production due to salinity, are now using soilless culture introduced by ICARDA. In Kuwait, soilless culture has increased production significantly and reduced water use by over 50%. In Yemen, adoption of integrated production and protection management (IPPM) practices for the production of cucumber in greenhouses has reduced pesticide use and increased irrigation efficiency by up to 93%.

Large areas of the Arabian Peninsula are desertified, primarily because of overgrazing. In order to cope with feed shortages, farmers produce forage crops using underground water for irrigation. This is threatening water resources in the region. The regional program is promoting the use of indigenous forage

species to provide livestock feed and rehabilitate degraded rangelands. Indigenous plant species were found to be of high value as forage crops; their water-use efficiency is high, a feature that is extremely useful in dry areas. Buffel grass or leybid (*Cenchrus ciliaris*), which proved to be a good forage, has been introduced to a number of private farmers in the UAE.

Thirty-eight accessions of spineless cactus were introduced by APRP at the Rumais Research Station in Oman, and they are now well established. These will be distributed to partner NARS through the Sultanate.

New partnerships

ICARDA and the NARS in the subregion have drafted a joint proposal for a large-scale technology transfer project for the Arabian Peninsula. Other partnerships continue to develop. ICARDA and the University of Sana'a, Yemen, signed an MOU in early 2005, to promote research in intensive production systems,

conserve natural resources, and improve information technology. Another MOU was signed in mid 2005 with the Kingdom of Saudi Arabia for the establishment of a seed technology unit. ICARDA provided equipment, training and technical support for the unit, which was established to enhance the production of seed of native forage and range plants in northern Saudi Arabia.

Workshops and coordination meetings

Two end-of-project meetings were held in December 2005 in Muscat, attended by 52 participants from the seven partner countries as well as FAO and the Netherlands. The meetings were hosted by the Ministry of Agriculture and Fisheries. They discussed, among other issues, a new project proposal to transfer successful technology packages developed during the current project.

Two recently launched projects held their first coordination/management meetings. The project on development of sustainable date

palm production systems in the GCC countries met in Aleppo in May 2005.

Twenty-nine participants from the various partner NARS discussed research priorities and the first season's work plans. Similarly, the project on protected agriculture in Yemen held its first steering committee meeting at ICARDA's

regional office in Taz, in June 2005. It was attended by representatives of two government ministries – Agriculture and Irrigation, and Planning and Development – and from the French embassy.

Human resource development

Several training programs were organized, covering various aspects: development of project

proposals, scientific writing and data presentation, soilless culture, greenhouse installation and management, propagation and management of forage (spineless) cactus, and molecular markers for fingerprinting of date palm. A total of 80 people participated: researchers, extension staff, NGO field staff, and farmers from across the Peninsula.

Highland Research Regional Network

Highlands (> 800 masl) cover over 40% of the agricultural land in CWANA, and are home to the most disadvantaged section of the population in the region. The harsh environment and poor accessibility, to a great extent, explain the neglect of these areas by national and international research and development organizations. Harsh conditions promote outmigration and land abandonment. Subsistence is secured from drought-tolerant, low-productivity crops such as barley, as well as fruit trees and vegetables, and from transhumant flocks of small ruminants

that move to mountain pastures in the summer. Much of the agriculture is conducted on sloping land and soil erosion is a major problem, especially in areas that have become degraded as a result of overgrazing and other inappropriate farming practices.

From its early days and until mid-2004, ICARDA managed its regional highland activities through the Highland Regional Program, that included countries of North Africa, West Asia, and CAC. Because those countries fall within the geographic mandate of other ICARDA Regional

Programs, it was decided to address the problems of highland agriculture within the framework of a Highland Research Regional Network (HRN). The goal of HRN is to contribute to improving the welfare of rural populations in the highlands of CWANA through strategies and technologies for sustainable improvement of agricultural productivity in these areas. ICARDA project staff are located in Iran and Afghanistan, while work in Turkey is handled from the Center's headquarters.

Afghanistan

ICARDA manages its highland collaborative research program in Afghanistan through a central office in Kabul, which coordinates the work in six target provinces – Ghazni, Helmand, Kabul, Kunduz, Nangarhar and Parwan. The office coordinates the activities of the Future Harvest Consortium to Rebuild Agriculture in Afghanistan. It also provides technical and logistic support to the DFID-funded program on research on alternative livelihood (RALF).

Collaborative research

ICARDA works with the Ministry of Agriculture, Animal Husbandry and Food (MAAHF) and national



A cereal field of the Village-Based Seed Enterprise participants in Kunduz province, Afghanistan.



H.E. Mohamed Sharif, Deputy Minister of Agriculture, discusses the importance of RALF field research trials with farmers, faculty members and project staff at the research farm of the University of Nangarhar, Afghanistan.

research institutes to rebuild agriculture in Afghanistan, through the USAID- and ICARDA-funded Rebuilding Agricultural Markets Program (RAMP). This consists of four projects: demonstrations and promotion of new technologies, village-based seed production, protected-agriculture systems for cash crop production, and production and marketing of seed potato (a joint project with the International Potato Center, CIP).

ICARDA established 356 demonstration plots for nine crops – wheat, potato, onion, tomato, rice, mung bean, cotton, okra and groundnut – in five target provinces of Ghazni, Helmand, Kunduz, Nangarhar and Parwan. The introduced crop varieties and associated technologies have significantly out-yielded local varieties in farmers' fields.

To facilitate adoption, ICARDA established 21 village-based seed enterprises (VBSEs) to produce and disseminate quality seed of improved varieties adapted to local conditions. The Center provided

technical assistance in seed production, trained farmers on how to run a profitable seed business, and provided agricultural machinery and source seed. To date, the VBSEs have produced over 2000 tons of cereal seeds. Seed is processed and marketed to the community and to international agencies.

Scientists from ICARDA and MAAHF continue to work on protected-agriculture technology for marginal, water-deficit areas. In addition to the earlier established Protected Agriculture Center comprising four greenhouses and a greenhouse-manufacturing workshop, 42 greenhouses have been installed on farmers' fields and in MAAHF premises. Farmers, extension workers, NGO personnel and MAAHF staff were trained on the installation and maintenance of greenhouses for growing cash crops like cucumber, tomato, lettuce and green pepper. Adoption is growing rapidly – some 200 farmers have requested greenhouses at subsidized prices or on credit.

Potato is one of the staple crops in Afghanistan. In collaboration with CIP, ICARDA has conducted research on the production, multiplication and marketing of clean potato seed to reduce the current dependency on imports. Seed producer groups in five target provinces have produced and marketed over 1500 tons of high quality clean seed potato of improved varieties. Facilities for micro-propagation have been established and used for the multiplication of improved varieties. The 15 country stores earlier constructed have been successfully used to store 70 tons of potato seed, and 18 new country stores were constructed in Ghazni, Helmand, Nangarhar, Parwan, and Bamyán.

A tissue culture laboratory was established and Afghan technicians were trained in micro-propagation and mini tuber production techniques. Four improved varieties – Kufri Chandarmukhi, Desiree, K. Badshah, K. Phukraj – were cultured *in vitro* to produce basic seed.

ICARDA scientists, through two RALF-funded projects, have identified viable alternatives to reduce the dependency of Afghan farmers on opium production. One such alternative is dairy production. Among other activities, the project is examining the possibility of growing high-yielding and nutritious forage legumes in north-eastern Afghanistan, to increase milk production.

The other project focuses on mint, and operates in Helmand, Kunduz and Nangarhar. Research/demonstration plots have been established, field days

organized, and a mint producers association established. The project aims to transform mint from a kitchen garden herb to a commercial crop by promoting large-scale production and marketing, e.g. for culinary as well as medicinal uses.

New projects

Two new research projects were developed and submitted to donors – one on training programs for capacity building, and the other for diversifying farmers' livelihood opportunities in eastern Afghanistan, through improved technologies and better seed availability.

Workshops and coordination meetings

ICARDA organized a number of meetings in Afghanistan, to plan and monitor two major collaborative projects: the Future Harvest Consortium and the DFID-funded RALF program, which comprises 11 sub-projects. Participants included scientists and administrators from Afghanistan, international agencies (USAID, FAO, JICA, DAI, CIAT), and NGOs; the Ministry of Counter-Narcotics, Ministry of Commerce, four Afghan universities, as well as educational, research and industrial organizations from Iran and Pakistan.

Capacity building

Over 30 training courses were organized: in-country training for technicians, intensive 1- or 2-week courses for research staff, and a range of training programs for farmers and extension/NGO staff in several provinces, using a combination of practical training, field days and farmer field schools. In all, some 4700 people participated, including over 3500



Integrated crop and disease management training in Afghanistan. Trainees and trainers are from Parwan province.

farmers. The topics covered included: protected agriculture and hydroponics, installation and maintenance of greenhouses, manufacturing of greenhouse components, crop production and protection techniques for field crops, cash crops production in greenhouses, seed health testing, variety identification, seed certification, processing and storage, management and profitability assessment of village-based seed enterprises, production and marketing of seed potatoes, tissue culture, and survey methodologies.

Turkey

Turkey formally became a CGIAR member in 2005. ICARDA has worked with the Turkish NARS for several years, through bilateral projects. ICARDA is collaborating with Turkey in four major bilateral projects: improvement of winter facultative wheat, promotion of winter-sown lentil, promotion of low-cost durum technologies (IRDEN), and use of naturally occurring fungi to control the Sunn pest.

Under the joint Turkey/CIM-MYT/ICARDA International Winter Wheat Improvement Program, germplasm was developed and tested in Turkey and Syria and then distributed to other parts of CWANA. Three hundred sets of international nurseries of winter facultative wheat were sent to 50 NARS partners for testing and selection. International nurseries (18 winter facultative wheat, 5 durum wheat, 2 spring bread wheat, 3 barley, 12 lentil, 15 chickpea, 2 faba bean and 6 forage legumes) were provided to Turkish partners for testing at research institutes and universities in various regions.

Under the GAP/ICARDA project, 20 tons of seed of lentil variety Idlib-3 (released in Syria) was planted in the 2004/05 season by farmers in the South East Anatolia Region. Another 170 tons was planted on 1700 ha in the 2005/06 cropping season.

Capacity building and collabora-



Scientists from Turkey visit the winter and facultative wheat breeding trials at ICARDA, May 2005.

tion through training programs, meetings and workshops was a major activity in 2005. Turkey and ICARDA jointly organized three meetings in Turkey on the CWANA international seed trade; International Assessment of Agricultural Science and Technology (IAASTD)-CWANA sub-global assessment authors' meeting; and land races. Fifteen Turkish scientists attended several meetings and workshops at ICARDA on wheat, water productivity, seed policy, and Sunn pest control.

Turkey, CIMMYT and ICARDA organized an international training course on conservation agriculture technologies for rainfed wheat production systems in Turkey, attended by 24 researchers from 13 CWANA countries. Seven Turkish scientists visited ICARDA for 1–2 weeks for courses on seed production, DNA molecular marker techniques, and electronic production of documents and web databases. Another 13 Turkish

scientists visited the Integrated Gene Management Program to get acquainted with cereals and legumes research at ICARDA and interact with the scientists. Also, seven ICARDA scientists visited Turkey to provide technical assistance and monitor collaborative activities.

Iran

Iran is now self-sufficient in wheat production. Production was adequate for the second year running, after four decades of deficits, and is expected to increase to a surplus next season. ICARDA has played a significant role. Twelve years of collaboration between DARI and ICARDA has led to the release of several new varieties of food, feed and oilseed crops, as well as improved soil and crop management practices that have significantly contributed to increased yields.

More than 485 collaborative projects and trials were conducted in Iran during the 2004/05 season:

variety testing, long-term crop rotations, supplemental irrigation, water harvesting, soil management, and crop management. Five durum, six bread wheat, and five barley varieties were selected for different environments. Two legume varieties – chickpea FLIP 93-93 and lentil FLIP 92-12L – are expected to be released for commercial cultivation. Forage lines from *Vicia panonica* and *V. dasy-carpa* (for cold regions), and colza hybrid Hyola 308 (for warm regions) are candidates for release. The colza line PI 537598 was recommended for seed multiplication. Future impact is expected to be even greater: the Ministry of Agriculture-e-Jihad plans on-farm demonstration trials on about 500,000 ha across five provinces.

A new project was launched with SPII for spring wheat improvement in irrigated areas in the lowlands of Iran, with possibilities of expansion to similar environments elsewhere in CWANA. Many lines and parental germplasm have been selected and the crosses made. SPII, ICARDA and CIMMYT are now discussing the possibility of a similar project on winter and facultative wheat.

The Karkheh River Basin projects on water productivity and livelihoods resilience are well under way. Baseline surveys have been completed, pilot communities and sites have been selected. More than 25 proposals will be implemented, focusing on improvement of livelihoods, watershed management and water-use efficiency.

Central Asia and the Caucasus Regional Program

Established in 1998, the Central Asia and the Caucasus (CAC) Regional Program is the youngest outreach program of ICARDA. It

emphasis is on on-farm testing of improved varieties and seed production of released varieties, to stimulate large-scale adoption.



A Field Day in Tajikistan: demonstration of improved chickpea and lentil lines selected from ICARDA-supplied genetic materials. About 65 farmers attended the event.

covers eight countries: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan in Central Asia; and Armenia, Azerbaijan and Georgia in the Caucasus. The Program has built strong partnerships with the NARS in germplasm improvement, plant genetic resources, soil and water management, integrated feed and livestock production, and human resource development.

New technologies

Three new varieties were released in 2005. Almira, a bread wheat variety, was released in Kyrgyzstan; chickpea variety Narmin and *Lathyrus* variety Ali Bar were released in Azerbaijan and Kazakhstan, respectively. About 50 promising varieties are now being tested for final release in different countries. The major

has sensitized policymakers to improve other germplasm storage facilities. Considerable progress has been made in Kyrgyzstan, Tajikistan and Georgia on establishing national genetic resource centers with medium-term storage facilities. The genebank at the Genetic Research Institute of Azerbaijan has been made functional, and a new genebank established in Turkmenistan.

A new project to improve genebank facilities in the CAC region, funded by the Global Crop Diversity Trust, started in July 2005. It is being managed by ICARDA and the Program Facilitation Unit (PFU). The project will provide support for the most urgent needs of genebanks in the CAC countries, focusing on crops of critical importance.

A collection mission in Armenia in July 2005, in collaboration with the national program, Vavilov Institute of Russia, and CLIMA of Australia, yielded a number of valuable legume landraces. Within the framework of the CATCN Network, a working group on

Genetic resources

Genetic resource conservation efforts have been strengthened throughout the region. Renovation of the Uzbek Gene Bank, with support from ICARDA and IPGRI,



H. E. Begench Atamuradov (center), Minister of Agriculture, Turkmenistan, with participants of the Eighth ICARDA-CAC Regional Coordination Meeting.

plant genetic resources (focusing on ICARDA's mandate crops) has been established in each CAC country. ICARDA provided all the eight groups with equipment (computers, digital cameras, projectors etc.) as well as training on PGR documentation.

Workshops and meetings

The eighth CAC Regional Coordination Meeting, held in Turkmenistan in March, was attended by 54 participants, including all NARS heads. Two other meetings for ADB-funded projects were organized in conjunction with this meeting: a Steering Committee meeting of the soil fertility project in Central Asia, and the inception workshop for an IWMI-ICARDA-ICBA project on degradation in the Aral Sea basin.

The Swedish International Development Cooperation Agency (SIDA) will begin activi-

ties in the CAC region in 2006. SIDA and ICARDA jointly organized a meeting on plant genetic resources in Aleppo in May 2005, attended by 27 participants from the eight countries, as well as IPGRI, PFU-CGIAR and the Global Crop Diversity Trust.

Human resource development

Capacity building efforts in 2005 included training programs for scientists, extension staff, farmers, and representatives from government departments. There were a total 67 participants from eight countries. The training covered various areas: PGR data management, disease survey techniques, IPM, seed production and related issues (seed policy, regulations, privatization, variety evaluation and release, variety maintenance, quarantine procedures, regional harmonization), and extension methods. Some of these programs will have multiplier effects. For



A disease survey training workshop in Azerbaijan.

example, participants in the course on PGR data management are expected to disseminate the database package and related skills to institutes holding *ex-situ* collections in their countries.

At NARS request, special efforts were made to improve English language skills. Two intensive 3-month courses were held in Tashkent, Uzbekistan. Seven such courses have been conducted, and about 400 scientists have been trained to date.

Latin America Regional Program

The administrative office of the Latin America Regional Program (LARP) is located at CIMMYT in Mexico. The objective of LARP is to collaborate with NARS, NGOs, and private organizations in the region on research, human resource capacity building and networking. Several collaborative projects were implemented in 2005.

Collaborative projects

National level collaborative projects included the development of barley adapted to central Brazil, which has been in operation since 2001, aiming to provide support for the introduction of barley to a new agricultural frontier. The

Cerrado Region is one of the few areas in the world where agricul-

ture is expanding, and the local programs and companies believe that barley has a niche in the region. A comprehensive breeding program has been developed



ICARDA barley breeder, Dr Flavio Capettini (left), met with the National Barley Coordinator, Dr Euclides Minella; the Regional Barley Breeder, Renato Amabile; and local farmers, during his visit to the new barley area in central Brazil.

for the region and new varieties adapted to the agro-ecological conditions are expected to be released soon.

The projects on the development of feed and forage barley adapted to Mexico continued. New projects on faba bean and chickpea were implemented in 2005. The introduction and development of germplasm, as well as exchange of information, will continue under these projects.

A project to promote barley in the north-west region of Mexico

was initiated with the local farmers' association, using a participatory approach. Researchers from ICARDA assisted in launching the program. Meetings were held with local producers to discuss opportunities for new crops and identify training needs. Barley evaluation experiments were established and field days will be organized in 2006.

Technical assistance

Within the framework of the collaborative project with EMBRAPA in Brazil, ICARDA provided technical assistance to the barley

breeding program for the selection and testing of new barley germplasm adapted to the region.

The ICARDA breeder visited Brazil to help evaluate experiments throughout the country. He discussed with local researchers the results obtained so far and opportunities for the release of new varieties. He also visited Ecuador in 2005 to strengthen the long-established and productive collaboration between ICARDA and the NARS.