



International Center for Agricultural  
Research in the Dry Areas



United States Agency for  
International Development



Ministry of Agriculture and Livestock  
Government of Afghanistan

# REBUILDING AGRICULTURE IN AFGHANISTAN

## War, Drought and Famine

After more than two decades of war and five harsh years of drought, agricultural production capacity and food security were greatly damaged in Afghanistan. There was no water for irrigation, no pesticides or fertilizers, few roads to transport produce and, most crippling of all, there was no seed to plant. An agricultural system that had once provided a steady income for about 80% of the population urgently needed to be revived for the 22 million people who depended on it.



## The Power of Partnership

In January 2002, ICARDA, with the support of the United States Agency for International Development (USAID), brought together 74 experts from 34 organizations including CGIAR centers and other research institutes, relief and development organizations, NGOs, U.S. universities, donor agencies and the Afghanistan Ministry of Agriculture at a meeting in Tashkent, Uzbekistan. The result was the creation of the Future Harvest Consortium to Rebuild Agriculture in Afghanistan (FHCRAA).

The Consortium identified four key areas that needed attention: seed systems and crop improvement; soil and water management; livestock, feed and rangeland improvement; and horticulture. With the ultimate goal of restoring Afghanistan's agriculture, the Consortium developed work plans for each of these areas.

## Immediate Aid

Afghans desperately needed wheat, a staple in their diets. Emergency food and seed had to reach families, especially those in remote areas. In April 2002, just in time for the spring planting season, the FHCRAA provided 3500 tonnes of improved wheat seed to around 70,000 farmers. The World Food Program transported the seed from Pakistan to Kabul; FHCRAA arranged to transport it to the Afghan provinces of Badakshan, Bamyan, Ghazni, Lowgar, Kapisa, Parwan, Wardak, and Uruzgan. NGOs and FAO coordinated the seed distribution.



*53 tonnes of foundation seed  
leaving ICARDA for Afghanistan.*

## FHCRAA Partners

**CG Centers:** International Center for Agricultural Research in the Dry Areas (ICARDA); International Center for Tropical Agriculture (CIAT); International Center for Maize and Wheat Improvement (CIMMYT); International Potato Center (CIP); International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); International Food Policy Research Institute (IFPRI); International Livestock Research Institute (ILRI); International Plant Genetic Resources Institute (IPGRI); International Service for National Agricultural Research (ISNAR); and the International Water Management Institute (IWMI)

**Other International Institutes:** The Asian Vegetable Research and Development Center (AVRDC); International Centre for Development Oriented Research in Agriculture (ICRA), International Fertilizer Development Center (IFDC)

**Afghanistan:** Local institutes, particularly the Ministry of Agriculture and Livestock

**Non-Governmental Organizations:** The International Federation of Red Cross and Crescent Societies (IFRC); The International Medical Corps, the Aga Khan Development Network, the Pamir Rehabilitation Bureau, MADERA, SOLIDARITES, GRSP, International Mercy Corps (IMC), ACTED, CARE International, Helping Afghan Farmers Organization (HAFO), Agricultural Development of Afghanistan (ADA), FOCUS, Concern Worldwide, Catholic Relief Services, The Danish Committee for Aid to Afghan Refugees (DACAAR), Islamic Relief Agency (ISRA)

**United Nations Agencies:** FAO, World Food Program

**United States Institutions:** Texas A&M, Cornell University, University of California, Davis, University of Vermont and Michigan State University

**Donor:** USAID provided a grant of US\$ 9.52 million



*First Steering Committee Meeting of FHCRAA held at ICARDA, Syria, August, 2002.*

## Objectives of FHCRAA

- Multiply and deliver quality seed of adapted varieties through effective delivery systems to reach affected farmers in time, and to build, with Afghan partners, an effective regulatory system that enforces standards and promotes the use of high quality seed and varieties
- Establish a framework and strategy for CGIAR technical assistance, in cooperation with partners, for the development of seed systems and sustainable agricultural production systems in Afghanistan at the central, regional, and local levels
- Restore an enabling environment through capacity building

*Cleaning seed near Kabul, a source of cash income for farm families, particularly war widows.*



*Farmers planting seed in spring.*

*"Everyone in the village lost two or three members of their family during the fighting. Things are much better now that I have work and I can help my family."  
---Woman working at seed cleaning facility near Kabul*

Around 5000 tonnes of improved wheat seed for the fall planting season was produced in the country. IFDC distributed fertilizer through a voucher system. Small quantities of rice, barley, chickpea, lentil, berseem, clover, alfalfa, flax, sesame and mung bean seeds were also purchased and distributed to farmers. More than 300 widows were employed in the seed cleaning and distribution operation. The women used traditional methods of sifting seed to remove chaff and tossing it in the air so the wind blows away the lighter weed seeds. The cleaning and distribution activities injected more than one million dollars into the Afghan economy and provided a means for women to support their families.



*Potato seed fields in Jalalabad.*

ICARDA shipped 53 tonnes of foundation seed of bread wheat, durum wheat, barley, lentil, chickpea and vetch to Afghanistan for on-site evaluation and to kick-start the release of new varieties.

The FHCRAA also initiated pioneer schemes for sustainable seed systems. These Village-based Seed Enterprises (VSEs) aim to produce seed in a cost-efficient manner. ICARDA staff trained farmers in seed production techniques and created a rigorous quality control program. Farmers learned to inspect their fields, remove off-type plants, treat their fields against disease, and package seeds for sale.



*Minister of Agriculture, Afghanistan addressing the "Code of Conduct" workshop.*

A potato seed program aimed at producing and supplying potato seed to Afghan farmers. Seed of improved varieties was imported for multiplication during fall season in the Jalalabad area and then used for further multiplication in spring season in the mid-hills (Chausiab, Maidan Shar) and in the high hills (Bamyan).

The Consortium is also working on improving potato production in the nation. Farmers have learnt integrated disease management techniques to control aphids that carry the potato leaf roll virus (PLRV) and mosaic virus. Farmers are also involved in producing virus-free seed and Consortium members are working with them to develop a certification process that will be recognized by potato seed purchasers nationwide.

### **Seed Policy: Creating a Code of Conduct**

During the political upheaval, Afghanistan lost its administrative structures, legal systems, and any regulatory framework it once had. As farmers returned to their fields, the need to ensure the availability of high-quality seed, standardize methods of production and develop import policies became evident.

In May 2002, ICARDA, the Afghanistan Ministry of Agriculture and more than 80 experts helped create and define standards and procedures that shape seed systems. Afghanistan's Acting Interim Government adopted this Code of Conduct; a National Seed Policy and a Seed Law for the nation are being finalized with support from FAO.

### **Rehabilitation of Research Capability**

Building a self-sufficient agricultural system also involves building research stations and laboratories to support it. In the 1970s, Afghanistan had 22 agricultural stations that have since been bombed and looted by provincial warlords. Afghanistan's national agricultural gene bank, that held the nation's agricultural heritage, was destroyed during the civil war. However, many of the seeds were in duplicate collections in Syria, Mexico, India and Pakistan and Consortium scientists have begun the process of repatriating them.



*Farmer-based seed production in Kunduz.*

So far, VSEs have been initiated in Nangarhar, Kunduz, Baghlan and Takhar involving 20 farmer groups (more than 200 farmers) working in over 350 hectares. Mobile seed cleaning machines, specifically designed for use at the farmer level, have been provided. Farmers are assisted and trained in seed production practices, including marketing. These farmer groups will provide a significant share of the seed for planting in successive seasons.

To assess the profitability and sustainability of such enterprises, business plans have been prepared for two selected farmer groups. These plans show that seed enterprises have the potential to be a profitable operation, worthy of credit and investment.

The International Potato Center (CIP) initiated a successful potato seed program aimed at producing and supplying potato seed to Afghan farmers. Seed of improved varieties was imported for multiplication during fall season in the Jalalabad area and then used for further multiplication in spring season in the mid-hills (Chausiab, Maidan Shar) and in the high hills (Bamyan).

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*Research plot at Baghlan research station.*



*New research station in Baghlan.*

ICARDA rebuilt six agricultural stations in five provinces: Kabul, Baghlan, Kunduz, Takhar and Nangarhar. The stations develop and evaluate new crop genotypes for distribution throughout the region and farmers visit the stations to select lines that perform well in their fields. Experimental plots of wheat, barley, chickpea, lentils, faba bean, tomato, onion, and pepper were harvested for the first time in many years. The stations also serve as centers for small business development, new market creation, crop improvement, technology transfer, and training and educational opportunities for farmers. Two seed quality testing laboratories in Badam Bagh (Kabul) and Jalalabad (Nangarhar) and two satellite stations in Kunduz and Baghlan were also established to ensure that marketed seeds are of superior quality.

Several international nurseries have been planted for testing yield, drought and cold tolerance, and disease resistance in a variety of crops. This international nursery program will identify adapted germplasm for Afghanistan's varied agro-ecological zones. A variety maintenance program has been initiated in Darul Aman, Baglan, Kunduz, and Taloqan to maintain varietal purity and to initiate seed multiplication of existing varieties.

### Pest Problems

*Eurygaster integriceps*, commonly known as Sunn Pest, is one of the most serious threats to wheat in Afghanistan. The insect, which feeds on stems, leaves and grain, also injects enzymes that break down the gluten in the wheat grain. If as little as 2-3% of the grain is infected, the resulting flour is unpalatable and bread will not rise. Sunn pest infestations can cause a 50-90% loss in wheat yields.

Afghanistan lost around 200,000 hectares of wheat to Sunn pest in the summer of 2002. It had almost lost the spring 2003 yields, but for the effort of the Central Asian Development Group (CADG). The organization saved more than 12 million dollars worth of wheat by using a Sunn Pest management package provided by ICARDA.

ICARDA scientists are now focusing on developing long-term weapons in the fight against Sunn pest. One option is the use of *Beauveria bassiana*, a fungus that is highly toxic to Sunn pest eggs and larvae. The other is to create pest-resistant varieties of wheat. Scientists have discovered a source of resistance to Sunn pest in a wild relative of wheat and plant-breeders are crossing these lines with Afghanistan-adapted bread wheat varieties.

### Beyond Wheat: The Need for Crop Diversity

Horticultural products once accounted for 40% of Afghanistan's exports. However, today Afghans are unable to produce enough fruits and vegetables to meet their own needs and often re-import domestically grown products to meet the off-season demand. Expanded production of fruits, nuts, vegetables, food legumes, forages and feedgrains will add important nutrients to Afghan diets and provide farmers with alternatives to poppy production.

The FHCRAA determined which crops were the most promising for both export and internal use, and nurseries have been established to plant hundreds of hectares of grape, fig, olive, pomegranate, almond, mulberry, apricot, peach, orange, lemon and walnut. These nurseries will be self-sufficient by selling seed and saplings to farmers.

### Needs Assessment

To target interventions and to develop a vision for rural Afghanistan, four needs assessments were carried out. These assessments collected existing information and identified priority thematic areas that require R&D for immediate, medium- and long-term action. The four areas addressed were: (a) Seed systems and crop improvement, (b) Soil and water management, (c) Livestock, feed and rangelands, and (d) Horticulture. Household surveys, key informant interviews, and wrap-up meetings were organized as an integral part of these needs assessments. The wrap-up meetings identified synergies and complementarities between the different needs assessments and ensured the participation of all Consortium members. Using teams of international experts, ICARDA implemented the needs assessment in all areas except horticulture, which was co-led by IPGRI and the University of California, Davis.



*Damaged seed laboratory in Badam Bagh.*



*Rehabilitated seed laboratory in Badam Bagh.*

## Building Human Capacity

Afghanistan needs to build a strong knowledge base. Farmers, technicians, professors, and scientists must update themselves with the latest skills and technologies. The Consortium provided training to Afghan researchers and agricultural university faculty members in all aspects of seed systems, seed production, seed enterprise development, variety management, potato seed multiplication, integrated pest management, operation and management of experimental stations, use of field equipment, fertilizer and pesticide application, meteorological equipment/station operation, management of water resources and improvement of water-use efficiency, advanced radio production, format development and audio-editing, agricultural journalism, digital audio recording and editing, and computer technology.



*Seed training course in Kabul.*



*A group discussion with farmers involved in setting up Village-Based Seed Enterprises.*

ICARDA staff organized a workshop in Kabul on Agricultural Journalism for reporters to learn the basics of journalism and radio production techniques. The Consortium also refurbished the Afghan Ministry of Agriculture and Livestock (MOAL) recording studio and installed modern digital recording and sound equipment, including a mini-digital recorder for conducting field interviews. MOAL staff members were trained in the use of personal computers, studio techniques, and digital audio editing software. Farmers now tune in to "Sow Well, Reap Well," a weekly, half-hour program that features interviews with agronomists and outlines various farming methods.

Thoughtful and strategic training in conjunction with other rebuilding efforts is raising the capacity of Afghanistan and enabling the nation to address its needs and achieve the ultimate goal of self-sufficiency.

## Short-term, High-impact Projects to Rebuild Agriculture in Afghanistan

Eight short-term, high-impact projects complemented the ongoing efforts to rebuild Afghanistan's agricultural system and begin the nation's transition from emergency relief to an economically productive, sustainable, and diverse rural economy. The FHCRAA/USAID awarded a total of \$1.25 million to each project. ICARDA managed this grants program and all the projects were completed by the end of August 2003.

### Potato Seed Production and Multiplication

The International Potato Centre (CIP), based in Peru, increased the supply of virus-free potato seed in Afghanistan for local needs as well as future export to neighboring countries, by developing a farmer-based seed multiplication system. The successful training of farmers and the testing of new varieties expanded from Jalalabad to Kabul and Bamyan districts. For example, Bamyan used virus-free seed produced in Jalalabad for the summer 2003 harvest. The new farmer candidates began their training and the necessary equipment was on its way.

### Sustainable Maize Systems: Seeds for Peace

The International Center for Wheat and Maize Improvement (CIMMYT) scientists implemented an open-pollinated maize improvement program. Researchers identified candidates for training and chose 20 locations for nurseries around Afghanistan. CIMMYT distributed seeds to the nurseries and arranged the planting of experiments near key villages. Farmer survey documents were prepared, and a manual in Pashto and Dari was produced for farmers and extension agents. After training, farmer-cooperators were able to observe production problems and identify maize populations for on-farm commercialization.



*Maize cultivar in Kunduz Province.*

### Building Human Resource Capacity in Wheat and Maize Research in Afghanistan

CIMMYT contributed to building human resource capacity by training around 30 scientists. Five Afghan scientists participated in the wheat improvement training course, and two attended the advanced agronomy course in Mexico. One maize breeder attended the advanced maize improvement course and two wheat scientists joined the CIMMYT-Turkey office for training. An in-country training course was held for 20 Afghan scientists.

## ***Rangeland Information Products from Remotely Sensed Imagery in Afghanistan***

Michigan State University utilized satellite remote sensing and GIS technology to create detailed maps to improve rangeland management. GIS experts accessed and overlaid MODIS imagery and DEM data layers and integrated the information from Landsat images for all of Afghanistan for the period May 2002 to the present. The on-ground data validation study began in June and despite enormous security and logistical problems, was a success. The crew traveled around the rainfed regions of Afghanistan with GPS, video and computing equipment to compare and validate on-ground forage productivity with Landsat-based estimates. The resulting maps were provided to farmers and agricultural professionals at the MSU website <http://35.8.163.126/research/> along with training in interpretation and utilization of the data for improved rangeland management.

## ***Agricultural Production on Degraded/Saline Land***

Drought has reduced surface water supplies and the bulk of the irrigation systems, which helped produce over 80% of Afghanistan's food supply in the past. The International Center for Biosaline Agriculture (ICBA), based in the United Arab Emirates, provided apprenticeship for extension agents to improve their basic skills in designing and operating improved irrigation systems suitable for saline soils and water. Three trainees worked at ICBA for six weeks and attended a two-month water and soil management course at ICARDA.



*An example of a MODIS image.*

## ***Farm Water Management and Irrigation***

Groundwater resources have been overexploited and the water tables have dropped significantly over large areas of Afghanistan causing wells to go dry. Soil salinization and degradation is a priority issue in five provinces - Helmand, Ghazni, Faryab, Shaberghan, and Kandahar. DACAAR worked to introduce best management practices for farm water management and irrigation. Their project commitment was fulfilled by training eight Afghan scientists in best water management practices at the water and soil management course at ICARDA headquarters.

## ***Best Management Practices for Water and Soil***

A team from Cornell University in Ithaca, New York held a workshop on "Best Management Practices for Water and Soil" at the College of Agriculture in Kabul. Seventy-four Afghans attended the first day's course on water management and approximately 200 attended the second day's training in crop and soil management. The researchers also organized a traveling workshop for 35 participants. The participants visited irrigation systems and farms in Baghlan and Balkh provinces, and toured the Parwan irrigation project. During the workshop, the investigators conducted field schools to help farmers better understand water and nutrient management principles. Handouts in local languages on key factors in wheat production, soil nutrient deficiencies, wheat diseases and water management were distributed at the workshop.

## ***Building Capacity to Control Sunn Pest Infestations***

The indiscriminate use of pesticides has created resistance in and killed the natural enemies of Sunn pest. ICARDA and the University of Vermont addressed the Sunn Pest problem by providing integrated pest management training to Afghan agronomists, farmers and NGOs. The training covered biological and behavioral knowledge of Sunn pest, farming practices, host-plant resistance, entomopathogenic fungi and the use of conventional pesticide. ICARDA also conducted an in-country training course. Crop production guides on insect management were translated into Dari and Pashto. The group also delivered a Sunn Pest Management Guide to CADG which enabled local farmers to save 32,000 hectares of irrigated wheat. Researchers also re-established the Kabul University Entomology Laboratory and furnished it with equipment purchased through this grant.

The USAID-funded, ICARDA-managed Short-Term High-Impact grants program made a difference in Afghanistan by providing improved potato and maize germplasm, better understanding of national forage productivity, and training plant breeders, agronomists, water and crop pest management researchers.



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