

Ecoregional Program: Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus

Rationale

The Central Asia and Caucasus (CAC) region consists of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan in Central Asia, and Armenia, Azerbaijan and Georgia in the Caucasus.

The region has undergone tremendous economic and social shocks following the dissolution of the former Soviet Union. Economies have shrunk, incomes have fallen, poverty has increased and food security is compromised. GNI (gross national income) per capita declined by an average of almost 50% between 1991 and 2000. By 2001, six of the CAC countries (Armenia, Azerbaijan, Georgia, Kyrgyzstan, Tajikistan and Uzbekistan) were classified as low income countries, and GNI per capita for the CAC region as a whole was less than the overall average for developing countries.

Prior to independence, the CAC republics were economically interdependent within the centrally managed Soviet economy. Agriculture contributed 15 to 45% of GDP and employed 20 to 50% of the national labor forces. Each Republic was specialized according to its agroclimatic resources, with production distributed through the Soviet trade system. Following the dissolution of the USSR and collapse of existing trade arrangements, exporters lost their export markets and importers lost their food supply. The newly independent republics were left with the task of developing their own independent economies.

This transition from the Soviet centrally planned economy to independent market-oriented economies has had severe consequences. With the collapse of the Soviet supply network and withdrawal of subsidies from Moscow, the agricultural sector contracted significantly. Although there are signs of recovery, agricultural and food production indices in most countries still remain below the pre-independence levels.

The collapse of the Soviet Union has not only disrupted production and trade, it has also had considerable impact on agricultural research. The agricultural research system of the Soviet Union was well funded, science-based and highly centralized. It provided the advantages of an elaborate research network, communication forum, and information and documentation system. While the newly independent republics have inherited a wealth of national research experience from the Soviet era, which provides a foundation on which to build collaborative research, they are ill equipped to respond to changes in their agricultural sectors and emerging market economies. Lack of contact with the international scientific community has caused a technology lag and prevented scientists from keeping abreast of scientific advances, while links between research and producers have been lost with the breakdown of the central planning system. Researchers now have no formal channels through which to disseminate information, knowledge and new technologies.

The challenge for the CGIAR is to apply its research to issues that address food insecurity and poverty in a region that is going through rapid transition. While the national problems vary between countries, depending on the state of the economy and degree to which the transition process has been implemented, there is a range of common challenges that warrant a regional approach.

While the NARS have a long and accumulated experience in commodity research, changes in the production environment require a shift in the research paradigm toward the development of technologies and supporting institutions that are suitable for the emerging small private farms and household production units. The opportunities for intervention are three-fold:

- (1) Generation and application of appropriate technologies that are cost-efficient and income-generating;
- (2) Development of a conducive policy environment together with supporting rural institutions;
- (3) Strengthening the capacity of NARS, including:

- (a) Strengthening their capacity to maintain client-oriented research, through institutional strengthening, development of appropriate research methods, and skills development of the next generation of researchers;
- (b) Strengthening channels through which to disseminate information, knowledge and new technologies;
- (c) Strengthening their capacity to provide information to policy-makers to enable policy reforms;
- (d) Strengthening regional integration and knowledge sharing.

The Ecoregional Programme

The CGIAR's research program in Central Asia and the Caucasus (CAC) is the outcome of a series of initiatives beginning with the ministerial-level meeting in Lucerne at which it was recommended that the CGIAR should consider an involvement with the agricultural research needs of the southern part of the former Soviet Union (FSU).

In December 1995 ICARDA organized a workshop with participation from the eight CAC countries and from other CGIAR Centers to identify the agricultural research needs of CAC. A CGIAR Task Force was established, which, in 1996, proposed an expansion of the geographic mandate of CGIAR and the development of an overall strategy for CAC.

The ecoregional programme for CAC was established in 1998 by a consortium of nine CG Centers (CIMMYT, CIP, ICARDA, ICRISAT, IFPRI, ILRI, IPGRI, ISNAR, and IWMI), with ICARDA as the convening Center. IRRI and AVRDC (the World Vegetable Center) have since joined the program.

A Program Facilitation Unit (PFU) has been established in Tashkent, Uzbekistan, hosted by ICARDA's regional office for Central Asia and the Caucasus and staffed by an internationally recruited unit head supported by a locally recruited staff. Of the nine Centers involved, four have posted staff in the region: ICARDA, IPGRI and IWMI have placed scientific staff in Tashkent, whereas CIMMYT has established a program office in Almaty, Kazakhstan. The PFU provides logistic support to the scientists involved in the various program activities.

The Program is managed by a Program Steering Committee (PSC) consisting of one representative from each of the participating CGIAR Centers and the eight CAC NARS, a representative from the CGIAR Secretariat and from TAC, and representatives from donors that support the Program. The PSC is co-chaired by the Director General of one of the CGIAR Centers and a NARS leader on an annual rotational basis. The head of the PFU reports directly to the PSC and acts as its Secretary. The PSC meets annually to review ongoing and new collaborative research initiatives for CAC and to ensure that they are within the framework established under the Program, and serves as a forum for the free exchange of information between all participants.

Program Description

The Ecoregional Program for CAC is organized under broad themes, with each theme sub-divided into activities, as follows:

1. Productivity of Agricultural Systems
 - 1.1 Germplasm Enhancement
 - 1.2 Strengthening National Seed Supply Systems
 - 1.3 Cropping Systems Management and Agricultural Diversification
 - 1.4 Livestock Production Systems and Integrated Feed/ Livestock Management
2. Natural Resource Conservation and Management
 - 2.1 Irrigation, Drainage, and Water Basin Analysis
 - 2.2 On-Farm Soil and Water Management
 - 2.3 Rangeland Rehabilitation and Management
3. Conservation and Evaluation of Genetic Resources

- 3.1 Plant Genetic Resources
- 3.2 Animal Genetic Resources
- 4. Socioeconomic and Public Policy Research
- 5. Strengthening National Programs

These themes provide the overall framework in which specific projects are developed and implemented in partnership between NARS and CGIAR centers.

The project goal, purpose, outputs, output targets and associated expected outcomes and impacts are provided in the attached “Project Impact Pathway” matrix. The logframe specifies which Center/partner bears primary responsibility for the achievement of outputs and the associated outcomes and impacts. Each Center finances its own projects and the details of the component projects are reported within the MTPs of the Centers implementing those projects.

External conditions and assumptions

Key assumptions in achieving research outputs include:

- The Program continues to attract restricted funding and grants for specific project research and training activities.
- National research staff trained by the program remain in their positions and strengthen their national research programs.
- Political stability in the region permits the Consortium members to continue their active partnerships with NARS.

Key assumptions (external conditions) for those outputs to generate the stated outcomes and impacts include:

- Political stability in the region ensures that outcomes have their intended impact.
- Local authorities support the establishment of water management institutions (water users associations, canal management organizations, etc).
- Farmers have access to equipment required by new technologies.
- National policy-makers and local authorities/decision-makers are willing to adopt recommended policy and institutional options for water management.
- Enabling policy environment for crop diversification and markets for new crops exist.
- National seed production systems have sufficient resources to produce seed, and farmers have access to seed of improved varieties.

Users and Beneficiaries

The program's outputs will be of direct benefit to farm households by increasing on-farm production, diversifying production options and increasing farm incomes from marketed products. The diversification of agriculture will enhance household diets and nutrition. Increased production and better market linkages will lead to increased food supplies for both rural and urban consumers and greater food security.

The conservation of genetic resources is of global importance as an international public good as well as providing a continuous source of material for future use by NARS and farmers in improving agricultural productivity. Improved management of the natural resources will have immediate impact on agricultural production today and sustainability in the long run.

The main users are national agricultural research systems and policy-makers. The program will have direct impact on the efficiency and effectiveness of national agricultural research systems through

human resource capacity building and will lay the foundations for a shift towards a demand-driven, problem-oriented, multidisciplinary and participatory approach to agricultural research. The transfer of advanced scientific methods and techniques to national programs will ensure that NARS' research is sustainable beyond the program.

Collaborators

- National research and extension programs, seed programs and agricultural universities in the CAC region.
- Central Asia and Caucasus Association of Agricultural Research Institutions (CACAARI).
- Centre for Legumes in Mediterranean Agriculture (CLIMA), Australia.
- N. I. Vavilov Institute of Plant Industry, Russia.
- USDA/ARS (United States Department of Agriculture/Agricultural Research Services).
- FAO (Food and Agriculture Organization of the United Nations).
- ICBA (International Center for Biosaline Agriculture).

Financing Plan

Funding from the CGIAR to support the Program Facilitation Unit (PFU) is the only financing received directly for the Ecoregional Program and is reported separately within ICARDA's financial plan.

The costs of all other activities are supported through a portfolio of Center projects. Each Center finances its own projects and details of the component projects are reported within the MTPs of the Centers implementing those projects.

The financing contributed through these projects is presented in the table below.

Ecoregional Program: Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus

FINANCING PLAN: 2004 Actuals, 2005 Estimates, and 2006–2008 Plan

CGIAR Outputs and Sub-Projects	2004 Actuals	2005 Estimates	2006 Proposal	2007 Proposal	2008 Proposal
1. Germplasm Improvement					
1.1 Crop diversification (ICARDA)					
Attributed funding from Japan	50,000	50,000	50,000	50,000	50,000
Attributed funding from EC:	1,004,000	891,000	891,000	891,000	891,000
1.2 Restoring food security (CIMMYT)	300,000	300,000	300,000	300,000	300,000
1.3 Food legumes for diversification (ICRISAT)		30,000	30,000	40,000	30,000
1.4 Improving and sustaining rice productivity (IRRI)	30,000	15,500	20,000	20,000	20,000
1.5 Potato crop improvement (CIP)		34,000	34,000	34,000	34,000
1.6 Vegetable improvement (AVRDC)		60,000	38,000	38,000	38,000
Sub-Total	1,384,000	1,380,500	1,343,000	1,353,000	1,363,000
2. Germplasm Collection					
2.1 Enhanced use of agro-biodiversity (IPGRI)	117,111	1,256,976	1,256,976	1,256,976	1,256,976
2.2 Conservation and sustainable use of agrobiodiversity (ICARDA)					
Attributed funding from EC:	668,000	193,000	193,000	193,000	193,000
PGR Conservation (Australia)	56,150	97,500	92,933	56,800	0
2.3 Global crop Diversity Trust					
Inventory of ex-situ collections of treaty crops in CAC (ICARDA)		43,500	0	0	0
Establishment of a regional PGR information network (ICARDA)		49,000	49,000	0	0
Securing important field collections of apple genetic resources in Kazakhstan and Turkmenistan (IPGRI)		103,000	7,500	8,360	0
2.4 Strengthening social and cultural aspects of agrobiodiversity management (IPGRI)		70,000	90,000	90,000	0
Sub-Total	841,261	1,812,976	1,689,409	1,605,136	1,449,976

CGIAR Outputs and Sub-Projects	2004 Actuals	2005 Estimates	2006 Proposal	2007 Proposal	2008 Proposal
3. Sustainable Production					
3.1 Integrated water resources management (IWMI)	278,000	649,000	828,000	792,000	252,000
3.2 International MS program in water (IWMI-TIIM)		15,000	15,000	0	15,000
3.3 On-farm water and soil fertility management (ICARDA)	382,850	308,575	308,575	0	0
3.4 Sustainable agriculture in Karakalpakstan (ICARDA)	25,000	50,000	0	0	0
3.5 Enabling communities in the Aral Sea Basin to combat land and water resource degradation through the creation of 'Bright Spots' (IWMI-ICARDA)		256,000	227,000	219,000	0
Sub-Total	685,850	1,278,575	1,378,575	1,011,000	267,000
4. Policy	0	0	0	0	0
5. Enhancing NARS					
5.1 Program Facilitation Unit for CGIAR	239,000	260,000	260,000	260,000	260,000
5.2 ICARDA Regional Program for CAC	200,768	181,417	181,417	181,417	181,417
Sub-Total	439,768	441,417	441,417	441,417	441,417
Total	3,350,879	4,913,468	4,852,401	4,410,553	3,521,393

MTP 2006–2008: Project Impact Pathway

Project	Ecoregional Program: Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus
Goal	Improved food security, economic growth, environmental sustainability and poverty alleviation in the countries of Central Asia and the Caucasus (CAC)
Purpose	Sustainable increases in the productivity of cropping systems through the generation and transfer of appropriate production technologies, natural resource management practices and the conservation of genetic resources, and by strengthening national agricultural research systems in the CAC region.

	Outputs	Intended Users	Outcomes	Impact
OUTPUT 1	Germplasm for improved productivity and sustainability of key cereals and legumes that are important for food security (ICARDA, CIMMYT)			
Output Targets 2006	A total of at least 15 promising new varieties of facultative/winter wheat, barley, food and forage legumes submitted to State Varietal Testing Committees (SVTC) in CAC countries (ICARDA and CIMMYT) 20 lines of spring wheat selected for advanced yield testing in Northern Kazakhstan (CIMMYT)	National crop breeding and state varietal testing programs; national seed production programs Kazakh varietal testing program	Release of 3-4 improved varieties of facultative/winter wheat, barley, food and feed legumes following testing and seed multiplication by national programs Identification of lines for wider multilocational testing	Increased farm yields and production from new released varieties
Output Targets 2007	A total of at least 15 additional promising new varieties of facultative/winter wheat, barley, food and forage legumes submitted to State Varietal Testing Committees (SVTC) in CAC countries (ICARDA and CIMMYT).	National crop breeding and state varietal testing programs; national seed production programs	Release of 3-4 improved varieties of facultative/winter wheat, barley, food and feed legumes following testing and seed multiplication by national programs	Increased farm yields and production from newly released varieties
	5 lines of spring wheat selected for on-farm testing in Northern Kazakhstan (CIMMYT)	Kazakh varietal testing program		
Output Targets 2008	A total of at least 15 additional promising new varieties of facultative/winter wheat, barley, food and forage legumes submitted to State Varietal Testing Committees (SVTC) in CAC countries (ICARDA and CIMMYT)	National crop breeding and state varietal testing programs; national seed production programs	Release of 3-4 improved varieties of facultative/winter wheat, barley, food and feed legumes and seed multiplication by national programs	Increased farm yields and production from newly released varieties
	At least 1-2 promising varieties of spring wheat submitted to SVTC in Kazakhstan for evaluation (CIMMYT)	National crop breeding and State Varietal Testing programs	Release of improved varieties of spring wheat following testing by national programs	Increased farm yields and production from new released varieties

	Outputs	Intended Users	Outcomes	Impact
OUTPUT 2	Options for diversification of agricultural production systems (ICRISAT, CIP, IRRI, AVRDC)			
Output Targets 2006	Multilocation evaluation of the 6-8 selected improved groundnut varieties completed and 1 or 2 promising varieties identified (ICRISAT)	National crop improvement programs	Release of improved groundnut varieties following testing and seed multiplication by national programs	Increased area and production of groundnut in participating countries Increased farm incomes
	Bulletin on groundnut production practices printed in Russian and distributed (ICRISAT)	National extension agencies, training programs and farmers	National programs provide support to new groundnut producers	
	Around 500 new breeding lines of rice evaluated through INGER network (IRRI)	National crop improvement programs	Release of improved rice varieties following testing and seed multiplication by national programs	Increase in area sown to rice in participating countries Increased farm incomes
	Japonica breeding material supplied for testing (IRRI)	National crop improvement programs		
	Promising true potato seed (TPS) families for long days developed 5-10 CIP-derived clones identified and incorporated in local potato testing programs (CIP) First cycle of field clonal selection launched in Tajikistan and high-yielding families identified (CIP)	National crop improvement programs	National potato breeding and testing programs developed	Increase in area and production of rice in participating countries Increased farm incomes
	Cost-effective rapid seed multiplication techniques identified and methods for Colorado potato beetle control evaluated in Uzbekistan (CIP)	National seed production and certification agencies and plant protection programs	National seed production systems providing quality seed to farmers	Increased potato area and production; increased farm incomes
	A functional network on vegetable crops to evaluate new accessions (around 60) from AVRDC Gene Bank in 3-4 countries of the region and varietal trials established (AVRDC)	National crop improvement programs	National vegetable breeding and testing and quality seed production programs developed	Increase in area sown to traditional and non-traditional vegetable crops Increased production of vegetables Increased and diversified farm incomes
	Varietal trials of non-traditional vegetable crops (5-6) established and seed production of improved varieties undertaken (AVRDC)	National crop improvement and seed production programs		

	Outputs	Intended Users	Outcomes	Impact
Output Targets 2007	Farmer's participatory evaluation of 3-4 selected improved groundnut varieties completed, farmers' preferred varieties identified, and basic seed of those varieties increased for large scale commercial seed production (ICRISAT)	National crop improvement programs	Release of improved groundnut varieties following testing and seed multiplication by national programs	Increased area and production of groundnut in participating countries Increased farm incomes
	Booklet on groundnut recipes printed in Russian and made available to the general public	Rural and urban consumers in CAC countries	Expanded demand for groundnuts	Increased market opportunities for groundnut producers
	A new set of improved rice breeding materials evaluated through INGER network and japonica program in South Korea (IRRI)	National crop improvement programs	Release of improved rice varieties following testing and seed multiplication by national programs	Increased area and production of rice in participating countries Increased farm incomes
	Seedling tubers from TPS families adapted to long day conditions tested in at least two countries and multi-location trials to test CIP-derived potato clones supplied in-vitro undertaken (CIP) Second cycle of field clonal selection launched in Tajikistan and promising tuber families shared with other NARS (CIP) Role of positive and negative selection combined with disease-detection techniques understood (CIP) Methods for Colorado potato beetle control evaluated and documented (CIP)	National crop improvement programs National seed production and certification agencies and plant protection programs	National potato breeding and testing programs developed National seed production systems providing quality seed to farmers	Increased potato area and production Increased farm incomes
	At least 50-60 new accessions of vegetable crops supplied to 3-4 countries and varietal trials established (AVRDC) Crossing program for genetic improvement of tomato and cucumber launched and varietal trials of around 10 non-traditional vegetable crops undertaken and seed multiplication initiated (AVRDC)	National crop improvement programs	National vegetable breeding and testing and quality seed production programs developed	Increase in area sown to traditional and non-traditional vegetable crops Increased production of vegetables Increased and diversified farm incomes
Output Targets 2008	Newly identified/ released groundnut varieties promoted for large scale adoption and their seed multiplied (ICRISAT)	National crop improvement programs	Release of improved groundnut varieties following testing and seed multiplication by national programs	Increased area and production of groundnut and increased farm incomes

	Outputs	Intended Users	Outcomes	Impact
	Improved rice breeding materials tested through INGER and South Korean japonica material evaluated (IRRI)	National crop improvement programs	Release of improved rice varieties following testing and seed multiplication by national programs	Increased area and production of rice and increased farm incomes
	Varieties developed using <i>in-vitro</i> clones and TPS families provided (CIP) Tuber families multiplied in each location to provide sufficient seed for trials (CIP)	National crop improvement programs	National potato breeding and testing programs developed	Increased area and production of potato and increased farm incomes
	Network of public and private institutions established for multiplication and dissemination of good quality potato seeds in Georgia and Uzbekistan (CIP)	National seed production and certification agencies and plant protection programs	National seed production systems providing quality seed to farmers	Increased area and production of potato and increased farm incomes
	A new set of vegetable crops supplied to 3-4 countries of the region and varietal trials established (AVRDC) Hybrid trials of tomato and cucumber initiated and seed production of improved varieties of vegetable crops undertaken (AVRDC)	National crop improvement programs	National vegetable breeding and testing and quality seed production programs developed	Increased area and production of traditional and non-traditional vegetable crops, and increased and diversified farm incomes
OUTPUT 3	Integrated natural resource management practices, technologies and institutions for improved soil and water productivity (ICARDA, IWMI, CIMMYT)			
Output Targets 2006	Water Users Associations (WUA) and Canal Management Organizations (CMO) established and support system developed in the Fergana valley in Kyrgyzstan, Tajikistan and Uzbekistan (IWMI)	National research and water management programs; farming communities	Experience and knowledge of pilot WUA and CMO used by similar organizations in CAC Improved technologies are demonstrated to large number of farmers and widely used	Improved productivity; increased farmers' income; improved management and use of water resources in Central Asian countries
	Community-based demonstration sites for combating soil and water degradation in the Aral Sea basin established (IWMI & ICARDA)			

	Outputs	Intended Users	Outcomes	Impact
	25 farmers actively involved in participatory research on economically efficient conservation tillage practices and alternative crops and rotations in each of the six Central Asian countries (ICARDA)	National research and development programs; development projects; farmers	Participating farmers adopt technologies and sites used for wider demonstration. National R&D programs and development projects actively promote recommended technologies.	Improved soil management and improved productivity and production in cropping systems in target areas
	Recommendation domains (agroecological target areas) for improved on-farm water and soil fertility management practices identified, described and information disseminated Wide-scale on-farm testing and demonstration of technologies in partnership with development projects in the region (ICARDA)	National research and development programs; development projects	National R&D programs and development projects apply recommended technologies in identified target areas	Sustainable on-farm soil and water management in target areas in Central Asia Improved soil fertility, optimal water use, and improved productivity (per unit land and water) in cropping systems in target areas
	Farmers trained in water saving technologies, conservation tillage practices and crop diversification options within FAO TCP project site in the drought affected region of Karakalpakstan in Uzbekistan (ICARDA)	Farmers in project site	Farmers in project sites adopt recommended practices	Sustainable on-farm soil and water management, and improved productivity (per unit land and water) in cropping systems in Karakalpakstan, Uzbekistan
	Project wrap-up workshop for stakeholders and development agencies (ICARDA)	National R&D programs; development agencies	Recommended technologies applied in other areas	
	Conservation tillage practices applied in spring wheat based system in 6 sites in Northern Kazakhstan (CIMMYT)	National research and development programs	National R&D programs actively promoting conservation tillage for use by farmers	Improved soil structure and fertility, and improved productivity of wheat in target areas
	Bed planting technology for irrigated wheat production applied in two countries (CIMMYT)	National research and development programs	National R&D programs actively promoting bed planting for use by farmers	Improved soil and water management in target areas and improved productivity of wheat in target areas
Output Targets 2007	Mechanisms of support systems for CMOs/WUAs organized in the Fergana Valley in Kyrgyzstan, Tajikistan and Uzbekistan, and MIS used by CMOs/WUAs	CMOs and WUAs	WUAs and CMOs are fully functional and water allocation models are used by CMOs and WUAs	Sustainable and equitable community-based water management in the Fergana Valley

	Outputs	Intended Users	Outcomes	Impact
	Guidelines for implementation based on lessons of integrated water resource management published (IWMI) Analytical report on water laws of the countries shared with policy-makers (IWMI)	Local water management authorities; national R&D programs Policy-makers	Local authorities and national R&D programs establish further WUAs/CMOs Policy-makers modify water laws to support community-based water management where necessary	
	Best options for salinity management in Aral Sea basin evaluated and demonstrated to farmers (IWMI and ICARDA)	National R&D programs; farmers	Farmers in pilot sites adopt best practices. National R&D programs actively demonstrate and promote technologies for use by other farmers	Improved soil quality, crop productivity and farm incomes in Aral Sea basin
	Technical bulletins on "best bet" on-farm soil and water management practices developed and disseminated (ICARDA) Recommended technologies transferred to extension and consultative services for further dissemination (ICARDA)	National R&D programs	National R&D programs actively demonstrate and promote technologies for use by other farmers	Sustainable on-farm soil and water management, and improved cropping systems productivity (per unit land and water) in Central Asian countries
	Analysis of the potential effects of policy changes completed, appropriate policy options identified and workshop for policy-makers organized (ICARDA)	Policy-makers	Policy-makers adopt appropriate policy options that support farmers' adoption of improved soil and water management practices	Widespread adoption of sustainable on-farm soil and water management practices
	Conservation tillage practices applied in spring wheat based system in 4 additional sites in Northern Kazakhstan (CIMMYT) Bed planting technology for irrigated wheat production applied in one additional country (CIMMYT)	National R&D programs	National R&D programs actively promoting technologies for use by farmers	Improved soil and water management and improved productivity of wheat in target areas
Output Targets 2008	Recommended policy changes for introducing sustainable 'bright' spots in the Aral Sea basin conveyed to policy makers through roundtable discussions (IWMI/ICARDA)	Policy-makers	Policy-makers adopt appropriate policy options that support the development of 'bright spots' in the Aral Sea basin	Improved soil quality, crop productivity and farm incomes in Aral Sea basin

	Outputs	Intended Users	Outcomes	Impact
	<p>Cost-benefit analysis of the farming practices introduced in project sites in the Aral Sea basin completed (IWM/I CARDA)</p> <p>Analysis of market advantages and constraints for crops grown on salt-affected soils in project sites in the Aral Sea basin completed (IWM/I CARDA)</p> <p>Recommended 'bright spots' disseminated and transferred to other targeted areas in Aral Sea basin (IWM/I CARDA)</p>	<p>Farmers in project pilot sites</p> <p>National R&D programs</p>	<p>Farming communities in project pilot sites adopt project interventions</p> <p>National R&D programs actively disseminate and promote the project's recommendations in other sites in the Aral Sea basin</p>	
	<p>Conservation tillage practices applied in spring wheat based system at 5 additional sites in Northern Kazakhstan (CIMMYT)</p> <p>Bed planting technology of wheat production applied in at least 15 sites in the five Central Asian countries (CIMMYT)</p>	<p>National R&D programs</p>	<p>National R&D programs actively promoting technologies for use by farmers</p>	<p>Improved soil and water management and improved productivity of wheat in target areas</p>
OUTPUT 4	<p>Strengthened national plant genetic resources (PGR) programs (ICARDA, IPGRI, AVRDC)</p>			
Output Targets 2006	<p>Germplasm catalogues on melon and medicinal and aromatic plants completed and made available (IPGRI)</p>	<p>National PGR conservation programs</p>	<p>National PGR collections fully documented</p>	<p>The CAC region's PGR are conserved for future sustainable use</p>
	<p><i>Ex situ</i> conservation facilities for apple genetic resources upgraded to meet international standards for long-term conservation in two CAC countries (IPGRI)</p>		<p>Apple genetic resources are securely conserved in two CAC countries</p>	
	<p>At least one PGR university course, with curricula developed in Russian, and one PGR short course (IPGRI)</p>		<p>University graduates and trainees apply new skills in national PGR conservation programs</p>	

	Outputs	Intended Users	Outcomes	Impact
	Eco-geographic gaps in worldwide collections of field crop accessions from CAC identified and targeted collection missions to those areas undertaken (ICARDA) Trait specific representative subsets of accessions identified using ecogeographic data, and subsets screened for tolerance to limiting factors (ICARDA)	National and international PGR conservation programs	National <i>ex situ</i> collections of field crop PGR are augmented with new accessions, and safety duplicated at ICARDA Trait specific ecogeographic subsets are characterized and evaluated for future use	Increased genetic variability of field crops with desirable traits is available to crop improvement programs for future use
	Regional strategy for conservation and utilization of PGR for agriculture developed and made operational (ICARDA and IPGRI, with Global Crop Diversity Trust)	National PGR conservation programs	Agreed and operational regional strategy provides the basis for the Global Crop Diversity Trust to invest in upgrading PGR facilities in the region	Reduction in genetic erosion. Broadened genetic base for use by crop improvement programs.
Output Targets 2007	Methodology and procedures for use by national partners and farmers/communities for <i>in situ</i> /on-farm conservation of horticultural crops and their wild relatives (IPGRI)	National PGR conservation programs Farming communities	Wild relatives, landraces and species of horticultural and vegetable crops effectively conserved through <i>in situ</i> /on-farm methods	Reduction in genetic erosion. Returns to farming communities from <i>in situ</i> conservation (incentives, income from seed production, etc)
	Effective horticultural, medicinal and aromatic PGR documentation and information systems are available, disseminated and used by national programs (IPGRI)	National PGR conservation programs	National horticultural, medicinal and aromatic PGR collections are fully documented within a common system that facilitates access to and exchange of information	CAC PGR programs are integrated with international PGR programs
	Web-based regional database on field crop PGR completed and accessible on internet, and results of collection missions and screening of subsets published (ICARDA)	National PGR conservation programs	National field crop PGR collections are fully documented within a common system that facilitates access to and exchange of information	CAC PGR programs are integrated with international PGR programs
Output Targets 2008	Community-based PGR management system developed for fruit crops (IPGRI)	National PGR conservation programs	Community-based PGR management system for fruit trees established in two CAC countries	Reduction in genetic erosion. Communities benefit from fruit tree PGR management activities.

	Outputs	Intended Users	Outcomes	Impact
	Status of crop wild relatives assessed and action plans developed for their <i>in situ</i> conservation in two CAC countries (IPGRI)	National PGR conservation programs and decision-makers	Action plans implemented in target areas in two CAC countries	Reduction in genetic erosion. Crop wild relatives, adapted to local agroecological conditions and available for future crop improvement research
	Socio-economic aspects of <i>in situ</i> /on-farm conservation of PGR studied and results included in policy recommendations (IPGRI)	Policy-makers	Policy options adopted that encourage and enable rural communities to implement <i>in situ</i> conservation activities	Farming communities benefit from <i>in situ</i> conservation activities
OUTPUT 5	Institutional strengthening through capacity building of national agricultural research systems (NARS), including human resource development			
Output Targets 2006	<p>Regional meeting on yellow rust and Sunn pest management in wheat</p> <p>International MSc program in water and environmental research for Central Asia at Tashkent Institute of Irrigation and Melioration (TIIM): lectures delivered by IWMI staff and at least two students complete their MSc.</p> <p>Specialized training of national scientists:</p> <ul style="list-style-type: none"> – Designated personnel trained in methods of groundnut seed production and one lead scientist from each participating country trained in various aspects of groundnut research and production at ICRISAT – Training of young scientists in rice research and development (IRRI) – One scientist from each CAC country trained in potato virus detection techniques (CIP) – One specialist from each CAC country trained in primary seed production of vegetables (AVRDC) – At least 8 scientists from each of the Central Asian countries participate in individual and group training/ workshops in on-farm soil and water management (ICARDA) 	<p>National research programs</p> <p>University students and young scientists</p>	Trained national staff	Enhanced national and regional capacity for agricultural R & D

	Outputs	Intended Users	Outcomes	Impact
	<ul style="list-style-type: none"> – Training courses in documentation, gene bank management and plant collection techniques for CAC PGR units (ICARDA) – Regional conference on conservation and use of indigenous PGR organized for young scientists from CAC (IPGRI) – Regional and national workshops on participatory approach in PGR management with farmers' involvement (IPGRI) 			
Output Targets 2007	<p>Specialized training of national scientists:</p> <ul style="list-style-type: none"> – One each from Georgia and Uzbekistan trained in formal and informal seed systems (CIP) – Training of young scientists in rice research and development (IRRI) – One specialist from each CAC country trained in vegetable post-harvest technologies (AVRDC) – Graduate research in soil and water management completed in four countries (ICARDA) – Eight training courses/ workshops and two MSc research programs on combating soil and water degradation in the Aral Sea basin (IWMI/ICARDA) – Training courses in documentation, gene bank management and plant collection techniques for CAC PGR units (ICARDA) – Regional and national training centers on priority fruit crops established (IPGRI) – Training on use of molecular marker technology for PGR evaluation for two scientists (IPGRI) 	<p>National research programs</p> <p>University students and young scientists</p>	Trained national staff	Enhanced national and regional capacity for agricultural R & D

	Outputs	Intended Users	Outcomes	Impact
Output Targets 2008	<p>Regional level meeting for yellow rust and Sunn pest management in wheat (ICARDA)</p> <p>Specialized training of national scientists:</p> <ul style="list-style-type: none"> – Training of young scientists in rice research and development (IRRI) – One scientist from each CAC country trained in IPM techniques to control Colorado potato beetle (CIP) – One specialist from each CAC country trained in IPM of vegetable crops (AVRDC) – Training on use of molecular marker technology for PGR evaluation for two scientists from CAC (IPGRI). 	<p>National research programs</p> <p>University students and young scientists</p>	Trained national staff	Enhanced national and regional capacity for agricultural R & D
OUTPUT 6	Enhanced cooperation among agricultural research and educational institutions at the national and regional level and with other international organizations			
Output Targets 2006	<p>One regional planning and coordination/ steering committee meeting</p> <p>One regional conference, one regional training course and one regional traveling workshop</p> <p>Regional conferences, seminars, workshops and English training courses</p> <p>Knowledge of new technologies and varieties disseminated through publications, reports, quarterly CAC-newsletter and website</p> <p>Collaboration among NARS in CAC region strengthened through support to the Regional Forum – CACAARI</p>	National agricultural R&D programs and universities	<p>Regional exchange of information and results on agricultural R&D</p> <p>Integration of CAC national programs into international agricultural R&D community</p> <p>Regional and international partnerships in agricultural R&D</p>	Sustainable increases in agricultural productivity through the transfer of appropriate production technologies, natural resource management practices and the conservation of genetic resources
Output Targets 2007	<p>One regional planning and coordination/ steering committee meeting</p> <p>One regional conference, one regional training course and one regional traveling workshop</p> <p>Regional conferences, seminars, workshops and English training courses</p>	National agricultural R&D programs and universities	<p>Regional exchange of information and results on agricultural R&D</p> <p>Integration of CAC national programs into international agricultural R&D community</p>	Sustainable increases in agricultural productivity through the transfer of appropriate production technologies, natural resource management practices and the conservation of genetic resources

	Outputs	Intended Users	Outcomes	Impact
	<p>Knowledge of new technologies and varieties disseminated through publications, reports, quarterly CAC-newsletter and website</p> <p>Collaboration among NARS in CAC region strengthened through support to the Regional Forum – CACAARI</p>		<p>Regional and international partnerships in agricultural R&D</p>	
Output Targets 2008	<p>One regional planning and coordination/steering committee meeting</p> <p>One regional conference, one regional training course and one regional traveling workshop</p> <p>Regional conferences, seminars, workshops and English training courses</p> <p>Knowledge of new technologies and varieties disseminated through publications, reports, quarterly CAC-newsletter and website</p> <p>Collaboration among NARS in CAC region strengthened through support to the Regional Forum – CACAARI</p>	<p>National agricultural R&D programs and universities</p>	<p>Regional exchange of information and results on agricultural R&D</p> <p>Integration of CAC national programs into international agricultural R&D community</p> <p>Regional and international partnerships in agricultural R&D</p>	<p>Sustainable increases in agricultural productivity through the transfer of appropriate production technologies, natural resource management practices and the conservation of genetic resources,</p>