CGIAR COLLABORATIVE RESEARCH PROGRAM FOR CENTRAL ASIA AND THE CAUCASUS

Annual Report[1]

(2002-2003)

Raj Paroda
Head, CGIAR-PFU
Tashkent, Uzbekistan

1. BACKGROUND

The process of transition from formerly centrally planned economies into market economies has led to significant consequences in most of the countries of Central Asia and the Caucasus. While on one side, the importance of agriculture in the region increased through its share, on the other, the agricultural production dropped in the mid- 1990s. While it recovered in some countries, on an aggregate, agricultural, crop and livestock production indices are still ranging between 50-90% of the pre-independence base of 1989-91. As a result, GNI per capita has declined by an average of 25% between 1991 and 1997. Six of the CAC countries (Armenia, Azerbaijan, Georgia, Kyrgyzstan, Tajikistan and Uzbekistan) are now classified as low income countries, and GNI per capita for the CAC region as a whole is presently less than the overall average for the developing countries in the world[2]. Consequences of all these have led to increased poverty (25 to 40%) in the region.

Also since independence, the institutional and human resource base got depleted, for want of support for agricultural research for development, justifying thereby the need for major support for agricultural research partnership within the region with other NARS and with international organizations such as CGIAR. Accordingly, with an overall goal of the CGIAR program of providing food security, economic growth and poverty alleviation in the Central Asia and the Caucasus, nine CGIAR Centers started working jointly in the region, with ICARDA taking the lead in establishing the Consortium and providing the facilitation function through World Bank funded system wide program, in 1998 and later through other donor funded initiatives. In this report, major achievements of the CGIAR program for CAC are being highlighted, with emphasis on important accomplishments during the last one year:

1.1. PROGRAM ESTABLISHMENT

In February 1995, the Lucerne Declaration and Action Program emphasized the need for strengthening the linkages with research institutes in Central Asia, Russia and Eastern Europe to tap the enormous potential of these areas to contribute significantly to global food supply.

Late in 1995, a CGIAR Task Force on Central/Eastern Europe and the states of the Former Soviet Union was formed to identify the needs of agricultural research of these countries. A consultation meeting between the CGIAR Centers and Central Asia and the Caucasian NARS was organized by ICARDA in Tashkent, during September 1996. The consultation reinforced the need for collaboration in agricultural research. The Task Force recommended to the CGIAR to extend support for agricultural research and human resource development by expanding its geographic mandate to the CAC region. The CGIAR accordingly approved this recommendation at the International Centers Week (1996), and encouraged the CG Centers to develop partnerships with the NARS in CAC in their respective mandated areas of agricultural research. Accordingly, in October 1997, the nine CG Centers (CIMMYT, CIP, ICARDA, ICRISAT, IFPRI, ILRI, IPGRI, ISNAR and IWMI) agreed to form a Consortium with ICARDA being the lead Center. The main objective of the Consortium was to develop a strategy for inter-center partnership collaborative research with greater involvement of the national programs in the region. The Consortium eventually developed a *CGIAR Collaborative Research Program for CAC* in May, 1998 and the same was

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[2] According to latest figures available for 2001, average GNI per capita for CAC countries was US$ 605 compared with the average of US$ 1,160 for all developing countries (World Bank, 2003).

launched in September, 1998 with its approval by the Steering Committee in a meeting held in Tashkent, Uzbekistan. Also a Program Facilitation Unit (PFU) was established in the CACRP Office of ICARDA in Tashkent. PFU has since then been providing facilitation function for the inter-center and inter-NARS initiatives in the region. In 2002, the International Rice Research Institute (IRRI) joined the Consortium thus, becoming the tenth CG Center working in the region.

Presently, four CGIAR Centers, CIMMYT, ICARDA, IPGRI and IWMI, have their regional offices established in CAC which are facilitating a truly site specific approach involving the complexity and needed interactions with NARS partners involved in different research fields, particularly in natural resource management (NRM). Regional offices provide an appropriate arena to facilitate a dialogue between NARS, international scientists and local farmers whose traditional knowledge is also highly relevant and useful in addressing agriculture related problems, which are often site specific as well as complex.

For effective implementation, coordination and governance of the collaborative program, in consultation with all stakeholders a strategy was developed, which was evaluated by TAC in March, 2000 and approved by the CGIAR in May, 2000. The research activities implemented by Consortium Centers in close collaboration with NARSs based on this strategy were very successful and, as stated during the fourth and fifth Program Steering Committee meetings

The policy makers of the CAC region also recognized the value of the collaborative research and committed themselves to strengthening research for development and sustainable agriculture. Policy makers met with CG Centers and donor representatives in June 2001 in Issyk-kul, Kyrgyzstan and adopted the *Issyk-kul Declaration* in support of agricultural research for development, which desired all key partners in international agricultural research to play a proactive role in building the agricultural research system in the region. As a result of this, various national governments are now re-examining their research support strategy in the agricultural sector.

1.2 REGIONAL PRIORITIES IDENTIFIED

Since the establishment of the collaborative program, there have been extensive consultations between CG Centers and the NARS to identify and prioritize thematic research areas (for instance, germplasm improvement, soil and water management, livestock development, policy orientation, and NARS institutional strengthening). With the seed money provided by the CGIAR and additional funds raised by the participating centers, the program has made significant progress. Annual meetings have been held regularly between all participating CG Centers and NARS at which work plans are reviewed and adjusted according to re-assessed priorities.

In line with the bottom-up priority setting approach adopted by the CGIAR under “Plank 4” of the CGIAR’s vision and strategy, the CAC Regional Forum and ICARDA organized a brainstorming meeting with NARS leaders and representatives of concerned CG Centers and donors on 20 September, 2001 in Tashkent. According to the broad consensus, the following research priorities were identified:

- Productivity enhancement of crops and thrust on seed development, with major emphasis on cereals, legumes, oilseeds, fruits and vegetable crops. Breeding of high yielding varieties with resistance to diseases, pests, drought and salinity. Also search for genotypes that can withstand better the low input conditions.
- Soil and water management for sustainable agriculture, including thrust on nutrient and water use efficiency, on-farm water management, marginal water utilization, salinity, drainage, conservation tillage etc.
- Conservation of genetic resources (crops and livestock) in view of existing rich diversity in the region.
- Livestock improvement and management with emphasis on market oriented breed improvement, health, feed management and rangeland resources.
- Crop diversification, with greater emphasis on incorporation of legumes in cropping systems for long-term sustainability, for better income generation and for household nutrition security.
- Post-harvest management, storage and value addition of crops, livestock, fruit and vegetable products that can help small and marginal farmers in rural areas.

- Socio-economic and policy research for infrastructure development, economic feasibility of technologies, resource evaluation, marketing, finance, and policy interventions for required adjustments in market economy.
- Strengthening of NARS and human resource development, with greater emphasis on training, including language training.

The partners also recognized that to achieve these objectives, multi-disciplinary, inter-institutional participatory research with a community-based approach would be needed.

In order to revisit earlier priority-setting efforts, a CWANA Regional Meeting on Agricultural Research Priority Setting was held on 8-10 May, 2002 at ICARDA headquarters in Aleppo. The priorities identified for the CAC region were as follows:

	Germplasm Management	NRM	Socio-economics	Cross-cutting issues
Priority 1	Germplasm Improvement and Biotechnology GR conservation	Water Soils Range	Marketing/ commerce and trade Post harvest technologies Gender	HRD Capacity building ICT
Priority 2	Seed production Diversification	Biodiversity	Technology dissemination Quality and value addition Institutional policies	Intellectual property rights Crisis and risk management
Priority 3	IPM	ICM	Impact assessment	Bio-safety and quarantine Indigenous knowledge

During the five years of joint activities in the region, the bottom-up approach and partnership philosophy, which are the key components of the CAC Consortium, allowed achieving considerable success in collaborative research, national research organization and management, human resource development and in the development of research networks. Collaborative research included joint activities in varietal improvement, seed production, on-farm water use efficiency, new agronomic practices, feed and livestock management, genetic resource conservation and strengthening of NARS. This report contains a brief summary of various activities carried out in the region by the Consortium partners during the year 2002-2003.

2. GERMPLASM ENHANCEMENT

In the past, the CAC countries were essentially a specialized commodity-producing region importing inputs from other places and exporting its produce elsewhere. In Uzbekistan, Turkmenistan and Azerbaijan, cotton was a major crop, whereas in Georgia, Armenia, and Tajikistan, fruits and vegetable crops were dominant. Wheat was mainly grown in Kazakhstan. At present, given the pressing need to meet domestic food demands, national policies tend towards promoting food security, both through increased production and diversification of the crops produced. Major constraints to improving crop production are the lack of improved high yielding varieties and poor access to germplasm. Research activities on germplasm enhancement have focused on testing different crop varieties to identify promising breeding material with resistance genes for both biotic and abiotic stresses.

- Annually, about 4200-4500 entries from 80 different nurseries of cereals, legumes, groundnut and potato supplied by ICARDA, CIMMYT, ICRISAT and CIP are tested in CAC region. Practically in all the eight CAC countries, the new promising breeding material has been identified, which is being used now either for improvement of the local germplasm or for direct selection as varieties and for multiplication and introduction on farmers' fields.
- For crop diversification in Central Asia and the Caucasus countries, the important role of legumes is being increasingly felt since testing of chickpea, lentil, vetch, groundnut, etc. started under the program. Collaboration during last 4-5 years has resulted in identification of

some promising breeding material, which has been taken for seed multiplication and for on-farm trials and demonstrations.

- ICRISAT tested groundnut varieties in six countries of the region and found several promising lines that significantly outyielded the local checks. Based on these results, a project proposal on groundnut production was developed and submitted to the EU for funding. CIP provided potato germplasm for testing in the Caucasus and found that new varieties tested were promising over the local checks. More potato germplasm is being distributed in Central Asia for testing in the current spring season.

In summary, during the last four years of collaborative research, six promising varieties of winter wheat (2), winter barley (1), spring barley (1), chickpea (1), and lentil (1) have already been released in the region based on their superior performance. These varieties have recorded consistently 30 – 40 % higher yield with superior cold tolerance and disease resistance over the local checks. In addition, more than 38 varieties of different crops are presently being tested in the State Varietal Trials, and are awaiting decisions for their release and wide scale adoption.

2.1 WHEAT VARIETAL IMPROVEMENT

In all, 1420 entries of wheat were tested in CAC region in 2002, consisting of 418 entries of durum wheat, 702 of bread wheat and 300 entries of facultative wheat.

- **Winter wheat:**

- During the last one decade, the area under cereals, especially bread wheat, has significantly increased (almost 3.0 million ha) in the CAC countries. In view of the increasing emphasis on cereal crops for attaining food security in the region, wheat breeders from Turkey, CIMMYT and ICARDA in partnership with concerned national breeders have identified the promising varieties of winter wheat that are most suited to the specific conditions of the region. These are:

Country	Line	Status	Year of submission
Armenia	ATGF-1, ATGF-2, ATGF-3, ATGF-5	Submitted to SVTC*	2002
Azerbaijan	Azamely-95 Gobustan, Nurlu-99	Submitted to SVTC Submitted to SVTC	2000 2001
Georgia	DGDAS94 Mtshetskaya-1	Submitted to SVTC Released	1999 2002
Kazakhstan	Egemen Akdan	Submitted to SVTC Submitted to SVTC	2001 2002
Kyrgyzstan	Jamin Keremet, Zagadka, Zubkov, Azibrosh, Aychurek, Cholpon, Kauz	Submitted to SVTC Submitted to SVTC Submitted to SVTC Submitted to SVTC	2001 2001 2002 2002
Tajikistan	Kauz Tacica, Norman-37 Alex, Ormon	Submitted to SVTC Submitted to SVTC Submitted to SVTC	1999 2000 2002
Turkmenistan	Bitarap, Guncha, Garagum	Submitted to SVTC	2000
Uzbekistan	Dostlik Rabat, Favat, Greacum	Released Submitted to SVTC	2002 2002

All these new varieties have demonstrated a yield advantage of 5-20% over the best local check and possess resistance to major diseases, especially the yellow rust.

On-farm testing

- Large scale on-farm promotion of new varieties and technologies was jointly supported and conducted in each of the countries. These were:
  Armenia: in cooperation with the State Variety Testing Commission and Armenian Technology Group (USA NGO).
  Azerbaijan: in cooperation with Azeri ARI and Tovuz-Baltya (private seed company).
  Georgia: in cooperation with the State Variety Testing Commission.
  Kazakhstan: as a part of GTZ-CIMMYT project.

Kyrgyzstan: in cooperation with Kyrgyz ARI and several externally funded projects (WB, TACIS, DFID).
Tajikistan: as a part of GTZ-CIMMYT project and in cooperation with the Soil Research Institute.
Turkmenistan: in cooperation with the Turkmen Research Institute of Agriculture and Water Resources.
Uzbekistan: as a part of GTZ-CIMMYT project, and ICARDA support for seed development.

The on-farm testing and seed development programs so undertaken provided either higher yield or considerable savings on inputs and labor.

Raised bed planting technology for winter wheat

- The on-station and on-farm trials with raised bed planting technology on winter wheat continued in Kazakhstan, Kyrgyzstan and Uzbekistan in 2002 at seven locations. The yield advantage was 20-40% compared to flat planting with substantial savings through reduced seed rates. Six bed planters were purchased by CIMMYT from Turkey for testing and possible duplication in the region.

Knowledge dissemination and capacity building

- In order to have a coordinated and systematic approach for wheat research in Uzbekistan, for the first time a workshop on "Strengthening wheat research program in Uzbekistan" was organized jointly by ICARDA and CIMMYT with support of GTZ in September, 2002 in Tashkent. The workshop was attended by 60 participants, including the representatives of the Presidential Office, the Uzbek Scientific Production Center for Agriculture (UzSPCA), the Center for Science and Technology (CST), the Tashkent State Agrarian University (TSAU) and the scientists and breeders from all the concerned research institutes of Uzbekistan. As a result, a Coordination Committee was constituted and for the first time the national level winter wheat trials were planned for testing under varying agro-climatic conditions.
- In May, 2003, ICARDA in collaboration with the Ministry of Agriculture and Water Resources of Uzbekistan organized a traveling workshop on "Establishing demonstration trials under on-farm conditions". In all, 51 participants of the workshop jointly visited the demonstration sites in Tashkent, Syrdarya, Jizzak and Samarkand provinces to see the performance of the new promising winter wheat varieties sown at 16 locations in Uzbekistan. They jointly identified four promising entries ( ), which could be entered into final testing by SVTC. Similar traveling workshop, involving 60 participants, was also conducted in May, 2003 in Akhal province of Turkmenistan by CIMMYT in collaboration with the Ministry of Agriculture.
- An Information Bureau "Seed" established through the GTZ-CIMMYT project, allowed publication of regional bulletins, newsletters and several important books. Also, a web-site was established to facilitate an access to the latest information about the project.

➢ **Winter triticale:**

- The grain yield of CIMMYT triticale lines by far exceeded all the wheat varieties and lines in the irrigated environment. Experiment with triticale green forage has shown that its biomass yield during winter is much higher as compared to that of barley. The varieties that have shown good performance are:

  Azerbaijan: Shirvan
  Uzbekistan: Farhad, Norman.

➢ **Spring wheat**

The Kazakhstan-Siberia Network on Spring Wheat Improvement (KASIB), supported by CIMMYT, involving 15 breeding institutions from Northern Kazakhstan and Siberia has achieved promising results:

- In 2002, the annual network workshop took place in Omsk, Siberia with participation of 30 people.
- In 2002, the structured exchange of the shuttle germplasm started in the region and three Kazakhstan Shuttle Breeding Nurseries (KSBN) were established.

Shuttle breeding program also got initiated between Kazakhstan and Mexico to combine drought tolerance, disease resistance and superior bread-making quality.

Under the FAO – Kazakhstan – CIMMYT project to promote conservation tillage in Northern Kazakhstan, following achievements were made:

- The experiments on zero tillage started in 2001 in Shortandy and Karagandy to look at practical aspects, continued in 2002. The experiments concentrated on fallow management practices, green manure options, nitrogen response under no-till scenario, and herbicide options. The results of two-year experiments clearly demonstrated significant advantage of conservation agriculture technologies for wheat production in Northern Kazakhstan.
- Four fully privatized farms in Akmola and Northern Kazakhstan provinces have been identified as project pilot sites with 400 ha specifically earmarked for testing and demonstration of conservation tillage practices during 2003.

First Central Asian Wheat Conference

The preparatory work for the 1st Central Asian Wheat Conference to be held from 10 – 14 June, 2003 in Almaty, Kazakhstan is almost complete. The conference supported by the Government of the Republic of Kazakhstan, CIMMYT, ICARDA, GTZ, Washington State University, USAID, Winrock International, FAO, and GFAR will be a major regional event during 2003 to bring together wheat scientists from the region as well as from the global scientific community to address the most relevant issues of wheat production in for Central Asia. About 200 scientists from the region will be participating, mostly supported by the Organizing Committee of the Conference. The decision to organize this Conference was taken jointly by CIMMYT and ICARDA during the last Steering Committee Meeting of this Consortium in Tashkent in June, 2002.

2.2 BARLEY VARIETAL IMPROVEMENT

After wheat, barley is the second most important grain crop in the CAC region. During FSU (Former Soviet Union), around 7.0 million ha were sown to barley in Kazakhstan. Presently, barley is grown in Kazakhstan on an area of about 1.75 million ha. Usually, barley yields are, on an average, about 10-15% higher than wheat under rainfed conditions.

In all, during the year under report, 1166 breeding lines of barley were distributed by ICARDA and 470 entries by ICARDA/CIMMYT.

The main problems in barley are diseases, insects, weeds, drought and high temperature during grain filling stage, cold in winter, and high soil salinity. The following promising barley varieties have been identified:

- **Winter barley:**

  Adel (submitted for SVTC in Kyrgyzstan in 2001: for rainfed conditions, very early variety, promising for malting, average yield gain 28%, potential productivity 6.0 t/ha).
  Bakharly (Rihane-03) (submitted for SVTC in Azerbaijan in 2001: for semi arid and irrigated conditions, average yield gain 18%, potential productivity 6.0 t/ha).
  Ortai- 111 (Southern Kazakhstan: for rainfed conditions, good resistance to diseases, pests and logging, cold tolerant with large seed size, average yield gain 22.4%, potential yield 5.6 t/ha).
  Aziret- 114 (Southern Kazakhstan: for rainfed conditions, average yield gain 22%, potential yield 5.42 t/ha).
  Sultan -118 (Southern Kazakhstan: for rainfed conditions, average yield gain 20%, potential yield 5.1 t/ha).
  Sonata (Turkmenistan: for irrigated conditions, average yield gain 18.3%, potential yield 4.45 t/ha).
  Alpha/Dura (Turkmenistan: for irrigated conditions, average yield gain 19.1%, potential yield 4.6 t/ha).
  Lignee -131 (Turkmenistan: for irrigated conditions, average yield gain 19.8%, potential yield 4.8 t/ha).
  Arisona (Uzbekistan: for rainfed conditions, average yield gain 85%, potential yield 1.89 t/ha).
  Arar/Lignee -527 (Uzbekistan: for rainfed conditions, average yield gain 80%1.8 t/ha
  Omega (Uzbekistan: for irrigated conditions, average yield gain 22.7%, potential yield 5.3 t/ha).
  73TH (Uzbekistan: for irrigated conditions average yield gain 25.9%, potential yield 6.0 t/ha).
  Wieselbuger (Uzbekistan: for irrigated conditions average yield gain 21.6%, potential yield 5.0 t/ha).

- **Spring barley:**

  Mamluk (released in Armenia in 2000: for rainfed conditions and supplementary irrigation, average yield gain 29%, potential productivity 5.0 t/ha).
  Batyr -1 and **Batyr-2** (submitted for SVTC in Kazakhstan in 2002: for rainfed conditions, average yield gain 25%)
  Birlik -1 (identified in Kazakhstan in 2002: for rainfed conditions, out yielded the standard check by 50%).

2.3 LEGUME VARIETAL IMPROVEMENT

In view of monoculture practice being dominant in the region, many crops including food legumes remained "neglected crops" and received little attention despite their importance for nutritional security and sustainability of production systems. On the contrary, food and forage legumes have great potential and importance in the farming systems in Central Asia and the Caucasus, especially in Uzbekistan, Kazakhstan, and Azerbaijan. Under the program, ICARDA laid emphasis on food and forage legume testing and identified several new promising lines for large scale state varietal testing and release.

- **Food legumes:**

In 2002, a large number of international nurseries have been tested in Central Asia and the Caucasus countries: chickpea-4 nurseries, 188 entries, lentil-4 nurseries, 96 entries, vetch-2 nurseries, 32 entries, faba bean-1 nursery, 8 entries and lathyrus-1 nursery, 16 entries.

The most promising varieties of chickpea and lentil identified under the program are:

- *Chickpea:*
  Narmin (submitted to SVTC in Azerbaijan in 2001: for rainfed conditions, large seed with good feeding quality, average yield gain 19%, potential productivity 3.0 t/ha).
  Elixir (released in Georgia in 2000: for rainfed and semi irrigated conditions, average yield gain 22%, potential productivity 3.5 t/ha).
  ICARDA-1 (submitted to SVTC in Kazakhstan in 2001: for rainfed conditions, large seed with high feeding quality, average yield gain 18%, potential productivity 2.5 t/ha).
  FLIP 88-85 (to be submitted to SVTC in Uzbekistan in 2003: for rainfed conditions, average yield gain 20%, potential productivity 1.4 t/ha)
  FLIP 93-93 (to be submitted to SVTC in Uzbekistan in 2003: average yield gain 20%, potential productivity 1.4 t/ha)

- *Lentil:*
  Pablo (released in Georgia: for rainfed conditions, large seed, average yield gain 15%, potential productivity 2.0 t/ha).
  Altun dan (submitted to SVTC in Uzbekistan in 2003: for rainfed conditions, potential productivity 1.2 t/ha)

In Georgia, during the year under report, area sown to released varieties of chickpea and lentil has considerably increased. Standard variety of chickpea has been replaced by Elixir on an area of about 7 thousand hectares, whereas cropping area under lentil variety Pablo has also grown to approximately 3 thousand hectares. Promising chickpea variety ICARDA-1 has become rather popular among farmers of northern Kazakhstan and there is already considerable interest to introduce this variety in the eastern provinces of the country. It is estimated that chickpea variety ICARDA-1 may possibly occupy around 1.5 million hectares in Kazakhstan. In Uzbekistan, where chickpea had been traditionally grown, improved varieties FLIP 88-85 and FLIP 93-93 may possibly replace the traditional varieties on about 60 thousand hectares.

- **Forage legumes:**

Forage legumes, such as vetches and lathyrus were screened for drought in Uzbekistan. In Azerbaijan, four promising lines of lathyrus were selected from ILATLS nurseries. One of them, ACC/SEL 273/481, demonstrated good adaptability and gave good yields during the last 2 years. In 2003, 20 kg of seeds of ACC/SEL 273/481 were planted for on-farm trials and field demonstration nursery. Turkmen breeders identified three promising lines of vetch, IFVN-556SEL2376, IFVN-563SEL 2471 and IFVS-2006SEL2757, one promising line of lathyrus, IFLS-19SEL444, and one line of faba bean, ILB-1266. In Tajikistan, one promising line of vetch, IFVN-561SEL2469, yielding, on an average, 3.3 t/ha, was selected in 2002. In Uzbekistan, four lines of vetch L-628, L-1004, L-694/1, L-651/2 were identified as promising

for seed multiplication and the large scale trials. Also, based on the results of the last four years, two promising lines of lathyrus, IFVN-560 and IFVN-562, were identified in Uzbekistan and will be submitted for SVTC in 2003. In Kazakhstan, new promising lines of forage legumes have been identified and multiplied for large scale testing. The ICARDA line IFLS 225 Sel 554 performed well during last 3 years and gave 16% higher yield. This line under the name **Ali-Bar** has been submitted for official state yield trials in Southern and Central Kazakhstan in 2001.

2.4 GROUNDNUT VARIETAL IMPROVEMENT

ICRISAT continued its support to groundnut improvement in the region. In addition, germplasm of sorghum was also provided for testing in 2003.

- During the year under report, ICRISAT supplied new materials to Azerbaijan (6 short-duration, 4 medium-duration, 3 confectionery, 3 foliar diseases resistant, and 2 drought tolerant advanced breeding lines), Kyrgyzstan (4 short-duration advanced breeding lines and one set of the IX International Short-duration Groundnut Varietal trial), and Uzbekistan (ICGV # 95290, 95322, and 94088, and 17 high oil content and 20 short-duration, large-seeded advanced breeding lines, and one set of the IX International Short-duration Groundnut Varietal trial).
- From earlier materials supplied by ICRISAT, several promising varieties in different maturity groups with specific traits have been identified in Georgia (ICGV # 95245, 95271, 95290, 95299, 95319, 93115, 93139, 93143, 94042, 94046, 95163, 95165, 95172, 96084, and 96100), Tajikistan (ICGV # 95302, 95248, 94357, 94350, 94299, 95245, 94040, 94007, 94062, 96066, 96100, 96110, and 96234), and Uzbekistan (ICGV # 86158, 86590, 87141, 87165, 86105, 87187, 86156, 87141, 91123, 93370, 93382, 83382, 86011, 86325, 87128, 92217, 92222, 93392, 86590, 92206, 86156, 87123, and 87187.
- In Uzbekistan, a short-duration breeding line ICGV 86155 was named as 'Salomat' and a medium-duration breeding line ICGV 94088 as 'Mumtoz' and these were recommended to the State Varietal Testing in 2002. Two other breeding lines, ICGV 86105 and ICGV 87187, were found suitable for planting after wheat in southern Uzbekistan.
- For the first time six sorghum genotypes from ICRISAT were also introduced into Kyrgyzstan and Uzbekistan and four short-duration pigeonpea genotypes into Kyrgyzstan for crop diversification.

Knowledge dissemination and capacity building

- Till date, seven scientists (one each from Armenia, Azerbaijan, Georgia, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) have received training in groundnut breeding and production technologies at ICRISAT, Patancheru, India. They got 'hands-on' experience in hybridization, handling of segregating populations, selection in breeding populations, conduction of multilocation trials, seed production, general agronomy, and plant protection against diseases and insect pests.
- ICRISAT also supplied scientific literature to groundnut scientists in the region and to PFU-CAC, Tashkent.
- An in-country field workshop on "Breeding and seed production of field crops" was held at the Mtskheta breeding station in Georgia on 29 June, 2002. The workshop involved 56 participants, including the representatives from the Ministry of Agriculture and the Academy of Agricultural Sciences of Georgia as well from a German company "Elcana".

2.5 MAIZE VARIETAL IMPROVEMENT

Since 2000, CIMMYT has also been working on maize improvement in CAC region. In 2002, 150 open-pollinated early maturing varieties and hybrids, including also the quality protein maize (QPM) were sent for distribution in the region. Also seven international trials: 1) CHTSW (subtropical white hybrid trial); 2) CHTSY (subtropical yellow hybrid trial); 3) CHTSEW (subtropical early white hybrid trial); 4) CHTSEY (subtropical early yellow hybrid trial); 5) EVT 16A (experimental variety trial); 6) EVT16B (experimental variety trial); 7) EVT 16EWY (experimental early varieties trial), were evaluated in the conditions of Central Asia (Kazakhstan – 3 locations, Kyrgyzstan – 1 location, Tajikistan – 1 location, Turkmenistan - 1 location, Uzbekistan – 2 locations).

In general, the CIMMYT`s genotypes were found late-maturing under Central Asian conditions. The CIMMYT`s maize was found suitable for subtropical high rainfall zones of Georgia and Azerbaijan. The promising maize lines are being used in the breeding programs.

2.6 IRRI SUPPORT ON RICE

Although the current area under rice production is relatively small in the CAC region, rice is an important food crop after wheat and there exists an immense potential for improving its productivity. In 2002, major constraints to rice production as well as priorities in the area of rice research were identified by the senior scientists from IRRI during their visit to Uzbekistan, Kazakhstan and Tajikistan. Based on common constraints identified, priorities are now given to germplasm improvement with emphasis on cold and salinity tolerance and early maturity, capacity building and crop management.

- In 2002, about 510 inbred lines were sent from IRRI to the Uzbek Rice Research Institute for evaluation under local conditions. Also, another set of seven hybrids and one inbred line were distributed in Kazakhstan, Turkmenistan, and Uzbekistan. These hybrids were found to be late maturing under Tashkent conditions.
- Part of the seeds received earlier by the Uzbek Rice Research Institute from IRRI (about 200 inbred lines), were supplied to Turkmenistan along with some Uzbek varieties of rice.

Knowledge dissemination and capacity building

- IRRI supported three participants from the region (two from Uzbekistan and one from Kazakhstan) to attend the International Rice Congress in China, held in September, 2002.
- A training course on “Modern rice technologies” is to be held in Tashkent during 2003. Three scientists from IRRI will be involved in this training course and also will carry a short-term assessment of technology needs.
- One computer and one digital camera were supplied to the Uzbek Rice Research Institute by IRRI.
- PFU supported one scientist for international travel to participate in “Hybrid Rice” training at Changsho, organized by the Government of China.

2.7 SEED PRODUCTION

Quality seeds of high-yielding varieties are critical for their further dissemination. Hence, emphasis was laid on seed development activities in the region. On-farm trials and demonstration plots turned out to be the most popular and important activities for increased agricultural production. The local scientists and farmers are also very keen in testing and selecting new varieties. To have an impact on farmers’ fields and for wide spread of promising varieties, efforts have been directed towards large scale seed production in collaboration with NARS. Some examples had been:

- Wide scale promotion of on-farm trails and field demonstrations for evaluation and seed multiplication of new varieties on farmers’ fields was introduced jointly with NARS and CIMMYT in Azerbaijan (3 locations), Tajikistan (4 locations), Turkmenistan (2 locations) and Uzbekistan (16 locations). These initiatives attracted attention of administrative authorities and also received very positive response from the farmers.
- ICARDA supported Karnapshyl farm located in Samarkand province of Uzbekistan in seed multiplication of drought tolerant barley variety Kyzylkurgan (200 kg) and durum wheat variety Makkyz (200 kg).
- About 1.5 ton of winter barley variety Bakharly was produced in Azerbaijan.
- Twenty two tons of winter wheat variety Mtskhetskaya 1, about 1.7 ton of chickpea variety Elixir and 700 kg of lentil variety Pablo were produced in Georgia.
- In Kazakhstan, at the Krasny Vodopad station, 200 kg of each of the new winter barley varieties, namely Ortai-111, Aziret-114 and Sultan-118, were produced. Also, 400 kg of new spring barley variety Birlik-1 were produced in Shortandy and this seed will be further multiplied this year.
- About 80 kg of new chickpea variety ICARDA-1 and 40 kg of Lathyrus variety Ali-bar were produced in Almalybar.
- In Kyrgyzstan, as many as 1.2 ton of winter wheat variety Jamin and 400 kg of winter barley variety Adel were produced.

- In Turkmenistan, 10 tons of winter wheat variety Bitarap, 9.5 tons of winter wheat variety Garagum and 4.2 tons of Guncha were produced.
- About 400 kg of new winter barley variety Pallidum 2002 and 120 kg of new lentil variety Altyn dan were produced in Uzbekistan. Also, approximately 120 kg of each of the new chickpea varieties, FLIP 88-85 and FLIP 93-93, were produced.

Joint FAO-ICARDA mission on seed production

A joint FAO-ICARDA mission visited Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan in January – February, 2003 to assess the efficiency of seed supply, seed distribution and marketing systems. According to their assessment, there is greater need for regional collaboration in the seed development issues, not only among the countries of the region but also with the specialists from the developed seed systems outside Central Asia and from the international regulatory bodies. The FAO-ICARDA team proposed an Action Plan to address three main objectives: (i) reformation of governmental seed sector support programs, including the seed regulatory framework; (ii) improvement of local seed production systems; (iii) development of regionally competitive seed industries with effective links to the international seed industries. To explore the issues and opportunities of seed production in CAC and to introduce successful seed system management, the team has proposed to FAO to organize a Regional Seed Conference in June, 2004.

Seed policy harmonization

ICARDA initiated a process of harmonization in the area of seed regulation and policy through a workshop held in Iran on "Review of National Seed Systems and Regulations in Central and West Asia" in 2002. The harmonization initiative was approved by the workshop participants and now NARS are conducting an in-depth review of their seed policies at the national level. It is anticipated that the proposed initiative on seed policy harmonization will help develop seed sector in the region and will enable the NARS to have systematic and simplified procedures in future.

2.8 INTEGRATED DISEASE AND PEST MANAGEMENT

Activities on integrated pest and disease management are an important part of germplasm improvement. Several surveys have been carried out by the scientists of CIMMYT and ICARDA in collaboration with specialists from USA, Canada, and Australia to study the overall situation in the CAC countries and develop appropriate mechanisms and recommendations for controlling the most severe cereal disease – yellow rust. The main achievements had been:

- Strengthening of the regional Wheat Yellow Rust Network to unite efforts of national breeders, pathologists and geneticists with the aim to facilitate developing resistant wheat varieties, establishment and distribution of resistant germplasm (Gene Pool) and the distribution of Yellow Rust Trap Nursery (CWAYRTN) to NARS.
- The yellow rust work started in spring 2000 (Kazakhstan, Uzbekistan and CIMMYT), is aimed at enhancement of resistance through targeted crosses, and an understanding of the genetics of resistance and pathogen populations. More than 200 crosses were made and advanced to F_2. Multilocational data on YR reaction were also collected.
- Extensive survey on cereal diseases and identification of physiological races in Azerbaijan, Kyrgyzstan, Tajikistan, and Uzbekistan. Data for mapping the distribution frequency of new races. Identification of effective resistance genes to yellow rust for Azerbaijan, Kyrgyzstan, Tajikistan, and Uzbekistan in 1999-2000: Yr 5, Yr 15, Yr 18, Yr Sp, Yr Sk and sharing information for selection of new sources of resistance. Defeated Resistance Genes in CAC, 1999-2000: Yr1, Yr2, Yr 9, Yr 11, Yr 6, Yr 7, Yr 8, Yr A, Yr17, Yr24, Yr 26. Recommendation has been made for replacement of varieties susceptible to yellow rust with resistant ones, and applications of fungicides for leaf protection of susceptible varieties have been made.
- The leaf rust epidemic in some areas of Northern Kazakhstan in 2000-03 allowed identification of effective Lr genes and sources of resistance through the special nursery obtained from CIMMYT and distributed by the Kazakhstan Center for Grain Farming.

Considerable areas of cereal crops in Central Asia and the Caucasus are annually affected by the most pestiferous insect – Sunn Pest decreasing yields and spoiling wheat grain quality, and also the cereals leaf beetle. In this context, main achievements had been:

- Regular field survey on insect pests of wheat and barley. Identification of sources of resistance to major insects: Russian wheat aphid, sunny bug, Hessian fly, cereal leaf beetle (new), wheat stem sawfly. Establishment of resistant germplasm (Gene Pool) and distribution to NARS nurseries for tolerance/resistance to insects. Developing by ICARDA entomologists together with professors from University of Vermont, USA a biological method of wheat control against Sunn Pest with the use of insect-killing fungi collected from the affected insects. New strains of fungi have been identified with almost 90-100% of effectiveness.
- To screen the global barley germplasm on resistance to the insect, a total 413 barley entries have been selected by ICARDA scientists for evaluation in Kyrgyz Research Institute of Agriculture and Galla-Aral Branch of Andijan Research Institute of Grain, Uzbekistan.

2.9 CROP DIVERSIFICATION

With the current land reforms and the emergence of small farm units, the role of alternative crops in a predominant system of monoculture becomes very important. Introduction of alternative crops will support the diversification of agricultural production and help ensure the viability of smallholder mixed farming. Several potential alternative crops have already been identified, such as chickpea, lentil, buckwheat, field peas, sunflower and safflower on dryland and mung bean, soybean, common bean, sugar beet and maize under irrigated conditions. Also the current prices are more profitable than wheat and, therefore, have potential for wide-scale adoption.

Similarly, diversification would demand changing existing food habits. Food legumes have already been found a good meat replacement for poor people in Georgia, Uzbekistan and Tajikistan. On the other hand, food legumes could also be exported to countries with good markets within and outside the region. Crop diversification might help reducing barren fallow area contributing to the cause of conservation agriculture.

In northern Kazakhstan, where continuous growing of spring wheat rotated with summer fallow is a generally adopted practice, the introduction of alternative crops into crop rotations proved to be very promising for more sustainable farming. During the three years of joint ICARDA research activities with a Research Center of Grain Farming within the framework of the ADB-funded project on 'On farm soil and water management for sustainable agricultural systems in Central Asia', food legumes such as chickpea, lentil and dry pea gave slightly lower yields (60-70%) to those of wheat while market prices for the legume crops were two-three times higher. In addition, the introduction of food legumes into crop rotations dominated by cereals could improve some aspects of soil fertility. Other alternative crops for diversification are buckwheat and oat. Alternative crops might be used as replacement of summer fallow in some cases when appropriate soil management and fertilization practices are applied.

In dryland conditions of southern Kazakhstan and Kyrgyzstan, safflower has been found to be the most reliable crop for crop diversification in small farm conditions. The area under this crop in Kazakhstan increased up to 70,000 ha in 2002 and there are prospects for further increase in 2003. In foothill zone with more reliable rainfall at Krasniy Vodopad station, chickpea was found to be a profitable crop and also a good preceding crop for winter wheat.

Sugar beet and maize followed by food legumes were also identified as economical crops for irrigated conditions and field pea on dryland in Kyrgyzstan. This is in contrast with common cropping practices in which the major crop in the region is winter wheat. Most fast adoption had been of common bean, which was not grown before.

In wheat and cotton based monocropping systems, there are opportunities to introduce food legumes as double crops and forages for growing in winter period. In Tajikistan, promising crops for double cropping after the winter wheat are cotton, rice and buckwheat, in Uzbekistan mungbean, soybean, common bean, maize and also cotton in the south. Two crops in a year using rotation cotton-wheat seem to be promising alternative to one crop in a year practice in southern parts of Central Asia. Area under double cropping has been increasing covering several thousand hectares in each country. Major limitation for wider adoption is agricultural policies in countries with long vegetation period encouraging more single crop practices.

There are many useful crops, which now need proper attention both for research and production, such as, potato, soybean, cowpea, rice, maize, safflower, sunflower, rapeseed, berseem and alfalfa. In this context, new germplasm has been arranged from different countries and international centers. Through the efforts of the CGIAR-PFU, seeds of new crops such as cowpea, Urd bean, mungbean, rapeseed-mustard, alfalfa, and berseem were supplied by the research institutes from Iran, India, Turkey, Egypt and

Nigeria, and distributed for testing in Uzbekistan and Azerbaijan. In addition, Uzbekistan received 9.0 kg of alfalfa seeds (3 kg of each variety) from Turkey. Also, Gurjat Agricultural University from India provided two new varieties of safflower and alfalfa to Azerbaijan (0.5 kg of each variety) and Uzbekistan (1.0 kg of each variety). Performance of these new materials will be watched during the current year.

2.10 ECONOMICS

- Within the framework of the GTZ-CIMMYT wheat quality project, quality standards for lepyoshka flatbread were investigated in Kazakhstan, Uzbekistan, Kyrgyzstan, and Tajikistan. The data are being analyzed and will be published soon.
- A nine-day training course on participatory and farmer survey methodology was conducted for ten scientists from Kazakhstan, Uzbekistan, and Tajikistan under the auspices of the GTZ-CIMMYT regional project. As part of the training, the group carried out Rapid Rural Appraisals (RRA) in five villages in Djambul district, Kazakhstan.
- The Azeri economists trained in 2001 on farmer participatory research under the auspices of the Agricultural Research Reform and Competitive Grant System in the Azerbaijan Agricultural Development and Credit Project conducted the filed work across all the soil-climatic regions of Azerbaijan.

2.11 HUMAN RESOURCE DEVELOPMENT

Following HRD activities were undertaken by CIMMYT and ICARDA on various germplasm improvement related aspects:

Date and venue	Organization	Title of event	Participants
March – August 2003, Mexico	CIMMYT	Six-month training course on “Wheat Improvement“	Eleven scientists from CEC region
July, 2002 China	PFU	Three-month international training on “Hybrid Rice”	One scientist from Uzbekistan
10 September – 10 November, 2003	ICRISAT	Two month training on “Groundnut Breeding”	One scientists from Georgia and one scientist from Turkmenistan
25 October – 29 November	CIP	Individual training on “Potato Breeding and Production”	One scientist from Uzbekistan
23 February - 6 March, 2003 Aleppo, Syria	ICARDA	Individual training on "Application of Molecular Tools for Biodiversity Studies"	One scientist from Kazakhstan
20 April – 1 July 2003, Aleppo, Syria	ICARDA	Individual training on “Evaluation of Legume Crops”	One scientists from Kyrgyzstan
10 May – 10 June, 2003 Aleppo, Syria	ICARDA	Training on “Yellow Rust”	One scientists from Azerbaijan and one scientist from Kyrgyzstan
10 May – 20 June, 2003 Aleppo, Syria	ICARDA	Training on “Barley Breeding”	One scientist from Kazakhstan
23 – 24 May, 2003 Tashkent, Syrdarya, Jizzak and Samarkand in Uzbekistan	ICARDA	Traveling Workshop on “Establishing demonstration trials under on-farm conditions”	Fifty one farmers and scientists from Uzbekistan
28 May, 2003 Akhal province in Turkmenistan	ICARDA/ CIMMYT	Traveling workshop on “Establishing demonstration trials under on-farm conditions”	Sixty farmers and scientists from Turkmenistan

3. SOIL AND WATER MANAGEMENT

Alongside the difficulties associated with a transitional period, one of the major reasons of low agricultural productivity is poor natural resource management. In the past, the use of natural resources was mainly focused on rather short-term economic developments, which contributed to serious environmental disasters that continue to have an impact on current economic growth. Therefore, in Central Asia and the Caucasus, there are critical problems common to the efficient management of water and land. These problems include: allocation and rational use of natural resources, deficiencies in available technologies

and their adoption due to poor knowledge dissemination, insufficient financial, institutional and policy support.

In addition, agrarian reforms and attention to socio-economic problems have progressed at different rates in countries of the CAC region. Those countries that have moved ahead with de-collectivization and privatization of land are also encountering problems arising from the fragmentation of land, and the sharing of water, particularly the management of large-scale irrigation systems to meet the demands of various small scale farmers.

For the new nations of Central Asia and the Caucasus to attain long-term sustainable growth and to increase agricultural productivity, it is so critical that their enormous natural resources are managed more efficiently in an integrated manner. Integrated soil and water resource management must form the basis for policy decisions at all levels. There is also an urgent need for appropriate policy orientation and reforms for input use efficiency. The emerging small farmers need assistance with enterprise development and improvement of their skills relating to the rational use of inputs, introduction of new crop rotations, and generation and adoption of more efficient production technologies.

Two CGIAR centers, ICARDA and IWMI, are addressing the issues of natural resource management at basin and on-farm levels, respectively.

During 2002/2003, major activities of IWMI in the region were conducted through the following three projects:

- "Integrated Water Management in the Fergana Valley", a Swiss Development Cooperation (SDC) –funded project,
- A project on "Adoption of the best practices for water conservation in the Syr-Darya and the Amu-Darya river basins in Central Asia", and
- A project on "Analyzing bright spots in land degraded zones".

3.1 Integrated Water Resource Management in the Fergana Valley

An SDC funded project on "Integrated Water Resources Management in the Fergana Valley", implemented jointly with the Scientific Information Center of the Interstate Commission on Water Coordination (SIC-ICWC) and local water management authorities, is being continued. During the year under report, the project has addressed the issues of reforming the water management from administrative boundaries to hydro-boundaries with stakeholder participation and democratic management on pilot scale in Sogd province of Tajikistan, Fergana province of Uzbekistan and Osh province of Kyrgyzstan. Also, new mechanisms for capacity building, information system management and water and land productivity monitoring were introduced. All these activities are aiming at providing legal, institutional and technical framework for implementing and up-scaling water sector reforms along the hydrological boundaries.

3.2 Adoption of the best practices for water conservation in the Syr-Darya and Amu-Darya river basins

A three-year project entitled "Adoption of the best practices for water conservation of the Syr-Darya and the Amu-Darya river basins in Central Asia" is being implemented by IWMI in collaboration with the SIC-ICWC and local water management authorities. During 2002, the project activities on evaluation and promotion of the best management practices for water conservation covered 11 district water management organization, 7 water users' associations, 18 collective farms, shirkats and join-stock companies and 25 private farms. As a result of these activities, in 2002, water productivity under cotton irrigation increased, by approximately 30 – 50% at a filed scale, by 25 – 30% at a farm scale and by 14 – 35% at an irrigation system level as compared with 1999.

3.3 Analyzing bright spots in the zones of degraded lands

A new project on "Bright spots in the zones of degraded lands" was initiated by IWMI in collaboration with the Tashkent Institute of Irrigation and Agricultural Mechanical Engineers (TIIAME). The project aims to identify, through comparative research, underlying factors and management processes that have contributed to sustained productivity, income and environmental sustainability in the zones of degraded

lands of Uzbekistan. During 2002, three case studies were undertaken in Bukhara, Jizzak and Syr-Darya provinces. The results have shown that able leadership and availability of suitable mechanization are the key success factors for sustainable production in degraded areas of Uzbekistan.

3.4 ICARDA-IWMI COLLABORATIVE ACTIVITIES IN KARAKALPAKSTAN

Joint activities on reforming water management in agriculture of Uzbekistan, initiated by ICARDA and IWMI in spring 2002 in Karakalpakstan, are being continued. In Djambul farm, located in Khodjeili district, IWMI has focused on improving the operations of a WUA (Water Users' Association), which previously had not been functioning properly due to a poor understanding of Participatory Irrigation Management (PIM) by both local authorities and farmers. By the end of 2002, the WUA has been re-organized through introduction of democratic principles of governance. Also, capacity building activities are being underway to strengthen the participation of farmers in WUA's management.

At the same site, ICARDA's role was to provide effective technologies for improved on-farm water, soil and crop management. To increase productivity of irrigated land and to promote crop diversification, which is much needed in Karakalpakstan, double cropping practices were introduced. The results obtained during 2002, have shown that sorghum, safflower and millet as double crops can provide sustainable yield in addition to winter wheat that can eventually contribute to increasing the farmers' income.

Also, ICARDA's activities in the field of improving irrigation technology have clearly demonstrated the advantage in cotton yield under accelerated furrow irrigation (4.0 t/ha) over the traditional practices (2.9 t/ha). Another activity on developing water-saving irrigation technology for rice production has been carried out by ICARDA in collaboration with the scientists of the Karakalpakstan branch of the Uzbek Rice Research Institute (UzRRI). The results have shown the possibility of using conjunctive irrigation for growing rice in dry years. Also intermittent irrigation, which was introduced in Karakalpakstan, allowed saving of about 20% of irrigation water while sustaining good yield of rice.

Based on these results, a proposal on "Sustainable agricultural practices in the drought-affected region of Karakalpakstan" has been developed jointly by ICARDA and the Ministry of Agriculture of Uzbekistan and submitted to FAO for funding under TCP during 2004 – 2005.

3.5 ICARDA PROJECT "ON-FARM SOIL AND WATER MANAGEMENT FOR SUSTAINABLE AGRICULTURAL SYSTEMS IN CENTRAL ASIA"

The year 2002 was the last year of the first phase of the ADB-supported project on "On-farm soil and water management for sustainable agricultural systems in Central Asia", of which the objectives were to (i) increase agricultural productivity and production through improved management of cropping systems, including optimal use of water resources and improved management of soils and nutrients; and (ii) achieve sustainable irrigated cropping systems through an appropriate farm-level management of irrigation and drainage and safe use of marginal water sources.

Through its four components, the project activities were addressing the issues of:

- Development of improved strategies for on-farm soil, water and crop management
- Assessing and improving farm-level irrigation and drainage management to ensure the sustainability of irrigated cropping systems
- Assessing and improving the utilization of marginal water sources
- NARS Capacity Building.

Component I, focusing on development of improved strategies for on-farm soil, water and crop management, includes research activities on water conserving irrigation technologies, soil tillage and crop diversification.

Water conserving irrigation technologies

- In steep slope areas, soil erosion and significant water losses for surface runoff are major constraints to sustainable agriculture. At Boykozon Integrated Research Site, Uzbekistan, contour irrigation technology demonstrated reduced soil erosion (from 2.7 to 0.12 - 1.10 t/ha) and proved to be efficient for cereal, vegetable, and melon crops production. Water use efficiency using contour irrigation increased by 24% comparing to control.

- Uniformity of water distribution on irrigated sloping areas is usually low. Application of contour irrigation using portable chutes has provided a uniform water jet to each furrow and has also increased water productivity by almost 50 – 100%. This technology is suitable for adoption in small scale farms.
- Under strip cropping, soil erosion was reduced two times comparing to existing practice of growing of continuous wheat at sloping areas having sufficient precipitation.At Fakhrabad site, Tajikistan in semi-humid conditions, supplemental irrigation and mulching were tested to maintain soil moisture storages. The research proved that supplemental irrigation along with mulching by plant residues provides highest survival rate of tree saplings at terraces.

Soil tillage

- In rain-fed semi-arid conditions of northern Kazakhstan, minimum and zero tillage proved to be promising as compared to generally adopted deep conservation tillage, provided adequate fertilization has been applied. In rainfed conditions of southern and southeastern Kazakhstan, shallow and deep conservation tillage gave almost the same grain yield as that of ploughing but conservation tillage was found to be more economical. Though conservation tillage is now widely adopted only in Kazakhstan, it could be possibly spread to neighbor countries growing grains.In Turkmenistan, three years in a row, soil tillage before planting winter wheat at various depths (from 10-12 cm to 30-32 cm) have not significantly affected grain yields; whereas reduced tillage contributed to resource saving and allowed timely planting. Water productivity under application of reduced tillage at 10-12 cm was 25% higher than that under deep ploughing at 30-32 cm.
- In Tashkent province of Uzbekistan, on typical non-saline gray soil, rotor cultivation (10-12 cm deep) with sub-soiling at 45 cm provided higher yield of winter wheat as compared with traditional deep moldboard ploughing. On an average, in two years, broadcasting of wheat seeds under shallow cultivation gave comparable grain yield with the deep plowing but was more economical for resources saving.
- In the Hissar valley, Tajikistan, on irrigated dark gray soil, deep ploughing at 40-42 cm ensured a little higher yield of winter wheat compared with traditional ploughing at 28-30 cm at high rates of fertilization. In 2002, minimum and zero tillage were tested under double cropping system of wheat and cotton in Yavan and Gozimalik regions. Preliminary results indicated that both crops may be effectively grown under minimum tillage system. More studies are needed on zero tillage technologies and soil fertility management.
- In the rain-fed farming conditions of Galla-Aral area of Uzbekistan, experimental data were in favor of traditional ploughing, but in 2002, no-till gave promising results for the first time. More studies should be done with more sophisticated conservation tillage equipment.

(The results of the project research activities on crop diversification have already been mentioned earlier).

Research activities under **Component II** address the issues of assessing and improving farm-level irrigation and drainage management to ensure sustainability of irrigated cropping systems.

- In water deficit conditions, at Arys-Turkestan site of southern Kazakhstan, two irrigation technologies, discrete and cutback alternate furrow irrigation, were tested. Improved technologies of alternate furrow irrigation contributed to irrigation water saving by 30% as compared with traditional furrow irrigation technology and reduced pressure to the drainage system by 40%. Water use efficiency increased by 16% compared to traditional furrow irrigation.
- For improving irrigation efficiency on sandy soil, sprinkler system was tested along with traditional furrow system for irrigation of winter wheat in the Experimental farm of Turkmen Agricultural University. The results have shown that sprinkler irrigation increased WUE from 0.36-0.47kg/m^3 ha under traditional furrow irrigation to 0.60-0.65kg/m^3.

Component III includes research activities on assessing and improving the utilization of marginal water of different quality.

Treated wastewater (TWW) use

- Utilization of treated wastewater for irrigation of fodder crops and tree plantations was tested around Sorbulak Lake in Kazakhstan. Based on 1999-2002 results, treated wastewater proved to be an important source of nutrient supply ensuring sustainable yields of fodder crops and good

growth of tree plantations. Content of heavy metals (Zn, Fe, Cd, Cu, Cr, Ni, Pb) in fodder crops produced under TWW irrigation does not exceed the threshold rates. Slight increase in Co content was, however, recorded in Jerusalem artichoke, sunflower and sugarbeet.

- Treated wastewater of Hodjent city was also tested for cotton irrigation at Kyzyltukay experimental site, northern Tajikistan. Besides minimizing the risk of fresh water contamination, the use of TWW for irrigation reduced dependence on chemical fertilizer use, thus significantly reducing the production cost.

Drainage water use

- At Dustlik experimental site in Fergana Valley, drainage water was tested for irrigation of recently planted forest shelterbelts consisting of Californian poplar, mulberry, pomegranate, almond, fig and pistachio trees. Cotton yield from the field protected with these shelterbelts was 25% higher than that from the non-protected field.

DEVELOPMENT OF A PROPOSAL FOR SECOND PHASE OF THE PROJECT

The objectives of the first phase of the project, such as establishing experimental sites and identifying and testing technologies to improve soil and water management, were successfully achieved. Some of the technologies are now ready for on-farm testing and validation over large areas, while others, particularly those associated with marginal water use, need further adaptive research to ensure they can be safely adopted by farmers. The preliminary results need to be verified and opportunities for scaling up the results to similar farming systems identified. Furthermore, these research results have largely been analyzed and reported by each country individually. The results need to be synthesized across the region by agro-ecological zones and disseminated to a broader audience. Therefore, ICARDA scientists and their colleagues from NARSs of Central Asian countries, joined their effort to develop a proposal for the second phase of the soil and water management project. After a series of consultation meetings, including those with the ADB review mission held in April, 2003, a full proposal was finalized and submitted to ADB in May, 2003.

In order to insure logical conclusion of the important experiments and field demonstration the project was extended till 30 June, 2003 on a no-cost basis. Also, a possibility of obtaining retroactive funding from ADB is being explored to avoid disruption of important research activities during July – December, 2003.

3.5 HUMAN CAPACITY BUILDING

Following HRD activities were undertaken by ICARDA and IWMI on various soil and water management aspects:

Date and venue	Organization	Title of event	Participants
8-9 August, 2002 Uzbekistan	ICARDA-CAC	A short –term training course on “Basic ways of soil moisture measurements using Diviner 2000”	Eleven scientists from Kazakhstan (2), Kyrgyzstan (2), Tajikistan (2), Turkmenistan (2) and Uzbekistan (3)
5 May - 12 June, 2003 Aleppo, Syria	ICARDA-JICA	Training course on "Management of Water Resources and Improvement of Water Use Efficiency in the Dry Areas"	Four scientists from Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
12 – 21 May, 2003 Tashkent, Uzbekistan	ICBA - ICARDA	Training workshop on "Biosaline Agriculture and Sustainable Production Systems"	Twenty seven scientists from Azerbaijan (4), Kazakhstan (4), Kyrgyzstan (4), Tajikistan (6), Turkmenistan (4), Uzbekistan (5)

4. FEED AND LIVESTOCK PRODUCTION

In the course of a consultation process, sponsored by ILRI, ICARDA and some other partners, in 1999, the NARS of CAC region identified three priority livestock research themes: increasing feed resources and efficiency of utilization; conservation and utilization of ruminant genetic resources under new production conditions; and policy options to create enabling environments for improved small holder production and markets. In addition to US$ 50,000 from the CG CAC Finance Committee, the ILRI-convened SLP provided substantial start up funds for initiating some activities in the different countries.

Agreement with partners and coordination mechanisms were established in mid 2000, and since then considerable progress has been made in all three themes in respect of establishing partnerships, diagnostic surveys of livestock production constraints, market structure, rangelands conditions, genetic characterization, training and preparation of manuals.

The project being implemented by ILRI in collaboration with NARS-CAC and other international organizations in the region on research and development of smallholder livestock production in Central Asia and the Caucasus has the overall objective to identify and target technologies and enabling policies that will improve the efficiency of smallholder production systems.

Increasing feed resources and efficiency of feed utilization

Two parallel studies are being carried out:

- Assessing rangeland use and coordination and preparation of guidelines for range-based animal production by smallholders
- Identifying technologies for feed production and utilization in crop livestock systems.

Conservation and utilization of ruminant genetic resources under new production conditions

- Sampling indigenous sheep and cattle breeds in Armenia, Azerbaijan, Georgia and Uzbekistan for molecular genetic characterization carried out by ILRI staff from Ethiopia. A total of 416 samples were collected in the first round from 18 locations and these are being processed and analyzed at ILRI, Nairobi.

Policy options to create enabling environments for improved smallholder production and markets

- Field surveys were carried out by MLURI with national collaborators in Kazakhstan and Turkmenistan to understand policy issues, production and marketing conditions and commercial potential for livestock products. It was assumed that other countries are also experiencing similar problems during the transition; therefore, these surveys would be of relevance to the whole region.

4.1 ICARDA PROJECT ON "INTEGRATED FEED AND LIVESTOCK PRODUCTION IN THE STEPPES OF CENTRAL ASIA (IFL-CA)"

The IFAD-funded project on "Integrated Feed and Livestock Production in the Steppes of Central Asia" (IFL-CA) was implemented by ICARDA in collaboration with CA-NARS, USAID-GL-CRSP and ILRI during 1999 – 2002. Results of the four major components of the project, (i) *Socioeconomic activities, (ii) Range management, (iii) Feed production and (iv) Livestock production and flock management*, are as follows:

(i) Socioeconomic activities:

Three main farm types operating in agricultural production were identified:

- Big scale farms (various types of cooperatives) that used to produce the main share of Countries' Livestock Product currently contribute less than 15%.
- Medium-scale farms (private farms) recently emerged as a result of reforms. The size of them varies from region to region and from country to country. They contribute 2-20% to Countries' Livestock Product with the largest share in Kyrgyzstan.
- Rural households (individual parcels) contribute up to 95% to Countries' Livestock Product.

Diagnosis of livestock producers' problems:

- The main problem for all types of livestock producers is lack of forage in wintertime.
- In countries where big scale farms were dissolved, producers have poor resources for efficient production.
- Small farmers have no adequate facilities for livestock operations.
- Traditional markets for pelts and fine wool reduced dramatically, thus causing decrease in their production.

Marketing:

- Local markets now bring more income to producers then selling products to processing companies as before.
- Among all types of products, live animals generate the biggest share of producers' income.
- Fresh milk is being sold in cities and towns mostly by milkmen supplying it directly to customers' homes.
- Sheep milk may become an additional source of producers' income.

Also, during the year under report, five participatory workshops were conducted as part of the seasonal monitoring of the selected farm types in Kazakhstan, Kyrgyzstan and Uzbekistan. The data obtained are being analyzed.

(ii) Range management

Several rehabilitation technologies were introduced to recover overgrazed rangelands:

- *Haloxylon* and *Salsola* planted in range stripes were successfully established after 3 years of drought in Turkmenistan. In Shymkent, Kazakhstan and Nurata, Uzbekistan, plantations *of Haloxylon-Kochia-Salsola* were used for establishing windbreak strips.
- Collection of range species' seeds and establishment of nurseries were conducted for future range rehabilitation in Kazakhstan, Turkmenistan and Uzbekistan).
- Testing options for the rational utilization of rangelands were developed through organizing mobile flocks to be moved for grazing in remote ranges.
- Rotational grazing system was introduced through the division of the village rangeland into two equal parts and alternation of grazing on each of these two parts. As a result, every year one of the portions is "resting" in spring or in autumn.

(iii) Feed Production

Sowing feed mixtures as intermediate winter crops to improve the fodder availability.

- Experiments on intensive production of fodder crops in Uzbekistan and Turkmenistan demonstrated to farmers from irrigated areas the possibilities to enhance their feed base. An option of cultivation of mixed forages (triticale+ oats+ fodder pea) followed by maize for silage produced, on an average, a total biomass of 13.5 t/ha and 10.3 FU as compared to 10 t/ha of DM and 7 t/ha of FU in control.

Use of drainage water for fodder production on marginal saline lands.

- The utilization of drainage water in Turkmenistan in saline soils confirmed the results of the previous years and produced even more biomass in view of sufficient rainfall in spring of 2002. In fact, the yields of halophytes under irrigation with drainage water were as high as 12-14 ton of DM/ha in early fall, when little biomass was available in the range. The use of xerophytic vegetation was also started with the introduction of spineless cactus in Uzbekistan through the collaboration with the M&M project.

Use of concentrates and mulberry leaves

- Trials were conducted on introduction of concentrates into the animal's diet and also substitution of concentrates with mulberry leaves in feed mixtures and feed blocks. The daily weight gain made only 35 g in control (grazing on the range). As for the group, of which the diet was based on feed mixture containing concentrates, the weight gain was 161 g/sheep. The same result was obtained when concentrates were replaced by mulberry leaves. The highest weight gain, 180 g/sheep, was observed in the group where mulberry leaves were incorporated into feed blocks as a substitute of concentrates. Thus, the results demonstrated that incorporation of mulberry leaves could be a good substitution of concentrates and eventually generate more income to the farmers.

(iv) Livestock production and Flock Management

- The results of testing early lambing technologies during the last year by Uzbekistan and Kyrgyzstan research teams were consistent with previous year. Advancing the lambing season, will allow farmers making better use of spring vegetation for lamb growth so that lambs can enter the market earlier than in the traditional system.
- The project continued on-farm activity on sheep milking with Karakul and Sarajeen sheep to improve farmer's diet and to generate extra income. Farmer Kydyrguly from Turkmenistan, applying his West Asian experience gained during the traveling workshop to Turkey, Jordan and Syria, milked over 40 Sarajin ewes producing 386 kg of cheese. In 2002, farmer Imamgulyev milked 30 ewes with an average daily yield of 22 kg per ewe.

- To improve the milk yield of local sheep for increased farmers' income in Boykozon, Uzbekistan, ewes of non-indigenous semi-fine wool breed were inseminated using the semen of dairy East Friesian and Lacaune breeds, received from the University of Wisconsin, USA. Out of 557 ewes inseminated using a laparoscopic method in October – November, 2002, 306 got pregnant (55%). By the end of lambing season, mid April, 2003, around 470 lambs have been born, e.g. the fertility rate amounted to about 130 percent.

4.2 COLLABORATION WITH USAID-GL-CRSP

The GL-CRSP contribution during year 3 of research activities in Central Asia can be summarized as follows:

Sheep production model is based on SRCRSP 78-88 model that was applied in many countries.

- The University of California Davis (UCD) completed updating of the model and a new program structure for web-based application has been developed. Also a preliminary data set for sheep in semi-desert Artmesia rangeland was assembled. An example of the sheep model application coefficients under different grazing systems was presented. The emphasis is now for the development of tools that can be released and made available broadly (over the Internet).

4.3 COLLABORATION WITH RUSSIAN LANGUAGE PLATFORM FOR LIVESTOCK, ENVIRONMENT AND DEVELOPMENT (LEAD)

An inter-institutional project on Livestock, Environment and Development (LEAD) with FAO initiated an establishment of Russian Language Platform under the financial support by the Swiss Development Cooperation (SDC). This initiative was also supported by a wide range of different donor and research organizations including ILRI. The main objective of the LEAD Russian Language Platform is to improve communication and to enhance the relevance of research and development issues related livestock-environment interactions. PFU-ICARDA Tashkent office had been actively involved in this initiative. During March, 2003, Mrs. Svetlana Livinets, Platform Manager, visited the Regional Office in Tashkent and was assisted in establishing contacts with various research institutes in the region. The Virtual Center of the LEAD Russian Language Platform is now functioning and can be accessed through the following Internet site: http://lead-ru.virtualcentre.org.

4.4 HUMAN CAPACITY BUILDING

Following HRD activities were undertaken by ICARDA and other collaborators in feed and livestock management aspects:

Date and venue	Organization	Title of event	Participants
September, 2002 Aleppo	ICARDA	Training on "Participatory Research Methodology"	Two scientists from Kyrgyzstan (1) and Uzbekistan (1)
November, 2002 McCaulay University, Scotland	IFAD	One month training on "Feed Evaluation Methodologies"	One participant from Uzbekistan
22 – 26 February, 2003 Dubai, UAE	ICBA	Training course on "Quality Evaluation and Utilization of Salt-Tolerant Forages"	One scientist from Uzbekistan

5. CONSERVATION OF GENETIC RESOURCES

The CAC region is the center of origin of many economically important crop species. It represents very rich genetic diversity of crops with many landraces and their wild relatives. In all, more than 8,100 plant species are recorded in the region, of which 890 are endemic. Here exists one of the world's best collections of fruits, nuts, and melons. Due to financial constraints and breaking of links with the VIR, the leading Russian institution on plant genetic resources, the support for geneic resource activities got weakened. Hence, efforts on PGR activities needed to be strengthened. Some of the activities undertaken by IPGRI, ICARDA, CIMMYT and other centers were:

A CATCN Network involving all eight countries of Central Asia and the Caucasus has been established

- Within the framework of the CATCN Network, eight working groups on plant genetic resources (PGR) on ICARDA's mandate crops were established in countries of Central Asia and the Caucasus. Each group comprised three specialists on grain crops, fodder crops and documentation. ICARDA provided all the eight groups with computers to make inventory and documentation of PGR in their countries and supported training of PGR documentation specialists.

ICARDA has established linkages with national programs, by organising collections in the Central Asian and Caucasus republics, and by ensuring that the countries concerned benefit from the results of these collections.

- Following the collection missions in 6 countries of CAC region organised in 1998-2000, ICARDA in 2001 and 2002, in collaboration with local NARS, VIR, Australian scientists and USDA launched a second round of collection missions to Armenia, Azerbaijan and Turkmenistan. In the course of these collection missions, 737 accessions have been added to already available 1045 accessions of cereals, food legumes and their wild relatives and forage and range species. The collected germplasm is now kept by the host country and stored "in-trust" in ICARDA's gene bank, providing safety duplication. ICARDA has also provided to the participating countries all information and analysis pertaining to the germplasm so collected.

Upgrading the storage facility of the Uzbek Research Institute of Plant Industry (UzRIPI)

Upon requests received from Uzbek PGR scientists, the International Centers ICARDA, IPGRI and USDA have jointly agreed to upgrade the storage facility at the Uzbek Research Institute of Plant Industry (UzRIPI) and turn it into a medium-term storage facility in order to conserve quality seeds for 10-15 years thus, replanting of stored accessions would be done in 10-15 years unlike it is done at present - every 2-3 year. On 19 September, 2002, the newly renovated gene bank facility was formally opened at the UzRIPI by Deputy Minister of Agriculture and Water Management and Director General of UzSPCA, Dr. Sherali Nurmatov. The facility has come up exceedingly well and the building now looks quite modern and functional.

Genetic Resource Center inaugurated in Tajikistan

A Plant Genetic Resource Center was inaugurated in Tajikistan by Prof. Dr. Adel El-Beltagy during his visit in September, 2002. Since then, ICARDA has provided support for upgrading the facilities at the Center. In particular, 10,000 seed containers and electronic scales were delivered. A humidifier and thermostat for seed germination as well as other equipment were supplied to Tajikistan during the last year.

Support to Genetic resource Center in Kyrgyzstan

ICARDA has provided support for upgrading the Kyrgyz storage facility through purchasing new equipment for the gene bank storage at the Kyrgyz PGR Center. As many as 5,000 seed containers and electronic weighing scales have been delivered to the Center. Also, a humidifier, cooling system and shelf stands have been procured. Dr. Bilal Humeid, Gene Bank Specialists, ICARDA visited Kyrgyzstan and Tajikistan in February 2003 for detailed evaluation of seed storage conditions and suggestions for their improvement.

IPGRI ACTIVITIES IN THE REGION

- **New Project on socio-economic studies on plant genetic resources**

The project 'Strengthening community institutions to support the conservation and use of plant genetic resources in Uzbekistan and Turkmenistan' was initiated in 2002 by IPGRI in collaboration with its sister center IFPRI under the support of System-wide Program on Collective Action and Property Rights (CAPRi). The project seeks to understand how changes in land tenure and rural institutions have affected conservation and use of plant genetic resources in Turkmenistan and Uzbekistan. During the year under report, National Workshops with stakeholders were held in Uzbekistan and Turkmenistan, during which priority species and project sites were selected. Also, the project team developed methodology and survey tools for collecting ecological, demographic, social and economic data on village, district, regional and national levels.

Other results achieved so far are:

Forest Genetic Resources

- Regional Data base on Forest Genetic Resources has been compiled and a Concept note of the project proposal on "Conservation of indigenous forest species and their use in combating land degradation and improving living conditions in mountainous area in CAC countries" has been developed.

Fruit Genetic Resources

- Regional database on Fruit GR has been compiled and hosted by Tajikistan R&P Centre 'Bogparvar'. Also, database on Pomegranate GR has been established at Garry Gala R&P Centre on PGR in Turkmenistan

- Funding of the PDF B phase of the project on "*In situ*/on farm Conservation of Agrobiodiversity (Horticulture Crops and Wild Fruit Species) in Central Asia" has been approved by UNEP-GEF.

Medicinal Plants

- A catalogue on Medicinal Plants in CAC region is being drafted and information needed to develop a concept note of a regional project proposal on MAP is being collected.

Knowledge dissemination and capacity building

- Methodology on "Assessment of Intra- and Inter-specific Diversity of Forest Species" and DL on *Pistacia vera* were published in Russian. Also, Russian version of "Training Guide on *In Situ* /On Farm Conservation" produced. Training Manuals on "Conservation through Sustainable Use of Fruit Genetic Resources in Central Asia" have been developed in English and Russian and are now in printing. Russian version of "Forest Genetic Resources: IPGRI's Strategic Action Plan" was published. In addition, CWANA Newsletter was published and distributed to 200 recipients in CAC.

HUMAN CAPACITY BUILDING

Following HRD activities were undertaken by ICARDA on genetic resource conservation and management:

Date and venue	Organization	Title of event	Participants
September, 2002, St-Petersburg, Russia	ICARDA	Documentation training at the VIR (Vavilov Institute)	Representative of Azerbaijan
22 – 23 October, 2002, Karaj, Iran	IPGRI	Training Course on 'Fruit Trees Germplasm Conservation in Central Asia"	Representatives from Uzbekistan and Tajikistan
20 May – 5 June, 2003 Aleppo, Syria	ICARDA	Training on "Data Documentation".	One scientist from Georgia

6. STRENGTHENING OF NARS

Most of the training activities have already been mentioned in the respective themes. Below are the summarized data on cross-sectional human capacity building:

All centers have made great efforts in the area of human resource development. It includes training on courses, study tours, participation in international, regional and national scientific meetings and workshops, supply of computers and other research equipment. From September 1998 to June 2003, the CAC Program arranged 64 short and long term training courses with participation of 614 scientists, 44 study visits with participation of 82 scientists, 54 regional and national workshops with participation of 1399 scientists and farmers, 20 International Conferences with participation of 252 scientists, and 50 consultation planning meetings with participation of 839 scientists. A total of 3534 scientists and farmers from the CAC countries have so far participated in different training and human resource development activities.

Besides, an English training course of 3.5 month was recently organized under the aegis of ICARDA and the CGIAR Collaborative Program for Sustainable Agricultural Development in CAC in Tashkent, Uzbekistan from 1 December 2002 – 15 March 2003. For the first time, the course was organized jointly for the scientists involved in various Program activities representing different countries from CAC. A total of 34 participants attended the course. In all, more than 350 scientists have received the training in English.

INVOLVEMENT OF ISNAR

A one-day workshop was organized in Baku on 10 October, 2002, jointly by ISNAR, Agrarian Scientific Center of the MoA of Azerbaijan, and the Agency for Support to the Development of Agricultural Private Sector. The workshop drew on the results of the project "Agricultural Innovation System of Azerbaijan: Assessment of Institutional Linkages", completed in May, 2001. Specific objectives of the workshop included examination of the current situation in the area of cotton supply chain, priority problems and their solutions, identification of linkages among different agents through the Information, Knowledge, Skills and Resources, and establishment of an Information Exchange Network (IEN) for promoting the Agricultural Innovation System on cotton production. The gathered information will be used for developing of a joint project proposal on IEN establishment in Azerbaijan.

In 2002, ISNAR also developed contacts with the Academy of Sciences, Horticulture and Viticulture Research Organization to initiate a similar process in Georgia. In addition, ISNAR started in December 2002 FAO funded project to evaluate the infrastructure and use of information and communication technologies in agricultural research, education, and extension.

IFPRI'S ACTIVITIES IN THE REGION

IFPRI has decided to continue its role in the Consortium for CAC region and looks forward to initiate the activities in future relating to policy research in the region.

IFPRI invited three researchers from Uzbekistan to initiate discussions on policy research studies in the region. The visit was fruitful in identifying institutional linkages with Uzbek economic research institutions including Tashkent State Agrarian University, Tashkent Irrigation Institute and Samarkand Agricultural Research Institute.

Beside involvement of IFPRI along with IPGRI under CAPRi Project, report of which is mentioned earlier, IFPRI plans to collaborate with CAC Regional Forum and other CG Centers to develop an information base for policy analysis, capacity strengthening and policy dialogue in the region. It has established an information network of policy analysts and policy makers in the region who receive its publications and training materials.

INFORMATION TECHNOLOGY

Information exchange has been improved through participation in the international and regional workshops, establishing e-mails and providing Internet access to all collaborating institutions.

CIMMYT launched a new web site http://www.semena.kz in Russian language. The site provides the information about GTZ-CIMMYT project, germplasm exchange, new varieties and technologies. A visitor can also find some important publications and announcements.

PARTICIPATION IN WORKSHOPS AND NETWORKING:

Dr. Paizilo Khodjiev, Director, Dr. Ravza Mavlianova, Deputy Director, and Dr. Valentina Lovkina, Specialist on Seed Storage from Uzbek Research Institute of Plant Industry (UzRIPI), Uzbekistan, visited India from 25 July to 2 August, 2002 Their visit was jointly organized by ICRISAT and IPGRI. The main purpose of the visit was to familiarize them with the functioning and management of modern gene banks in New Delhi and Hyderabad and learn about oilseed, sorghum, and millet research and development in India. In New Delhi, they visited Indian Agricultural Research Institute (IARI), National Bureau of Plant Genetic Resources (NBPGR), both ICAR institutions as well as IPGRI, CIMMYT, IRRI, and CIP offices. In Hyderabad, they visited ICRISAT office in Patancheru, Directorate of Oilseeds Research (DOR), National Research Center for Sorghum (NRCS), NBPGR Regional Station (ICAR institutions). The visiting team from Uzbekistan had extensive exposure to gene bank management both at ICRISAT and NBPGR.

Prof. Giyoz Rakhimov, Director and Dr. Shuhrat Haidarov, Scientific Secretary from Uzbek Rice Research Institute (URRI), Uzbekistan, and Dr. Bakiruli Kurmanbekov, Deputy Director, Priaral Research Institute of Agroecology and Agriculture, Kazakstan took part in the International Rice Congress held in Beijin, China, on 16 – 19 September, 2002. The Congress, which was organized by the Government of Peoples Republic of China, was attended by 2500 representatives from 58 countries. During the congress, representatives of Uzbekistan and Kazakstan presented posters about their activities related to rice breeding and production, and established important contacts for future collaboration. These included a special agreement with Hunan Academy of Agricultural Sciences on opening of a joint Uzbek-Chinese laboratory at URRI. PFU-CGIAR provided logistical support for their visit.

An inter-regional Cotton Workshop was held during 12 – 13 October, at Agricultural Research and Education Organization (AREO), Tehran, Iran, with participation of scientists from Azerbaijan, India, Iran, Pakistan, Tajikistan, Turkmenistan, Uzbekistan. The following organizations were sponsoring the workshop: AREO, AARINENA, GFAR, CAC-Forum, APAARI, and ICARDA. The participants agreed to establish an "Inter-regional Network for Research Collaboration on Sustainable Cotton Production in Asia and North Africa" that aims at fostering the collaboration in cotton research issues of common interest through exchange of germplasm, information and expertise in major production-related topics such as breeding, irrigation management, integrated pest management, fiber quality marketing, etc. They also agreed on the establishment and composition of a Steering Committee, as well as a Facilitation and Coordination Unit (FCU) for the Network. The FCU will also facilitate the circulation of information through an electronic newsletter.

A special symposium on Agricultural Development in Central Asia was organized in the USA. It was sponsored by ICARDA and ZEF with active participation of CIMMYT during the Annual Meeting of the American Society of Agronomy held on 11 November, 2002 in Indianapolis, the USA. A total of 17 papers related to Central Asia were presented during the symposium attended by more than 100 delegates from different countries. The symposium provided an overview of the current agricultural problems, socio-economic and demographic constraints, research priorities and the improvement of crop and livestock sectors for increased and sustainable production. Efforts are on way to publish the proceedings of the Symposium soon.

Dr. Sherali Nurmatov, Deputy Minister for Agriculture, Uzbekistan visited ICRISAT from 12-15 Nov 2002. During his visit, Dr. Nurmatov explored the opportunities for collaboration between ICRISAT and his country in crop improvement, natural resource management, biotechnology, and genetic resources. He also paid a visit to ICAR institutions in Hyderabad and New Delhi.

Dr. Amir Karakulov, Vice-President of the Tajikistan Academy of Agricultural Research and Dr. Kahkarov Kohkar visited ICRISAT on 15 Jan 2003 to familiarize themselves with ICRISAT. They also had in-depth discussion on livestock research with the ILRI group located at ICRISAT. They also visited the national Academy of Agricultural Research Management in Hyderabad.

A Workshop on "Rural Development Strategy in CWANA" was organized by ICARDA from 23 – 26 February, 2003 in Cairo, Egypt to address the issue relating to a new strategy on rural development, developed by the World Bank. The new strategy refocuses the rural development process to concentrate on improving the well-being of rural people and reducing rural poverty in the widest possible sense. The workshop was attended by around 100 participants, including senior managers from Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan.

From ICARDA Headquarters, Drs. Adel El-Beltagy, Mohan Saxena, William Erskine, Richard Thomas, Thomas Blake, Jan Valkoun, Elizabeth Bailey, Samuel Kugbei, Theib Oweis, Luis Iniguez, Kenneth Street, Adriana Buggeman, Amor Yahyaoui, Moussa Mosaad, Ashutosh Sarker, Fransis Turkelboom etc. visited the region and interacted with senior scientists and research managers.

Dr. Masa Iwanaga, Director General, CIMMYT, also visited Kazakstan and Uzbekistan from 1-7 September immediately after his appointment. Dr. David Mackill and Dr. Abdel Ismail from IRRI also visited Central Asia from 29 August to 5 September.