# CGIAR COLLABORATIVE RESEARCH PROGRAM FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT IN CENTRAL ASIA AND THE CAUCASUS

PROGRAM FACILITATION UNIT

# ACTIVITIES AND OUTPUTS 1999/2000


**CGIAR Collaborative Research Program for Central Asia and the Caucasus**
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# INTRODUCTION TO THE PROGRAM

The CGIAR Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus was developed by a consortium of nine CG Centers viz. CIMMYT, CIP, ICARDA, ICRISAT, IFPRI, ILRI, IPGRI, ISNAR and IWMI based on the needs and priorities of the eight National Agricultural Research Systems (NARS) of Armenia, Azerbaijan, Georgia, Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan as identified in previous workshops and coordination meetings. The goal of the program is to contribute to achieving the overall goal of food security, economic growth, environmental sustainability, and poverty alleviation in the countries of Central Asia and the Caucasus. The key objective of the Program is to assist the eight CAC countries in achieving sustainable increases in the productivity of crop and livestock systems through the adaptation and transfer of production technologies and natural resource management and conservation strategies, and by strengthening agricultural research and cooperation among the CAC countries and with international research organizations.

The Program was initiated in September 1998 after its approval by the Program Steering Committee (PSC) in its Meeting held in Tashkent, Uzbekistan, 28-29 September 1998. ICARDA is the focal point for the Program and facilitated by a Program Facilitation Unit (PFU) based in the Central Asia and the Caucasus Regional Program Office of ICARDA in Tashkent.

The Program is organized around five main "themes" corresponding to the five main activities within the CGIAR approved research agenda:

1. **Productivity of Agricultural Systems**
   - *Agroecological Characterization, System Diagnosis and Constraint Analysis*
   - *Germplasm Enhancement*
   - *Strengthening National Seed Supply Systems*
   - *Cropping Systems Management and Agricultural Diversification*
   - *Livestock Production Systems and Integrated Feed/Livestock Management*

2. **Natural Resource Conservation and Management**
   - *Irrigation, Drainage, and Water Basin Analysis On-*
   - *Farm Soil and Water Management Rangeland*
   - *Rehabilitation and Management*

3. **Conservation and Evaluation of Genetic Resources**
   - *Plant Genetic Resources*
   - *Animal Genetic Resources*

4. **Socioeconomic and Public Policy Research**
   - Constraints on the Uptake of Innovations
   - Market Reforms
   - Land Reforms and Common Property Rights

5. **Strengthening National Programs**
   - *National Research Organization and Management*
   - *Human Resource Development*
   - *Information Technology, Data Management, Information Exchange and Networking*

# A. APPROVED PROJECTS AND ACTIVITIES FOR 1999/2000

The Program Steering Committee (PSC) in its First Meeting held in Tashkent, Uzbekistan, 28-29 September 1998, approved the following projects and activities for the 1998/99 crop season. The same were carried out in the 1999/2000 season and are mentioned below.

## a. Supported by the CGIAR funds

Strengthening National Programs: National Research Organization and Management
Implementing Center — ISNAR

On-farm Soil and Water Management for Sustainable Agricultural Systems in Central Asia
Implementing Center — ICARDA

Germplasm Conservation, Adaptation, and Enhancement for Diversification and Intensification of Agricultural Production
Implementing Centers — CIMMYT, CIP, ICARDA, ICRISAT, and IPGRI, with ICARDA as the Coordinating Center

Seed money for initiating activities and preparing project proposals
Implementing Centers — IFPRI, ILRI, and IWMI

## b. Supported by Non-CGIAR Sources

Crop genetic resources conservation, documentation and utilization (ACIAR-supported)
Implementing Center — ICARDA

Integrated livestock and feed production in the steppes of Central Asia (IFAD-supported)
Implementing Center — ICARDA

On-farm soil and water management for sustainable agricultural systems in Central Asia (ADB-supported)
Implementing Center — ICARDA

Sheep/range management (supported by USDA/ARS)
Implementing Center — ICARDA

Improving productivity, sustainability and profitability of wheat sector in Kazakstan (World Bank IDF Grant-supported)
Implementing Center — CIMMYT

Seed sector study in Kazakstan (supported by Denmark)

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|---|---|
| Implementing Center | ICARDA with COWI, Int. of Denmark |

Study on the competitiveness of Kazakstan's wheat sector and sources of future productivity growth (supported by World bank IDF Grant)

# B. ACTIVITIES CONDUCTED IN 1999/2000

The Program activities were carried out in different projects as per the approval by the Second PSC Meeting held in Tbilisi, 23-25 June 1999. These were carried out by a consortium of nine CGIAR (CG) Centers (CIMMYT, CIP, ICARDA, ICRISAT, IFPRI, ILRI, IPGRI, ISNAR, IWMI) in close collaboration and cooperation with the eight NARS of CAC (Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan in Central Asia, and Armenia, Azerbaijan and Georgia in the Caucasus) and other International Organizations, NGOs and Private Consultancy Institutions. The results of the Program activities presented here include: (i) those activities that **were** carried out in the projects supported by CGAIR funds and (ii) those activities supported by non-CGIAR sources. The collaborative work jointly carried out by the NARS and the CG Centers during the 1999/2000 crop season is presented below under the five themes of the Program.

## Theme 1. Productivity of Agricultural Systems

***Sub-Themel.l. System Diagnosis and Constraint Analysis* 1.**

**Main Constraints to Livestock Production in CAC**

***Livestock Production Scenario in CA***

The main characteristics of the current production scenario include:

- Disruption of markets
- Disruption of production supporting services: research, technology transfer, provision of inputs, veterinary programs, credit, marketing forecasting and marketing channels
- Structural reforms in tenure: changing the production scales from large to smallholdings
- Deterioration/lack of production infrastructure and mechanization:
  - > Existing infrastructure is inadequate for new holdings
  - > The infrastructure is in process of being dismantled
  - > Machinery deteriorates or is obsolescent
- Disruption and lack of production organization
  - > Disruption of seasonal grazing patterns
  - > Lack of producer's associations
  - > Disconnection from market demands
  - > Lack of animal markets for livestock exchange
- Lack of managerial and entrepreneurial education.

***Main consequences***

- Production stagnation
- Degradation or subutilization of rangelands
- Disruption of forage production and transfer of biomass to the winter season

- Emergence of new production problems (i.e. threats to An-GR, health, feed shortages) that compounded into low production levels
- Raising of poverty
- Reduction of consumption rates due to low purchasing power
- Increasing of rural migration

***The** present **and future***

The CGIAR has an important role to play, helping the region in looking for new production horizons, in the improvement of productivity and the income of farmers. In this context, ICARDA's efforts are directed to:

- Support research to fill in the gaps left by the cessation of services
- Understand the nature of the constraints and processes involved
- Assess markets
- Assess the production base potentials and those of the local germplasm
- Matching potentials to target market opportunities
- Training and scientific exchange.

**(ICARDA)**

## 2. Economic Analysis of Wheat Production in CAC

• Study on wheat competitiveness, future productivity, and regional linkages in Central Asia and the Caucasus continued with the fieldwork for Armenia and Azerbaijan completed in 2000. A draft report was prepared.

• Training on farmer participatory technology and rapid rural appraisal was conducted for ten people in the framework of Azerbaijan Agricultural Development and Credit Project in 2001. This was the first step of introduction of participatory technologies into the Competitive Grant System.

**(CIMMYT)**

## 3. Constraints to Groundnut Production

***Identification of constraints to groundnut production***

In order to identify major constraints to production of groundnut crop on a spatial and temporal scale, it is necessary to prepare maps of soil, climate (rainfall, thermal regime, photoperiod, evaporative demand, atmospheric humidity), length of crop growing period, soil water and nutrient availability, disease and insect pests incidence. Overlay of the crop distribution and yield on the base resource maps will help in identifying the severity and magnitude of various constraints to groundnut production. Analysis of long-term climate data would enable determining the probability of occurrence and severity of a given stress and thereby help reduce risk of growing groundnut in new potential areas.

***Ongoing and future plan of work***

Databases for the CAC countries were downloaded from global data bases, for crop and climate (FAO); land use/land cover and altitude (Source: EROS Data Center, USA) and climate (Utah Climate Center, Utah, USA) to prepare ecoregional maps. It was encouraging to note that there are 54 climate stations in eight countries of the CAC

region, that have historical climate data (rainfall, and maximum and minimum temperature), ranging from 11-14 years which will be useful for this study.

We have obtained soil and climate maps of Armenia, Azerbaijan, and Uzbekistan through PFU, CGIAR-CAC program, Tashkent, and have requested them for assistance in procuring Agricultural Atlas of Kyrgyzstan, Tajikistan, Turkmenistan and Georgia. Currently, soil, climate, and crop maps of Uzbekistan are being digitized to update the chapter "Groundnut in Uzbekistan". Maps of remaining six CAC countries will be digitized to update country chapters. Proceedings will be published by the end of year 2000

*Prospects: probability of success*
It is apparent from the preliminary analysis of data on ecoregional scale that there is a large variation in soil type and climate between the countries in the region, and equally large is the year-to-year variation in climate at a given location. Spatial display of soil and climate data and overlay of crop distribution on these layers suggest that groundnut can be successfully introduced in many areas. Also, new potential niches can be identified in the existing production systems for introducing the crop.

Yield of groundnut is low, ranging between 0.36-2.5 t ha"[1]. These are far below the realized potential yield of this crop in on-farm situations in other but similar agroecologies. Both soil and climate data suggest that abiotic and biotic factors may be constraining the potential productivity of groundnut.

**(ICRISAT)**

**4. Constraints to Soil and Water Use**

*Production constraints, research interests, and priorities*
Production constraints, research interests, and priorities differ by countries because of the differences in physical environments and biophysical resources.

**In mountain areas,** foothills and upland valleys support dry land farming. Productivity is low, but subsistence is obtained from drought resistant crops, such as barley and transhumant flocks of small ruminants that move to the mountain pastures in the summer. Much of the agriculture is conducted on sloping land and soil erosion caused by wind or water is leading to serious land degradation. More productive, but resource conserving modes of land use are needed. Conservation tillage methods need to be improved to ensure a sustainable soil fertility maintenance and higher yield.

**In rainfed areas,** inputs are low and problems in maintaining soil fertility under the predominant cereal-based systems in the absence of fertilizers are developing. The emerging small farmers need assistance with enterprise development and introduction of new crops and rotations. Under the extensive cropping systems of the former Soviet Union, the predominant rotations included annual fallow so large areas remained unsown each year. There is an opportunity to reduce the area under summer fallow and diversify production by introducing alternative crops. Considerable potential exists for developing diversified farming based on the integration of crop and livestock production approach.

**In irrigated areas,** salinization and waterlogging are major problems due to either the lack of drainage systems or poor maintenance of the ones existing drainage systems and the rising water tables. Management of former state-operated large-scale irrigation systems is collapsing. Opportunities for intensifying irrigated agriculture exist, but only if appropriate water management systems are applied for water delivery to private holdings. Appropriate irrigation and drainage practices are employed at the farm level to maximize the productivity of water and control salinization.

**(ICARDA)**

*Sub-Theme 1.2. Germplasm Enhancement*

1. **Spring Wheat**

The high-latitude spring wheat improvement project, managed by CIMMYT, is targeted to develop improved germplasm for northern Kazakhstan. The highlights include the following:

a. Shuttle breeding program to combine drought tolerance, disease resistance and end-use quality in day-length sensitive background has been established. The following activities have been conducted:

Mexico. The area with additional light was established in Cd. Obregon and Toluca to allow selection of bread wheat sensitive to day length in early generation. The crossing program makes annually 300-400 crosses. The F3 and F4 lines are grown under normal conditions and extended light to allow evaluation of response to day length. Screening for disease resistance is done starting from F2 both in Cd. Obregon and Toluca. The resulting F4 or F5 lines are sent to three key locations in Kazakhstan and Siberia for selection for adaptation. In 2001 the first 120 lines originating from the program were sent to the region. Additionally more than 1500 lines were supplied which can have adaptation to the region. Similar work is being carried out in durum wheat and triticale. Kazakhstan/Siberia. The quarantine nurseries were established at key locations. The selection of the most suitable local parents for the shuttle was done and more than 100 lines were shipped to Mexico. The selection from CIMMYT nurseries was made and respective information and the seed of 50 lines were sent to Mexico for utilization in crosses. The best 50 lines selected from CIMMYT nurseries in 1998-2000 were distributed to 12 breeding programs in the region for planting in 2001. The durum lines identified from international nurseries were included into crossing program and distributed in the region.

b. The leaf rust epidemic in some areas on northern Kazakhstan allowed identification of effective Lr genes and sources of resistance due to special nurseries obtained from CIMMYT and distributed by the Kazakh Inst, of Cereals.

(CIMMYT)

**2. Winter Wheat**

*Introduction*

The increase in yields and stabilization of grain production is the most important objective for all countries of Central Asia and the Caucasus to achieve their urgent goal of food independence. In the past, many countries of the region had to grow certain crops on large areas. In Uzbekistan, Turkmenistan, Azerbaijan it was cotton, in Georgia, Armenia, and Tajikistan fruits and vegetable

production was dominant. At present period of time two trends are evident: a sharp increase of acreage under cereals especially bread wheat and widening areas of cereal crops under irrigation. In the previous years cereals were grown in general in rainfed conditions. Lately, the area covered by irrigated winter wheat has been increasing steadily, reaching only in Uzbekistan 1.1 million ha in the present season.

The main biotic stresses that limit cereals production in the Region are diseases and insects. During the last three years yellow rust has been the most important pathogen, which has considerably decreased wheat productivity in Uzbekistan, Azerbaijan, Kyrgyzstan, Tajikistan (in some seasons up to 40 %). Sunny-bug is the most spread and pestiferous insect, which affects yield and especially grain quality.

***Superior winter and facultative wheat germplasm for Central Asia and Caucasus***

• Efficient mechanism of germplasm exchange has been established with International Winter Wheat Improvement Program (IWWIP), CIMMYT-Mexico and CIMMYT/ICARDA program at Syria playing important role in a) supplying the winter/facultative germplasm for the breeding institutions; b) receiving the best regional germplasm for incorporation into international breeding programs.

• Performance of the germplasm developed through cooperation with international centers:

- Armenia. The lines identified (3rd YET-IRR 9806-ZCL/3/PGFN//CN067/SON64(ES86-8)/4/SERI/5/UA-2837, 9810-OK82282//BOW/NKT) were tested in preliminary and yield trials and exceeded the local check by 15-20%.
- Georgia. Variety Mtskhetskaya 1 (5th FAWWON 35 - TAST/SPRW//SAR) identified by Mtskheta Breeding Station demonstrated yield advantage of 10-15% compared to local check and was superior in yellow rust resistance.
- Azerbaijan. Varieties Azametly (16* ESWYT 12 - PRIMA), Gobustan (RBWON-SAA 2 - PEG//HD2206/HORK) and Nurlu 99 (KAUZ) have been included in official testing in 2001. A number of superior winter durum lines were identified and included into the yield trials. Six triticale lines have been identified and included into multilocational testing.
- Kazakhstan. Breeding line identified as 2902 (BHR/AGA//SNI/3/TRK13) demonstrated excellent yield (10-15% compared to local check) in two large plot on-farm trials/demonstration in Almaty region and will be submitted for official testing in 2001. Several tons of seed is accumulated. Eight triticale lines have been identified and included into preliminary yield trials.

  Kyrgyzstan. Breeding lines (NS55-58/VEE and F10S) demonstrated yield advantage of 5-15% compared to Bezostaya 1 and are included into large plot on-farm verification trials for 2000-01 season.
- Tajikistan. Wheat varieties Tacica (5th FAWWON 35 - TAST/SPRW//SAR) and Norman (5th FAWWON 37 - ORE F1.158/FDL//BLP/3/SHI4414/CROW) entered official trial in Tajikistan. Some areas are cultivated by varieties Atay, Sultan, Kinaci (imported from Turkey and originated directly or indirectly from CIMMYT). Turkmenistan. Three varieties: Garagum (TRAKIA/KNR), Guncha (HYS/7C//KRC(ES84-16)/3/SERI) and Bitarap (SN64//SKE/2*ANE//3/SX/4/BEZ/5/SERI) entered the official testing and multiplication on farmer's fields.

- Uzbekistan. Variety Dustlik (YMH/T0B//MCD/3/LIRA) entered official trial and demonstrated 10-20% yield advantage over the best local standard cultivars in on-farm trials.

  Regional: the winter wheat germplasm created healthy competition to the locally derived germplasm and in all countries competes well with the local checks.

(CIMMYT/ICARDA)

Yellow rust initiative started in spring 2000 aiming at enhancement of resistance through targeted crosses, understanding of genetics of resistance and pathogen population. The initiative unites five institutions from Kazakhstan and Uzbekistan with CIMMYT playing catalytic, technical and coordinating role.

GTZ/CIMMYT project (1st phase, 1999/2000). "Revitalization of cereals breeding, seed production and variety testing in Tajikistan" was successfully completed with the following outputs: identification of most suitable wheat varieties for major production areas of the country through official uniform variety trial using new methodology; seed multiplication (130 t) of adapted yellow rust resistant varieties; establishment of multi-location testing (six sites instead of one) for breeding trials; provision of essential machinery for breeding and seed production (tractors, combine harvester, threshers, planters, cleaners); training.

GTZ/CIMMYT regional project (1st phase, 1999/2001) "Regional network for winter wheat variety promotion and seed production" aims to establish sustainable and efficient mechanisms of promotion of better varieties and seed production in the "chain "research institution-seed farm-administrative unit". The network includes Kazakhstan, Tajikistan and Uzbekistan. So far the regional work plan was developed at the first planning meeting. The institutions and the farms participating in the region have been identified and country work plans are being developed.

Characterization and classification of breeding environments in winter wheat is being completed. The field data from international and special nurseries is being analyzed. The detailed questionnaire was mailed to each program asking for description of target area and classification of the regions according to ME.

The World Bank funded regional seminar "Introduction of new technologies through on-farm trails and demonstrations" was conducted in Almaty in May 2000 and attended by 30 participants. The seminar combined theoretical and practical aspects of on-fann activities.

(CIMMYT)

*Strengthened NARS wheat breeding/research capacity*

• Wide scale training was conducted to enhance the knowledge and skills:

In-country:

20 people were trained English language
50 people were trained modern agronomy and breeding methods
15 people were trained PS breeder's software
20 people were trained economic analysis of technology testing data
10 people were trained rapid rural appraisal methodology

Regional:

30 people were trained on-farm trials and demonstrations
15 people were trained wheat breeding and agronomy

International:

Two persons were trained winter wheat breeding methodology (1 month, Turkey)

14 persons were trained wheat improvement (6 months, Mexico)
Two persons were trained in advanced wheat improvement (1.5 months, Mexico)

**(CIMMYT)**

***Regional wheat improvement and genetic resources network***

Central Asia and Caucasus Winter Wheat Improvement Network (CAC-WWINET, a joint venture with ICARDA) continued its activities, which in 2000-2001 comprised: distribution of the 1st Regional Winter Wheat Exchange Nursery representing germplasm from all the eight CAC countries; coordinated evaluation of the germplasm for specific traits (grain quality, diseases); publication of two newsletters in Russian language; a coordination meeting in Bishkek in September, 2001.

**(CIMMYT/ICARDA)**

***1PM in CAC countries***

The following IPM activities were jointly carried out with NARS:

Survey of insect-pest and diseases
Sunn pest on wheat and Cereal leaf beetle on barley in Uzbekistan
Sunn pest and Cereal leaf beetle on wheat in Kyrgyzstan
Sunn pest on wheat and Cereal leaf beetle on spring barley in Kazakstan

In collaboration with the University of Vermont, NARS and ICARDA, entomopathogenic fungi of Sunn pest were collected from overwintering sites in Uzbekistan, Kyrgyzstan and Kazakhstan. Thus,

Thirty-five entomopathogenic fungi were isolated from the specimens collected in Uzbekistan and 50 from those collected in Kyrgyzstan and Kazakhstan Eighty percent of the isolates collected from Uzbekistan were Beauveria bassiana, and the remaining were members of the genus Paecilomyces.

***Emphasis on stress factors***

Considering the need, collaboration in the areas of germplasm development/evaluation was strengthened. Special emphasis was placed on drought and heat tolerance, yellow rust, leaf minor, and Sunn pest management.

***On-farm trials/demonstrations in Uzbekistan***

- These were conducted at 10 locations in three different regions. The yield advantage was 10-31 %. A traveling workshop on-farm trials and demonstration plots was organized in Jizzak and Kashkadarya regions of Uzbekistan, May 8-9, 2000. A total of 53 scientists and farmers participated.

**(ICARDA)**

## 3. Barley

***Introduction***

Barley is the second most important grain crop after wheat in all CAC countries. The largest area has been occupied by barley in Kazakstan, where the crop before the recent dramatic changes covered up to 7million hectares. Even after a considerable contraction of the sown area of all

grain and forage crops barley is still grown on rather a large area of about 3 million hectares in this country. Most of barley crop in Kazakstan is of spring type and has been grown for feed in the steppe with semiarid climate under rainfed conditions with the annual precipitation rate between 250 and 350 mm. Spring barley is fitting well to fallow-grain rotations, occupying usually one of the 3-5 grain fields, the last field before the summer follows as a rule. The seeding dates are normally just after the sowing of spring wheat which is at the end of May. Spring barley is also grown in the mountainous areas of Kyrgyzstan and Armenia. In southern Kazakstan, Kyrgyzstan, Uzbekistan, Tajikistan, in plain valleys of Kyrgyzstan, and in the Caucasus countries Georgia and Azerbaijan it is winter barley, which is a dominant crop.

Usually, barley yields are on an average about 10-15% higher than wheat, which was enough to justify the increase of grain production. But this yield increment became insufficient under the present market conditions when wheat grain prices went up very fast. Therefore, to be competitive with wheat crop barley varieties must out-yield wheat by 25-30%.

***Major constraints to barley production***

Main constraints are the difficult economic circumstances faced by the farmers, with low and unstable prices for grain, limited access to credit and inputs, etc. Often, farmers fail to implement the whole set of agrotechnic measures, because of lack of basic knowledge in the sphere of agricultural technologies. Mismanagement and procrastination are the reason of delay in planting and harvesting of the crop. Time and financial investments are needed to rearrange *shirkat* and private farms to new trends in agricultural development of the country. It requires new efforts to train specialists and farmers in growing of cereal crops. Also, the biological science should find new adequate approaches corresponding to changes in economy and new trends in the development of grain farming.

The main biotic factors limiting the grain production in CAC countries are diseases, insects, and weeds. In barley, diseases, such as net blotch, powdery mildew, and loose smut are important. Also, insects such as: Sunn pest and cereal beetles can cause a considerable loss in grain production. Sunn pest is the most widespread insect pest, which affects yield and especially grain quality. Weeds are another very serious constraint especially during the recent years when farmers had to stop application of herbicides for weed control.

Among the abiotic factors, the major ones are drought, high temperature during grain filling stage, sometimes sever cold in winter time, and high soil salinity. Under rainfed conditions, heat and drought are frequent constraints which condition yield decreases.

In the southern Kazakstan, spring barley is usually planted to a depth of 8-10 cm because of delayed seeding dates (at the middle or end of May). Therefore, the seedling vigor is very important. However, in this environment drought is by far the most serious yield constraint, which may occur at any time and at any crop stage. Thus, varieties should be drought-tolerant during all periods of growth, especially between tillering and heading. At the same time, barley varieties should be very responsive to erratic rainfalls, which sometimes are intensive.

Spring barley has an economic importance as a so-called reserved crop which can be used for 'repairing'' winter wheat and winter barley fields damaged by severe frosts. For this purpose barley varieties should be early ripening. As distinct from wheat, which is mostly produced in irrigated areas, barley usually would be grown on rainfed fields or under supplementary irrigation. As a rule, crop is for feed grains although there is a growing interest to develop malting barley varieties because of their greater demand. Some varieties have already been developed in Kazakstan.

These factors compel national scientists and representatives of international donor organizations to seek ways and methods to meet the challenges and overcome barriers in grain production. The crop improvement through breeding and seed production is considered as a very effective approach to increase wheat and barley yields by 20-35%. This is the cheapest way for farmers.

*Major challenges:*
The major challenges in barley improvement are:

- Drought and heat as the main constraint for barley in the period between heading and grain filling stage.
- Winter-hardiness is the other important trait for winter barley cultivation almost throughout the CAC Region.
- The high soil salinity is becoming a very serious constraint limiting barley yields in rainfed conditions and irrigated environments.
- Leaf diseases and also loose and covered smuts are very important constraints to barley grain production.
- The early ripeness is important for winter barley in irrigated conditions in order to have time after harvest to practice double-cropping.
- Improvement of malting and brewing qualities of barley gram is an urgent task of breeding to meet demands of industry and market.

*Main activities and outputs in 1999/2000*
The main activities include the following:

- Distribution of international nurseries of spring and winter barley from ICARDA Headquarters in Aleppo and spring barley from CIMMYT, Mexico.
- Targeted crossing for specific countries and environments, using CAC materials and improved barley germplasm (2000-2003).
- Introduction of improved varieties into practice by jointly carrying out the on-farm trials/demonstrations in Uzbekistan (at 10 locations in three regions), Armenia (two locations), and Azerbaijan (one location).
- Strengthening of the national barley programs by
- Appointment of national coordinators for barley improvement and preparations for the establishment of a Barley Improvement Network for CAC (CAC-WNET).
- Training to CAC NARS in English language (2000-2001), and plot design, data and field book management.
- Providing computers to all the eight CAC countries for computerization of the national barley programs.
- Financial support for operational expenses of the national barley programs in Kazakstan, Kyrgyzstan, and Uzbekistan;
- Assistance to eight barley scientists in preparing abstracts for the 8th International Barley Genetic Symposium, Adelaide, Australia.
- Assistance in seed multiplication of new promising lines and varieties for (i) the official state yield trials, (ii) on-farm trials and demonstration plots, and (iii) for basic seed increase of a spring variety Mamluk in Armenia.

(ICARDA)

## 4. Potato

The activities of the International Potato Center (CIP) in the CAC Region have concentrated on:

The identification, assessment and evaluation of national project needs and opportunities

Training activities, involving all eight countries of the region and - Strategic partnerships and medium-term plans for the CAC Region.

Discussions were held with Armenian potato scientists to initiate two potato projects in Armenia during the year 2000. The first will be a well-defined seed potato project, and the second a much more comprehensive potato project, which will include everything from seed production to marketing. In general, it may be said that following a year of region-wide evaluation and information gathering, CIP reached the stage of concrete project planning and identification of potential donor agencies. The fact that so far concrete projects are only being discussed for three of the eight countries of the CAC Region does not mean that the other countries are being neglected. A search for concrete project opportunities for all eight countries was constantly underway.

Within the framework of CGIAR Program, CIP organized a workshop/training course in Russian language on the management of potato germplasm and potato seed production systems for 11 participants from eight CAC countries, viz., Armenia (2), Azerbaijan (1), Georgia (1), Kazakhstan (1), Kyrgyzstan (1), Tajikistan (3), Turkmenistan (1), and Uzbekistan (1). This workshop/training course was conducted from October 23 to October 30, 1999 by Polish potato scientists from various departments of the Polish Plant Breeding and Acclimatization Institute (IHAR) at the facilities of the Mlochow Potato Research Center in Poland.

**(CIP)**

## 5. Food Legume Improvement

### a. Chickpea and lentil

*Introduction*

As a result of monoculture dominant in agriculture during the former administrative system many valuable plants turned out to be in the category of "neglected crops" and thus received very little attention for their commercial production and research activities. Now, agricultural administrators in the Region and the national program scientists realize the need for crop diversification to provide cotton- and/or cereal-based sustainable cropping systems in the region. Thus, legumes could occupy a worthy place in new crop rotations and the economy of agriculture. They could considerably contribute to soil fertility improvement through the symbiotic nitrogen fixation and thus serve as an important component of subsistence farming in many countries. Therefore, food and forage legumes have great potential and importance in the farming systems in all the eight CAC countries; their promising perspectives for production and breeding improvement especially exist in Uzbekistan, Kazakstan, and Azerbaijan.

A project on Germplasm conservation, adaptation and enhancement for diversification and intensification of agricultural production in CAC countries was initiated in September 1998, under the Consultative Group on International Agricultural Research (CGIAR) and in the frameworks of the Collaborative Research Program for Sustainable Agricultural Development in CAC with its headquarters in Tashkent. Since then, a large number of elite lines of chickpea have been supplied by ICARDA for their evaluation for adaptation under local conditions in all the eight CAC countries. In addition, efforts were made to strengthen the NARSs capability and

linkage between different CAC countries either through residential training courses or study visits to ICARDA headquarters in Aleppo, or through in-country and regional training courses.

***Major challenges***

Chickpea crop, which is mainly grown in the spring under the conserved moisture conditions face the following challenges:

- Drought as a common stress in all the countries, and in some areas cold at seedling stage and drought and high temperatures at flowering stage;
- Ascochyta blight as an important disease affecting the seed yield in Uzbekistan and Azerbaijan;
- The spring weeds in some areas also cause a serious damage and need special attention. Furthermore, the agronomy of the crop needs exploration throughout the region.
- Promoting chickpea in mild winter areas as winter crop (autumn-planted) and advancing the planting date from traditional spring to early-spring, based on the very promising results obtained so far..

***Objectives***

- To develop and deliver improved germplasm to CAC countries
- To conduct on-farm evaluation and demonstration of improved cultivars and production technology for farmers
- To improve the research capability and expertise of national scientists
- To establish a legume network for CAC countries as mechanism to help them benefit from one another.

***Activities/Outputs in 1999/2000***

- Distribution of Food Legume Trials/Nurseries

| Country | Chickpea | Lentil | Faba bean | Total |
|---|---|---|---|---|
| Armenia | 1 | 1 | - | 2 |
| Azerbaijan | 3 | 2 | 1 | 6 |
| Georgia | 8 | 9 | 4 | 21 |
| Kazakhstan | 5 | 1 | - | 6 |
| Tajikistan | 2 | 2 | - | 4 |
| Uzbekistan | 6 | 1 | - | 7 |

Screening for drought tolerance in chickpea and lentil in Uzbekistan at UPJPI and Galla-Aral

Demonstration and seed increase of chickpea and lentil in Armenia, Azerbaijan, Georgia, Kyrgyzstan and Kazakstan (Shortandy and Almaty) - Visit of CAC scientists to ICARDA and of ICARDA scientists to the region A Regional Training Course on "Legume Improvement" in Tashkent, 2000

**New promising lines identified**

Armenia: Chickpea: Flip 93-174C, Flip 94-93, Flip 95-45, Flip 95-52, Flip 95-57, Flip 95-69. Lentil: ILL 4605, ILL6002, ILL 6037,ILL 6434

Georgia: Chickpea: CIEN-W-MR1-2000: 13144, 13146, 13244, 13247, 13223

Lentil: LIEN-L: 1112, 1114, 1113, 1206, 1109. Promising lines of lentil (34112, 34120, 34211) and chickpea (6129, 6249, 29219 from 1997-98) are sent for official variety testing and one of the best will be submitted for registration. Faba Bean: FBIABN: 31112, 31103, 31202, 31115, 31306

Azerbaijan: Chickpea: CIEN-MR2-2000: 14224, 14208, 14240, 214, 223,201,210, 211, 215,219, 248, 249,220; CIABN-2000: 21244, 21239, 21226, 21206
For large scale testing and increase
Chickpea lines: FLIP 88-85C, FLIP95-45C, FLIP 95-65C, FLIP 95-69C.
Lentil: LIFWN: ILL 6037, 6434, 8074, 8119, 8120

Kazakhstan: ChickpeaFLIP 97-137C, FLIP 97-186C, FLIP 97-198c, FLIP 95-55c, FLIP 88-85c, FLIP 95-69C. FLIP 88-85C and Flip 97-37C are best for release Lentil: ILL 4605, ILL 5582, 6037. 6037 are best lines.

Kyrgyztan: Chickpea: S95277 and S95439 lines were selected for increase

Uzbekistan:

Chickpea : a) 294 chickpea accessions were grown in autumn and 42 were selected; b) 66 accessions were grown in spring and 12 were selected. Chickpea lines for increases: FLIP 88-85, FLIP95-52, FLIP95-55, FLIP 96-69C. Lentil: 130 lines were grown and 45 were selected.

Spring planting At Bakhmal Experimental Station: Chickpea:
10 selected lines for seed multiplication and testing. Lentil: 10
selected lines for seed multiplication and testing.

**(ICARDA)**

**b. Groundnut**

***Introduction***

At present, groundnut *{Arachis hypogaea)* is a minor crop in the agriculture of Central Asia and Caucasus region (CAC). Statistics about area, production, and productivity of the crop in the region are not well documented. Legumes can help in crop diversification and improving the productivity of predominant cereal-based cropping systems in the region in a sustainable manner. Most of the countries in the region import edible oil, which strains their national economy. Groundnut can effectively fill in this gap in the economy and stimulate edible oil and other groundnut processing industries in the region.

With a view to develop a long-term strategy to promote groundnut in the CAC region, the following activities were initiated in 1999 in collaboration with scientists in the national programs of the region: review and synthesis of information available on groundnut in the region; assembly of available crop, soil, and climate data bases on CAC countries to identify existing and potential areas of groundnut cultivation; an appraisal of groundnut production situation and potential constraints in selected countries, and development of near-term and long-term work plans to achieve the objective of sustainable increase in groundnut production in the region.

***Achievements in 1999/2000***

To pursue aforementioned activities further, the following steps were taken in 1999/2000.

***Visit to the region:*** Principal Groundnut Breeder from ICRISAT visited Azerbaijan and Uzbekistan in September 1999 to appraise groundnut production situation and identify its potential constraints in these countries. In general, the crop in Uzbekistan suffered little damage from diseases and insect pests. Although, the crop husbandry was of high standard there, in many places the crop showed yellowing of terminal leaves probably induced by iron chlorosis. In Azerbaijan, groundnut holdings were smaller than that of Uzbekistan, the crop suffered from leaf spots, and many plants showed virus-disease like symptoms.

*Supply of breeding* ***materials:*** To initiate genetic enhancement activities in groundnut in the region, the following breeding lines and sets of international trials were made available to five countries.

| Country | Materials |
|---|---|
| Uzbekistan: | 35 elite breeding lines |
| Armenia: | ISGVT, IMGVT (SB), ICGVT, and IDRGVT |
| Azerbaijan: | ISGVT, IMGVT (SB), ICGVT, and IFDRGVT |
| Tajikistan: | ISGVT, IMGVT (SB), ICGVT, and IFDRGVT |
| Kyrgyzstan: | ISGVT |

ISGVT = International Short-duration Groundnut Varietal Trial
IMGVT (SB) = International Medium-duration Groundnut Varietal Trial (Spanish Bunch)
ICGVT = International Confectionery Groundnut Varietal Trial
IDRGVT = International Drought Resistant Groundnut Varietal Trial
IFDRGVT = International Foliar Diseases Resistant Groundnut Varietal Trial

*A* ***Regional workshop:*** A review and planning workshop was organized at Tashkent during 16-19 November 1999. In addition to two scientists each from ICRISAT and CGIAR-CAC-PFU, 13 scientists from six countries (Armenia, Azerbaijan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) in the region also attended the workshop. The main outputs of the workshop included increased awareness among the scientific community in the region of the potential beneficial role groundnut in CAC agriculture, work plans for collaborative research and development activities, and a concept note on groundnut research and development activities in the region for possible donor support. The proceedings of the workshop will be published in November/December 2000.

***Collaborative work plans:*** The future work plans cover all aspects of groundnut genetic enhancement and production. In the genetic enhancement, the short-term strategy involves introduction of diverse improved breeding materials and their evaluation for performance and local adaptation in the region. In the long-term, a self-sustaining genetic resources and enhancement program is proposed to be established in interested countries, which will cater to the local requirements. In both cases, seed production of selected promising genotypes and their dissemination among farmers will receive a high priority.

The crop production research will focus on agronomy and plant protection measures to promote groundnut production in an environment-friendly, sustainable manner. As the crop will be venturing into many new areas and new uses, the socio-economic and policy issues will also be addressed. Of course, the future collaborative activities will require a strong support from donors and local administrators and policy makers.

***Training of CAC scientists at ICRISAT:*** Three scientists (and potential collaborators), one each from Azerbaijan, Kyrgyzstan, and Uzbekistan, under went 3-month 'hands-on' training (August-

November 1999) in groundnut improvement and production technologies at ICRISAT. They also selected breeding populations at harvest for evaluation in their respective countries.

*Characterizing current areas of cultivation and identifying new areas*

Although the groundnut crop is currently grown on a small scale in the CAC countries and its area has declined over period of time, there is good scope to recapture and further increase the area under the crop with the changed political, social, and economic scenario. This is because the crop is adapted to a diverse soil and climatic conditions.

*Approaches*
Our approaches in expansion of groundnut cultivation in CAC countries are common to other crops and regions. These are:

- Increase groundnut productivity per unit area

We propose to achieve this objective by identifying major constraints to groundnut production in the target regions and introduce varieties that are tolerant to specific biotic and abiotic stresses and that are specifically adapted to the target region. We expect that these varieties will have positive and synergistic crop x environment interactions that would help in maximum expression and realization of available genetic yield potential

- Increase area under groundnut cultivation

We plan to attain this goal first by characterizing the current groundnut growing areas in quantitative terms of soil and climate parameters and identifying areas that produce high yield. Using soil and climate surface maps we would, then, identify potential niches similar in characteristics to current high yielding groundnut areas. This information will be used to formulate and suggest new production systems with groundnut as a component crop.

**(ICRISAT)**

**6. Forage Legume Improvement in CAC**
*(Forage Legumes: common vetch -Vicia sativa; grass pea -Lathyms sativus)*

*Introduction*
Livestock is an integral and important part of farming systems where crop production is limited by large seasonal variations in rainfall. Annual forages such as vetches(Vicia spp.) and grasspea or chickling *(Lathyrus* spp.) are recognized for their potential to produce extra feed from fallow land, and through the interruption of cereal monoculture. These crops can be used for direct during late winter or early spring, harvested for hay in spring either in pure stand or in mixture with cereals (oat, barley, or triticale), or for grain and straw at full maturity. They are mainly used for feed livestock. Each crop tends to have an ecological niche. For example, grasspea is suitable to low rainfall areas between 200-300 mm, because of its great drought tolerance, whereas wooly-pod vetch and Hungarian vetch are adapted to high elevation cold areas because of their rapid winter growth and cold tolerance.

Forage legume production is also expected to have a positive effect on rangelands by: a) reducing overgrazing problem and b) allowing for adoption of proper grazing systems. The revival of livestock is inevitably connected with increasing animal feed production. Leguminous crops are rich in protein, essential amino acids, phosphorus and calcium. Their straw is also used for livestock feed.

*Major constraints*

- Biotic (Diseases and insects)
- Abiotic Stresses (Cold, drought and heat)
- Losses during harvesting
- Socio-economic problems

*Germplasm enhancement*

Although, there is a huge diversity of *Vicia* spp. and *Lathyrus* spp. only a few have been used as food and feed crops, and these have received little attention in the past from plant breeders and agronomists. In areas where rainfall is less than 300 mm, *Lathyrus* spp. are common, whereas in higher rainfall areas *Vicia* spp. are better adapted. *Vicia narbonensis* is adapted to dry sites, whereas *Vicia ervillia* and *Vicia sativa* perform better with more moisture. *Vicia villosa spp. dasycarpa*, and *Vicia panonica* are better adapted to cold environments in the highlands. Underground vetch *{Vicia sativa* subsp. *amphicarpa)* and underground chickling *(Lathyrus ciliotatus)* are adapted to areas with marginal lands, hilly rocky non-arable lands and low rainfall.

*Objectives*

- The major objective of ICARDA breeding program for forage legumes improvement is to develop and produce improved lines of feed legume crops for national programs mainly vetches and lathyrus and to target these crops to feed livestock in areas with less than 400 mm rainfall either in crop rotation in arable land or marginal non-arable lands.
- To conduct on-farm evaluation and demonstrations of improved promising lines and their production technology for farmers
- To improve the research capability and expertise of national scientists
- To establish a legume net work for CAC countries

It is also highly desirable to have widely adapted varieties that can be recommended for different locations with similar agronomic-ecological conditions. While attempting to improve yield potential and adaptation to environments, emphasis should be laid on ensuring that the quality components of the end products such as palatability, nutritive value, protein content, intake of herbage, hay, grain and straw are acceptable by animals.

*Activities in 1999/2000*

- Distribution of forage legume trials/nurseries to CAC

| Country | Vetch | Lathyrus |
|---|---|---|
| Armenia | 1 | 1 |
| Azerbaijan | 1 | 1 |
| Georgia | 4 | 2 |
| Kazakstan | 4 | 2 |
| Tajikistan | 2 | 1 |
| Uzbekistan | 2 | 2 |

- Screening for drought tolerance in forage legumes in Uzbekistan at URIPI and Galla-Aral
- Seed increase of vetch and lathyrus in Armenia, Azerbaijan, Georgia, Kyrgyzstan, and Kazakstan (Shortandy and Almaty)
- Adaptation trials in 7 CAC countries
- Screening for cold tolerance in vetch and Lathyrus in Uzbekistan at Galla Aral and Bahmal
- Identification of promising *V. narbonensis* lines for marginal areas

- Seed multiplication of four vetch lines for on-farm trials
- National capacity building
    - Visit of ICARDA forage legume scientist to CAC countries
    - Visit of CAC scientists to ICARDA
    - Regional training course on "Legume Improvement", Tashkent, 2000.

**The new promising lines identified:**

In Uzbekistan, vetch L-628 and L-694 were selected for seed multiplication and on-farm trials and demonstration plots.
In Kazakstan, lathyrus from ICARDA nurseries lines have been identified with advantage in yield productivity: **ILAT-LS-00-2, ILAT-LS-00-13.** They have perspective in Northern Kazakstan. For Almaty region **ILAT-LS-99 505and ILAT-LS-99 554** are more promising.

In Azerbaijan, selected lathyrus lines ACC/SEL 273/481, ACC/SEL 347/587, ACC/SEL 223/533, and ACC/SEL 491/533 have bright perspectives in the country. The advantage of these lines was so evident and significant that they can be used for the fast seed multiplication and commercial production.

Now, farmers are very interested in strengthening of the feed basement for livestock. For this purpose the new identified ICARDA vetch lines could be very useful: ACC/SEL 715/2556, ACC/SEL 362/2566, ACC/SEL 709/2603, ACC/SEL 4280/2630.

**(ICARDA)**

***Sub-Theme 1.3. Strengthening National Seed Supply Systems***

## 1. Seed Sector Analysis in Kazakstan

Seed sector analysis in Kazakstan was supported by the World Bank/Denmark funds and implemented by COWI Int. of Denmark) and ICARDA. The team, consisting of Mr. M. Lemonius (COWI), Drs. M. Turner and M. Suleimenov (ICARDA), Dr. I. Abugaliyev (NACAR) and Mrs. A. Bouts (MoA), made the study during 1-24 October 1998. The mission visited the following agencies: Ministry of Agriculture, NACAR, State Variety Testing Commission, State Seed Inspectorate, Associations of Seed Producers, Seed Farms and Commercial Farms.

***Status of the seed sector***
Seed sector of Kazakstan has been characterized by the following: low buying capacity of crop growers resulting in neglecting importance of good seeds; seed growers do not receive good price for quality seeds; state support to seed industry is inadequate and provided with big delays; seed producers use out-of-date machinery for production and processing of seeds.

***Recommendations to the Government of Kazakstan***
The mission gave the following recommendations to the Government of Kazakstan:

To establish a Seed Industry Counsel with a Secretariat to oversee policy in the Seed Sector;
To strengthen Seed Producers Associations;
To establish two well equipped pilot Seed Production farms to demonstrate new technologies;
To pass a Seed Law in the parliament;
To reduce number of seed quality control inspection activities;

To establish links with the International Seed Organizations; and To
allow more active involvement of private sector in seed industry.

***Outputs of the mission***

a. A workshop on results and recommendations of the Mission was conducted in Almaty at the NACAR on 22 October 1998.
b. A Report on "Analysis of the Seed Sector in Kazakstan" submitted to the Government of Kazakstan.
c. Recommendations of the Report presented and discussed at the National Meeting on the World Bank supported agricultural research activities in Kazakstan, Astana, 10-12 November 1999.

**(ICARDA)**

## ***Sub-Theme 1.4. Cropping System Management and Agricultural Diversification***

### 1. Farming Systems and Crop Diversification

During the Soviet-era, cropping specialization of countries was based on comparative advantage principle: Kazakstan - spring wheat; Kyrgyzstan - alfalfa and maize for seeds; and Tajikistan, Turkmenistan and Uzbekistan - cotton. This policy resulted in crop monoculture in all these countries except Kyrgyzstan with main crops taking up to 70% of cropland, followed by low crop yields and land degradation.

During the transition to market economy period dramatic market and politically driven changes occurred. In Kazakstan, a drastic reduction of sown area was observed. First of all, most radical sown area shrinkage happened for feed grains (barley) and forages because of dramatic reduction of livestock population. Wheat area was reduced also because of shortage of financial resources to buy inputs. Nevertheless, the wheat share in the cropland area increased. In Kyrgyzstan, most striking was the trend to increase wheat area at the expense of forages and feed grains. It can be explained by the fact of considerable reduction of livestock population, as well as better prices on wheat.

In Tajikistan, Turkmenistan and Uzbekistan, with slight differences between countries, the cropping pattern changed towards dramatic increase in wheat area at the expense of cotton and forages under irrigation. This trend occurred by and large because of political decisions to reach self-sufficiency in wheat in line with their Governments' policy of independence in production of strategic crops, namely wheat and cotton.

In spite of some differences in food policies of Central Asian countries they proved to be unsustainable and resulted in a further lowering of crop productivity and land degradation because of prevalence of grain crops and reduced share of forages (alfalfa). This trend was aggravated by the reduced rates of fertilizer application due to their non-availablity.

***ICARDA strategies to diversify cropping systems for better sustainability***

***a. Germplasm evaluation of alternative crops***

A set of experiments was conducted throughout Central Asia to evaluate the following alternative crops: food legumes (chickpea and lentil); forage legumes (lathyrus and vetch); and oilseed crops (sunflower, safflower, rapeseed).

Preliminary results were found promising. Yields of chickpea and lentils (between 1.5 and 2 t/ha) were obtained under rainfed conditions in northern Kazakstan, where chickpea has a very small sown area, while lentil is an unknown crop. Although the 1999 crop year was characterized with extremely favorable weather conditions, food legumes most probably can become very important source of income for small farmers considering very good demand and high prices in the region. However, marketing studies will be very important to ensure introduction of alternative crops.

*b. Studies of crop rotations as affected by crop diversification*

These studies were initiated in 2000 in the five Central Asia republics under the umbrella of the ADB-supported project " On-farm Soil and Water Management for Sustainable Agricultural Systems in Central Asia" in the following areas:

*"Grains and summer fallow based crop rotations in rainfed cropping systems"*
Trials established in northern Kazakstan (Grain Production RI, Shortandy), in southern Kazakstan (Crop Husbandry RI, Almalybak); in Kyrgyzstan (Soil and Crop Management RI, Zhana Pakhta) and in Uzbekistan (Grain Production RI, Galla-Aral).

*"Wheat based crop rotations in irrigated cropping systems"*
Trials established in Kyrgyzstan (RI of Soil and Crop Management, Jal), and Turkmenistan (RI of Agriculture).

*"Cotton and wheat based cropping systems"*
Trials established in Uzbekistan (Cotton Research Institute), and in Tajikistan (Soil Science Research Institute).

*c. Conservation soil tillage studies*
Minimum and zero tillage studies in combination with crop rotations and soil fertility management were started in the rainfed cropping systems of northern and southern Kazakstan. Conservation tillage studies were started in the rainfed cropping systems in Kyrgyzstan and Uzbekistan. Conservation tillage studies were started in the irrigated cropping systems in Tajikistan, Turkmenistan and Uzbekistan).

(ICARDA)

2. Modern sustainable cropping practices for high latitude spring wheat and irrigated facultative/winter wheat

• The second year of the World Bank IDF grant "Improvement of productivity, sustainability and profitability of wheat sector in Kazakhstan" demonstrated to farmers the advantages of the new technologies in making their production higher yielding and with higher returns. For the southern part of the country it was shown that better varieties planted with low rate and fertilized once with medium rate provide the best return compared to farmer's practice as well as to maximum yield potential practice. In northern Kazakstan, the role of variety, planting time and preceding crop was clearly demonstrated. More than 10 farmers obtained free seed of a set of varieties for participatory selection.

The visits **and** consultations on zero tillage in 2000 resulted in establishment of a set of experiments in Shortandy and Karagandy in 2001 to look at visibility and practical aspects of introduction of zero tillage in the northern Kazakhstan.

The World Bank funded regional seminar "Introduction of new technologies through on-farm trails and demonstrations" was conducted in Almaty in May 2000 and attended by 30 participants. The seminar combined theoretical and practical aspects of on-farm activities.

**(CIMMYT)**

## ***Sub-Theme 1.5. Livestock Production Systems and Integrated Feed/Livestock Management***

### 1. Integrated Feed Livestock Production in the Steppes of Central Asia

***Alain design features***

Through a grant provided by IF AD to ICARDA, and adaptive research project to improve the productivity of livestock production systems was initiated in Central Asia involving Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan. The project aims at helping the emerging production systems in a new scenario of open markets and privatization processes. The adaptive process features include:

A regional NRM orientation
Built on past experiences
Integrate experiences such as that of the M&M project in WANA and current development efforts
Projects a strong interaction through multi-partnership, integrating the comparative advantages and experiences of the GL-CRSP, ILRI, IFPRI and USDA
Focus on range-crop-livestock interactions

***Chronology of implementation***

- . Contract signed in March 99 (US$ 1.5 m) Pre-launching preparations until Sept 99 Launched in October 99 and is now under present implementation.

***Research strategy***

Elements of the strategy include:

- Organization of a basic research team of Pis and collaborators, involving ICARDA's NRMP, UC-Davis, U-Wisconsin and ILRI, within a range of disciplines:
  - > Socioeconomics
  - > Range and forage production
  - > SR production and health
  - > GIS and water management
- Close links with NARS to develop an on-farm participatory and market-oriented research framework geared to:
  - > Understand the nature of problems
  - > Focus on markets and market opportunities to reorient production systems
  - > Build on past knowledge and available techs

> Integrate production techs to increase production with a market orientation
> Promote training of researchers and farmers
> Link with thesis research programs and involve young professionals.

***Achievements***

***1. Research plan developed***

These were developed through four National Coordination meetings, which ended in a Regional Coordination Meeting. This is an achievement itself in view of the introduction of a new approach to solve problems. The document was approved in October by the Project's Steering Committee

***2. On-farm research sites established***

- Eight sites selected in contrasting environments in four countries, the whole set providing representativeness of SR-Production systems in CA
- Eight on-farm networks established (a network being a group of farmers in a site)
- Two unified research sites established, one each at Sorbulak (near Almaty) in Kazakhstan and the second at Boykozon (near Tashkent in Uzbekistan.

***3. Training***

The following types of training was provided:

- GIS at ICARDA for site Characterization
- Scientists trained in training workshop on early weaning and fattening of sheep (Nurata, Uzbekistan) to target markets
- Scientists trained in training workshop on range management methodologies
- Scientists trained in training workshop on socioeconomic methodologies
- Four CA scientists trained in the areas of range, forage, socioeconomics, and animal **production** at ICARDA.

***4. Status of production systems***

The reviews **on** production systems have been conducted and are being assessed for existing documents and data. Documents are completed and being translated into English.

***5. Technology file***

A compilation on technologies on range, forage production, flock management and health has been completed and are being translated into English.

**(ICARDA)**

# Theme 2. Natural Resources Conservation and Management

## ***Sub-theme 2. I. Irrigation, Drainage and Water Basin Management***

The presentation focuses on goals of irrigation management, issues in drainage management, reforms of water resources institutions and the proposed project of IWMI and SIC-ICWC to SDC.

The Aral Sea Basin provides water to some 7.6 million ha of irrigated area, and 90% of the river water is diverted to the irrigation system through a highly regulated physical infrastructure. The water takes a long traveling time from river to reach the root zone. The five republics in Central Asia share this water according to the agreements they have reached between them.

The irrigation management has two primary goals; uniform distribution consistent with water rights and reliable availability of water. While assessing the performance of irrigation systems, the performance tools should, therefore, look at these two key performance indicators. The uniform distribution over larger areas can be assessed through application of remote sensing tools. If the water distribution is not uniform, certain areas will receive more water than others, and thus the productivity over the area will not be optimized. Evaporative fraction can tell us what part of the system is well irrigated, and what parts are water stressed. Thus Evaporative fraction assessed through remotely sensed images can serve as tool to assess equity and reliability in water distribution over larger areas.

The temporal hydrographs of water deliveries to various irrigation systems can help in analyzing reliability. Unreliable distribution causes farmers to over or under-utilize water, and also leads to un-optimized productivity at the basin scale.

The primary principle in the drainage management is to minimize the drainage volumes, which is only possible if the irrigation is managed in such a way to correspond to crop water requirements. There are several options for on-farm drainage disposal:

- By using the drainage water for crops, which requires growing salt tolerant crops,
- Crops can be irrigated with drainage water at less sensitive stages,
- Drainage water can be treated, for example with sulfuric acid and gypsum, or
- Drainage water can be mixed with fresh irrigation water to make it less saline.

Considering the above, there are many knowledge gaps for using these options. Assessment of on-farm drainage water availability versus crop demand, its storage, treatment costs, and assessment of overall costs and benefits need to be carried out. The leaching requirements for the marginal quality water needs to be known, and the impacts on soil structure after a long term use needs to be assessed. Designing appropriate infrastructure, and appropriate institutions through community involvement are other issues that need to be addressed.

Central Asian Republics tackle the issue by dumping the polluted water into the river systems for diluting it. However, at a basin scale, dilution is not a solution for pollution, because the downstream water will become gradually more and more saline. The lands in downstream areas will get quickly salinized and water logged, which may be unacceptable to the downstream republics. This is exactly the situation, which the Aral Sea Basin is facing. The regional options seem to be:

- Discharge to surface waters (current practice)

- Discharge to oceans (requires new infrastructure, and is expansive)
- Evaporation Basins in areas where land has already gone out of production
- Serial Biological Concentration
- Land Disposal
- Aquifer Storage or
- De-salinization

However, the comparative costs and benefits of various options need to be assessed, which will vary from area to area and state to state. A combination of options can also be used.

*Reforming Water Resource Institutions:*
Water Resource Institutions around the world have been reformed due to different reasons. These include:

- Problems in financial viability due to inability to meet the O&M needs on time. For example, the Punjab province of Pakistan only recovers 33% of the costs, and Uzbekistan recovers only 16% of the costs.

- Another reason for reforms is to improve equity and reliability of irrigation delivery.

Usually, before reforming water institutions, the policy makers and all involved will ask two fundamental questions: (i) will the costs rise for farmers? and (ii) will the farmers be able to pay?

In general, the costs to the farmers increase after reforms as subsidies are eliminated. The experiences elsewhere show that farmers have ability to pay for O&M costs only and not the capital costs. In Sri Lanka, the O&M costs are 4-6.5% of net farm income, and in Pakistan and Egypt these are 6 and 5% of the net farm income, respectively.

The results from case studies in Philippines, Mexico and Pakistan and elsewhere show that the reforms improved equity in water distribution.

Reforms can only be successful if following conditions do exist before and during the reforms:

- The governments have a firm and consistent long term political commitment to reform;
- The water rights of water managing organizations as well as farmers are clearly defined and are consistent with the water delivery system;
- The Water Users Associations (WUAs) and farmers organizations are legally and politically recognized;
- The WUAs have right to raise funds and apply sanctions to offences; and
- The WUAs and water managing organizations are financially autonomous.

To sustain the reform efforts, following post-conditions need to be met:
- Multiple support to organizations in operation and maintenance, conflict resolution and legal issues;
- Periodical Financial Audits
- Possibility of federating the grassroots institutions at higher levels of the system.

In the Central Asian Republics, there is an Inter-State Commission for Water Coordination (ICWC) to look at the issues of inter-state water rights and distribution; each river basin has a river basin organization. Within each state, ministries of agriculture and water resources,

provinces (oblasts), districts *(rayons)*, and former State Farms with varying degree of privatization are managing water within their area of jurisdiction.

*Activities in 1999/2000*

*Project on "Institutional arrangements for water management in the Ferghana Valley"*
A project for analyzing and improving the institutional arrangements for improved irrigated agriculture and integrated water management in the Ferghana Valley, where three countries (Uzbekistan, Kyrgyzstan, and Tajikistan) share the irrigation and drainage infrastructure.

- For developing a project proposal, IWMI organized two workshops in 1999. These included one in September in Lahore in which participants were: from SDC Office in Tashkent, CA Regional Representative of SDC, four experts from Scientific Information Center (SIC) of ICWC, six from IWMI's Regional Office in Lahore, a senior IWMI fellow, and one international consultant. The second workshop was organized in Tashkent in November 1999 to develop project concept, its objectives and major components. The participants were from SDC, ICWC and IWMI.
- Proposal to SDC on "Irrigation Institutional Analysis" submitted in January 2000;
- In August 2000, the SDC co-financed a working meeting in Tashkent to draft the final version of the project in consultation with the participation of the representatives of the three participating NARS to finalize the components, determine activities of each component as well as responsibilities and collaborative arrangements. The project, with a budget request of US$ 750,000, has three objectives.

  > Possibilities for farmers in former collective farmers be organized into WUAs and in a way that these WUAs be responsible for O&M of irrigation and drainage infrastructure
  > Organizing water resources management in the valley that is compatible with respective hydrological boundaries
  > Analyzing water distribution in the valley to assess agricultural productivity of land and water to identify opportunities for real water saving

- One senior staff member (Dr. Vilma Horinkova) was recruited in May 2000;
- A student from SOAS in UK joined IWMI work in May 2000 to analyze reasons for successful and unsuccessful WUAs in Uzbekistan and Kyrgyzstan;
- IWMI's current and planned activities with the CAC NARS for institutions and performance studies in Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan and Georgia were discussed with different donors like SDC, ADB and IDA.
- For the CA, we need to

  > Analyze productivity per unit of water for various irrigation systems;
  > Know the relationship between available water and yield at scheme level;
  > Know when water is limiting productivity
  > Know when environmental conditions limit productivity

In the CA Republics, water diversions to cotton ranges from 1100 to 1500 mm, whereas the consumptive requirements for cotton is less than 750 mm. This indicates opportunities of real water saving. However there are constraints at different levels of the irrigation systems. These constraints need to be understood right from the river to the root zone to help restore the Aral Sea.

**(IWMI)**

***Sub-theme 2.2. On-farm Soil and Water Management***

***Introduction***

Following the break-up of the former Soviet Union, the changes during the transition towards a market driven economy in the five Central Asian States (Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) have brought with them a disruption of the economic infrastructure and a decline in living standards. The present yields and production levels are generally below those of the other developing of the world and, therefore, food security has become a serious concern of the countries.

After several meetings between ICARDA and national scientists of the Central Asia States, problems of soil and water management were identified as a priority and a research proposal was developed to attract funding for research. The proposal was submitted to the Asian Development Bank (ADB) for funding. ADB kindly supported our effort through the proposal entitled *"On-Farm Soil and Water Management for Sustainable Agricultural Systems in Central Asia"* with a budget of USD 1.2 million for three years. The objective of this project is to develop pilot research activities in the region according to identification of the themes and interests of each country. Activities are organized under themes: application of technologies that improve water and nutrient use efficiency; alleviation of salinization in irrigated areas; utilization of marginal water sources; and human resource development. The technologies and practices developed in each pilot project will target the farmers' needs and be applicable for implementation by farms with similar conditions.

In the plan of work, ICARDA and national scientists considered farmers in both rainfed and irrigated areas to be the primary beneficiaries of this program. Ultimately, the whole population of the region will benefit from higher production and improved food security. Successful implementation of the results should also benefit the environment.

*Objectives*

The project objectives are 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 the safe use of marginal water sources.

The project is being implemented through collaboration between ICARDA and national scientists of the five CA countries, building on available national research results and new technologies for sustainable use of land and water resources. Activities will be conducted in pilot sites selected according to specific needs and characteristics of each country. Results achieved at one pilot site may be transferred to other areas or countries for further adaptation and use.

***Project components and outputs***

***Component I. Development of improved strategies for on-farm** soil, water, **and** crop **management (water management, irrigation methods, fertility, tillage, crop diversification)***

Under this component activities have been divided into two groups for *lowland* and *highland/mountain* farming systems.

In *lowlands* of Uzbekistan, at the Boykozon Integrated Research Site, research activities on integrated crop and animal production systems, initiated in 1999, are being continued and expanded. Main emphases are given to water and irrigation management through testing and improving irrigation technologies to optimize irrigation process, increase water use efficiency and reduce soil erosion.

To optimize the use of land and water resources' potential, research activities on crop diversification and soil tillage are being conducted in Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Thus, experiments on crop diversification through introduction of alternative and intermediate crops into crop rotations have been conducted and are to be continued in Kazakstan, Kyrgyzstan, and Uzbekistan. Food legumes are considered to be the most promising crops to maintain and improve soil fertility and sustain rather high yield productivity.

Experiments on better soil treatment practices have addressed the issues of water conservation in the soil that would provide reduction of irrigation rates and increase of water productivity. These activities are conducted in Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.

A multidisciplinary approach, which is believed to be one of the main features of the Project's strategy for implementation, has indicated a need to establish demonstration sites within the Project's framework. Thus, in Kyrgyzstan, the activities to test various technologies of crop rotation practices, soil fertility build-up and maintenance as well as irrigation and fertilization methods have been initiated for further demonstration to the farmers of the region. In Turkmenistan, technologies of water-conserving tillage for winter wheat production that were tested at the pilot site would also be demonstrated to the growers.

For the *highland/mountain* farming systems, pilot sites have been established in Tajikistan and Kyrgyzstan. In Tajikistan, which is a mountainous country, the issue of soil erosion is a great concern. Therefore, the research activities in both rainfed and irrigated farming systems will be focused on developing technologies of soil conservation tillage.
In Kyrgyzstan as well as in rainfed site of Tajikistan, crop diversification and different tillage treatments are to be explored.

*Component II. Assessing and improving farm-level irrigation and drainage management to ensure the sustainability of irrigated cropping systems (leaching, drainage, irrigation methods and scheduling, crop selection)*
Under this component, in Kazakhstan, Tajikistan, and Uzbekistan agriculture management practices to improve salt-water balance in soil prone to salinization are being conducted for sustainable resource-use and increase in crop productivity. In Kazakhstan and Uzbekistan, the research sites are situated in the drainage-impacted areas of Arys-Turkestan canal and Hungry Steppe, respectively, where mainly cotton production has been conducted over a long period of time. Soil salinization caused by poor technical status of drainage network and application of inappropriate irrigation technologies has lead to low water use efficiency and significant yield losses. Therefore, the research priorities have been assigned to developing and testing advanced irrigation technologies that would improve irrigation water use efficiency and eventually soil reclamation status. In Tajikistan research site located in Vakhsh Valley, the activities on construction of vertical drainage system have been initiated to maintain water, salt and nutrient balance in soil.

In Turkmenistan, research activities specifically focus on developing adequate irrigation scheduling for production of traditional and new varieties of wheat to improve water-use efficiency and sustain economically feasible crop yields.

***Component III.*** **Assessing and improving the utilization of marginal water sources (recycled water, drainage water, etc.)**

Under this component, different types of marginal water will be tested for agricultural use to reduce stress on natural resources and save good quality water for drinking purposes. Thus, in Kazakhstan and Tajikistan, wastewater from Almaty and Khojent Cities is being tested for irrigation of agricultural crops. In both cases, wastewater goes through a treatment cycle and then flows to the freshwater bodies. It has been proven that nutrient properties of treated wastewater (TWW) can be beneficially used in agriculture provided there is an appropriate system to control the utilization process, especially with regard to contamination hazards. At the Sorbulak Integrated Research Site in Kazakhstan, the activities initiated in 1999 on fodder crop production under TWW utilization for irrigation are to be expanded. Beside fodder crops, TWW from Almaty City will be utilized for wood and other industrial crop production. It is also planned to initiate the research on biological resources of Sorbulak collector to explore an opportunity for further utilization of fish species for fish meal fodder production that would ensure balanced diet to the existing livestock system. As for the Tajikistan case, TWW from Khojant plant is being used for cotton irrigation and the activities are focused on testing different rates of TWW application for irrigation that includes its blending to river water as well as developing appropriate and environmentally sound fertilization rates to provide sustainable production of cotton.

In Uzbekistan and Turkmenistan, research activities are conducted on drainwater utilization for irrigation of grains and alfalfa. The major outputs of these activities will be developed recommendations and qualitative criteria of drainwater utilization in agriculture. It will contribute to reduction of drainage runoff and eventually prevent further deterioration of ecological status in these areas. At the same time, along with quality analyses of the final produce, it is planned to carry out monitoring of labor and financial costs to evaluate economical feasibility of drainwater reuse in agriculture.

***Component IV.*** **Human Resources Development: Capacity building of National Agricultural Research Services (NARS) [training in research methods and new management principles]**

Project's activities under this component cover different aspects of on-farm soil and water management by providing training opportunities in the region as well as in other countries of which the experience in the related fields can be beneficial to the farmers and NARSs of Central Asian countries.

Regional training courses will give the opportunities to NARS from the region to chare their successful experience with their colleagues. Thus, for example in 2001 an intensive training program will be planned.

ICARDA will provide individual training for Central Asian scientists on GIS and agro-ecological characterization and maintain at least one training opportunity in planned advanced short-term courses on soil and water resource management organized by ICARDA's Human Resources Development Unit (HRDU). At the same time, whenever possible and appropriate, ICARDA will provide participation of the scientists associated with the Project in international workshops and professional conferences as **well as** in in-country English training courses.

To strengthen the potential of NARS, ICARDA will register nominated postgraduate students of the National Programs who are working on the different project activities in its HRDU degree program.

All above activities are designated to enhance NARSs' human capacity building and to strengthen cooperation among scientists of the region as well as with international scientific community.

**(ICARDA)**

**Sub-theme 2.3. Rangeland rehabilitation and Management**

**1. Research on Range Management in Central Asia**

ICARDA's research on range management is conducted under the support of two projects:

- The Integrated Feed and Livestock Production in the Steppes of central Asia (IFL), funded by IFAD
- Sheep and Range Research project, funded by the USD A

***Collaborators***

ICARDA

- Range Project
- Forage Project
- Livestock Project
- Water Project
- GIS Unit
- Genetic Resources Unit

ARS-USDA and U-Utah (USDA Project)
UC-Davis (GL-CRSP) (IFL Project).

***Importance of rangelands In Central Asia***

- Fundamental as a feed source for livestock and to sustain the livelihood of farmers
- A source of fuel (condition that determines serious deforestation)
- A rich source of range germplasm biodiversity: annual and perennial grasses, legume forages and shrubs
- Apparently a sink of C with important implications in global warming.

***Current Condition of Rangelands***

- Cultivation of range in rainfed areas for cereal production is causing alarming levels of degradation in some areas
- Although mountains and steppes are still productive, degradation processes are progressing in view of:
  > Overgrazing in areas surrounding villages
  > Undergrazing of open range causing progressive weed colonization
- Progressive deforestation, involving the woody and also herbaceous strata..

***Current Activities***

***On-going Assessment of Range Potentials and C02 Flux***

- Estimation of range biomass productivity along with C02 flux estimation in Karnab, Uzbekistan, is part of a multi-partnered project involving ICARDA, ARS-USDA and the GL-CRSP

- Biomass estimation and assessment of range productivity status is now being undertaken in Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan, as part of the Integrated Feed Livestock (IFL) project
- Assessment of the conditions of water points in rangelands (IFL)
- Book and herbarium on range flora in Uzbekistan (USDA-funded)
- Monitoring sheep production on range and modeling production (USDA-funded).

*On-going on-farm Interventions to Improve Range Production*

- Inventorying and compiling available techs for range management in CA (IFL)
- Collection of valuable range species and establishment of two nurseries for seed production (Uzbekistan and Kazakhstan) (IFL)
- On-farm application of management techniques in Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan, with active farmer's participation (IFL)

*On-going training on range management*

- Training of four range scientists at ICARDA (USDA and IFL) in 1999 and 2000
- Workshop on Standardization of range methodologies, Ashgabat (IFL) in 2000

**(ICARDA)**

**2. Increasing feed resources and efficiency of utilization**

*Assessing rangeland use and condition and guidelines for range-based animal production by smallholders*

The work will be implemented in Kazakstan. This research will be carried out in collaboration with the Institute of Feed and Pasture, Almaty; Baraev Institute of Grain Farming, Shortandy; Sheep Breeding Institute of Kazakstan and Livestock Breeding Institute of Kazakstan and coordinated by Dr. Emilio Laca, University of California, and Davis. Arrangements are underway to begin fieldwork in June

**(ILRI)**

*Animal feed resources in the Caucasus*

*A* study to identify and target technologies for feed production and utilization in crop livestock systems will be started in June of 2000. The study, in collaboration with national institutions in Armenia, Azerbaijan and Georgia, will be lead by ICARDA. Dr. Mustapha Bounejmate from NRMAP of ICARDA, who is coordinating this study, would travel the three different countries end of May to finalize arrangements.

**(ICARDA/ILRI)**

# Theme III. Conservation and Evaluation of Genetic Resources

## ***Sub-theme 3.1. Plant Genetic Resources***

### *Plant Genetic Resources Activities in Central Asia and the Caucasus*

IPGRI and ICARDA have been carrying out its activity in Central Asia and the Caucasus under the "CGIAR Program Sustainable Agriculture Development in Central Asia and the Caucasus" through: (i) networking, (ii) collaborative research and (iii) human resource development

**Network**
Network is very important mechanism to promote collection, conservation, exchange, evaluation and enhancement of plant genetic resources as well as to share information. Also, Network is an effective tool for identification of priority and coordination. Both IPGRI and ICARDA provide technical support for the Network, whereas PFU/IPGRI provides secretariat support to the Network.

**Collaborative research**
Collaborative research carried out in partnership with national institutions is a way of building capacity, transferring of technologies and knowledge.

**Human resource development**
Human Resources Development is one of the key activities in strengthening of National Systems. Special attention is paid to training, developing training materials, and encouraging training programs.

***Outputs***

**A. Within the framework of the CGIAR Program**

a. Establishment of Central Asian and Trans-Caucasian Network on Plant Genetic Resources (CATCN-PGR).

- Five Central Asian countries: Kazakstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan established Central Asian Network on Plant Genetic Resources (CAN-PGR) in 1996. Three Caucasian countries, namely Armenia, Azerbaijan and Georgia expressed their willingness to join the CAN-PGR in 1999, and thus the Network was renamed as CATCN-PGR.
- The Network has its Coordination Committee headed by the Chairman. Officially-nominated National Coordinators from each country are members of the Coordination Committee.
- Nine thematic working groups are established within the Network at national and regional levels.
- Each member country of the Network is responsible for the activity of certain working group at regional level:

| ## | ***Thematic Working Group*** | ***Country, responsible for the activity of the group*** |
|---|---|---|
| 1 | Cereals | Kazakstan |
| 2 | Pasture and Fodder Crops | Kyrgyzstan |
| 3 | Vegetables and Melons | Armenia |

| | | |
|---|---|---|
| 4 | Fruit, Berry, Subtropical Plants & Vine | Georgia |
| 5 | Industrial Plants | Tajikistan |
| 6 | Cotton | Uzbekistan |
| 7 | Forest and nut bearing species | Uzbekistan |
| 8 | Grain legumes | Azerbaijan |
| 9 | Wild (edible), medical and aromatic crops | Turkmenistan |

The Thematic Working Groups coordinate their activities at national and regional levels for:

- Setting priorities
- Development of action plans
  Proposals for research activities
- Exchange of information

A total of 123 institutions dealing with PGR in the region are involved in the Network activity.

The closest national partners in the region are:

| | |
|---|---|
| Kazakstan | National Academic Center of Agrarian Research (NACAR) |
| | Research and Production Center "Plant Genefund" |
| Kyrgyzstan | Committee of Forestry, Fishing and Hunting |
| | Agrarian Academy |
| | Research Institute of Forest and Nut Production |
| Tajikistan | State Agency on Forestry |
| | Research Institute on Forestry |
| | Academy of Agricultural Sciences |
| Turkmenistan | Production Association on Forestry 'Tajikies" |
| | Research Institute of Agriculture and Water Management |
| | Ministry of Nature Protection |
| Uzbekistan | Research and Production Experimental Station on Plant Genetic Resources |
| | Uzbek Forestry Research Institute |
| | Institute of Genetics and Plant Experimental Biology, Academy of Science |
| | Uzbek Institute of Botany and Botanical Gardens |

b. Establishment of Regional Forest Genetic Resources dBase in Central Asia.

- A Regional Working Group on Forest Genetic Resources agreed to establish regional computerized dBase on priority species in the region at its first Meeting (Bishkek, 1997). Passport datum on 154 plus trees of priority species *(Juniperus seravchanica, J. semiglobosa, J. turkestanica, Halohylon aphellum, Pinus Pallasiana, P. silvestris, Picea sibirica, P. excelsa)* 12 plus plantations *(Picea Shrenkiana, Halohylon aphellum, Ficus carica, Juniperus turkomanica, Punica granatum), 2* genetic reserves *(Picea Shrenkiana, Juniperus seravchanica),* 6 field collections *{Amygdalus communis, Juglans regia, Populus alba var Stremitelniy, P. alba var. Pervenetz Uzbekistana, P. alba var. Pyramidalniy Uluchenniy)* are computerized. Uzbek Research Institute of Forestry is hosting the dBase. The dBase will be acceptable via Internet.
- Methodologies of assessment of inter- and intra- specific diversity of priority species.

  It is planned to make a joint publication on methodologies of assessment of inter- and intra- specific diversity of the following genera: *Pyrus, Malus, Abies, Pistacia, Juniper, Betula, Vitis, Juglans, Salsola, Haloxylon, Crataegus and Juniperus*

- The following action plan was developed by Forest Genetic Resources WG at the Meeting in Almaty, Kazakhstan (19-23 July 1999):

  Enhance the conservation and sustainable use of genetic diversity of priority species in Central Asia. (Ecogeographic Survey, Collecting and Agro-botanical characterization of *Pyrus* Genetic Resources, 2000Develop format of the Regional Strategy of FGR
  Compile methodologies on assessment of inter- and intra- specific diversity of priority species.

c. Human Resources Development:

- Representative of Georgia participated in IPGRI/ICARDA Training Course on Seed Bank Management, September 1999, Aleppo.
- Representative of Uzbekistan attended ICARDA Training Course on Germplasm Documentation, 1999, Aleppo.
- Three modules of training support materials on "Ecogeographic survey", "Introduction into collecting", "Planning collecting mission" are translated into Russian.

**B. Within the framework of other projects:**

a. Assisting National Programs in germplasm collection, conservation and evaluation

- A total of 292 accessions of 43 species (both cultivated and wild) were collected during the mission on survey and collection of vegetables in Uzbekistan, 1999 and conserved *ex situ* in Uzbek Research institute of Plant Industry and at ICARDA.
- A total of 250 samples of cereals and legume crops were collected in Armenia, 1999

b. Assistance in developing new project proposals

The following new Project Proposals has been developed and approved:

- Study on the ecogeographic distribution, agro-morphological characterization of pistachio in Central Asia and enhancement of the conservation and use of its genetic resources
- Enhancement of the use of melon genetic resources in Uzbekistan through the strengthening of on farm and *ex situ* conservation
- UNEP PDF B Project *"In situ* Conservation of Crop Wild Relatives through Enhanced Information management and Field Application", presented by GRST, Rome (Uzbekistan and Armenia are involved)

The following new Project Proposals have been developed and are under consideration:

- OIC/COMSTECH Project Proposal to UNEP-GEF "In situ/On farm Conservation of Agricultural Biodiversity in Central Asia"- PDF A phase
- Regional PGR information network for the Central Asia and the Caucasus (CAC) region (Jointly with ICARDA)
- "Agrobiodiversify Conservation in Armenia" (GEF/UNDP funding) - PDF-B phase

c A Germplasm Documentation Unit was established in the Uzbek Research Institute of Plant Industry, Botanica (near Tashkent).

C. **Inter-regional cooperation**

Close links are being established between CATCN-PGR and the Networks in West Asia and North Africa (WANA) and in Europe in the following area:

a. CATCN-PGR and WANA

- The work plan of collaborative activities on Pomegranate between WANA and CATCN-PGR was developed during Inter-regional Meeting, March 2000, Medenine, Tunisia.

b. CATCN-PGR and European PGR Networks

- Development of information system about collections, joint projects for characterization and evaluation, increased exchange of germplasm, safety collections, technical guidelines, strategies were discussed at Meetings of European Cooperative Program for Crop Genetic Resources Networks (ECP/GR) and European Forest Genetic Resources Program (EUFORGEN) where representatives from Armenia, Azerbaijan and Georgia participated.

***Expected outputs:***

- Project "Creation of the Regional Plant Genetic Resources Infrastructure" within Fifth European Framework Program (Trans-Caucasian countries are involved)
- PGR databases, EURISCO = the European Search Catalogue will be established
- Strengthen activity on pomegranate genetic resources conservation and sustainable use

***D. Participation in International conferences and workshops***

Participation of national scientists in the following international Conferences and Workshops was supported by IPGRI:

- G.R.E.M.P.A. Meeting on Pistachio and Almonds, September 1999, Sanliurfa, Turkey (Uzbekistan).
- ECP/GR Industrial Crops Network coordinating meeting and World Beta Network meeting, Sept. 1999, UK, (Armenia and Georgia)
- Fourth EUFORGEN Noble Hardwoods Network meeting, Sept. 1999, Austria (Armenia)
- ECP/GR Forages Network meeting, Nov. 1999, Portugal (Georgia)
- First EUFORGEN meeting on Conifers, Mar. 2000, Slovenio (Armenia)
- Third EUFORGEN Social Broadleaves Network meeting, June 2000, Bulgaria (Armenia and Uzbekistan)

**(IPGRI/ICARDA)**

***Sub-theme 3.2: Animal Genetic Resources***

**1. Conservation and utilization of ruminant genetic resources under new production conditions**

The following activities were initiated by ILRI:

- Agreements have been made with ICARDA (Dr. Luis Iniguez) to conduct a training workshop on Animal Genetic Resources for the Caucasus region.
- In May/June 2000 we expect to sample indigenous sheep and cattle breeds in Armenia, Azerbaijan and Georgia for molecular genetic characterization. Logistical arrangements for the sampling are being made with the assistance of Dr. Surendra Beniwal, PFU, Tashkent.

**(ILRI)**

**2. Characterization of Breeds of Small Ruminants in CAC**

***Conceptualization***

At ICARDA, the improvement of productivity and the characterization of breeds is conceptualized under a natural research management approach, considering the interactions of the production systems with markets. Within this context, ICARDA's main orientation in the characterization of breeds is to assess how biodiversity suits farmer's livelihood and production strategies to cope with production constraints

***SR Production in the dry areas is based on adapted/selected breeds***

Adaptation produced a range of specialties suitable for different ecosystems. While some specialties are not fully assessed, other traits and potentials are still cryptic and need to be untapped. This is particularly true for adaptive traits to marginal and harsh dry conditions that could be managed in a more strategic manner and also offer possibilities for a future of more water scarcity. It has also been seen that in many countries in WANA and CAC specialties and market niches are unexploited.

***CAC countries are not free of threats to germplasm integrity***

- There is a process of population fragmentation, increasing the number of flocks and reducing their size that could derive in inbreeding and bottlenecking
- Ag-modernization in some areas could increase the production of feed an the rearing of large ruminants in some areas, a process conducive to genetic erosion and breed substitution
- Development plans could lead to gene migration and, if not adequately advised, could led to displacement of genes for adaptation
- Economic crisis are causing dramatic changes in the animal population stocks, for instance drastic erosion was recorded in Kazakhstan where 27 m sheep were lost in less than a decade

**ICARDA's on-going SR breed characterization research activity**

***Final goals***

- Assess production base and market potentials
- Characterize breeds and specializations
- Match specializations with production base and market potentials

**Research components**

- On-station production characterization (USDA)
- On-farm characterization and assessment of production base and market potentials (USDA and IFAD-IFL)
- Genetic characterization (in organization)

*Oii-station production characterization*
The objective of the work is to compile past information on breed characterization of SR in all the CAC countries. The present status is:

- Available information has been comprehensively reviewed
- Breeds not fully studied were identified
- Flocks with controlled genealogy were identified
- Eight documents have been completed in Russian with photo illustrations (under translation and editing)

*On-farm production characterization*
The objective of the study is to evaluate production under real constraints and current production scenarios. The present status is:

- Only few (main) breeds are being evaluated (needs <-»)
- Monitoring of flocks (> 2 lambing seasons)
- Monitoring of the markets and production base is currently on going in parallel

*Genetic characterization*
The objective of the work is to evaluate breed relationships, and identification of QTLs and markers for adaptive traits, assisted by Molecular Genetic techniques.

- Interacting with ILRI for complementarities
- Under present organization and donor identification

(ICARDA)

# Theme 4. Socio-economics and Public Policy Research

*Sub-theme 4.1:* ***Market Reforms***

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

The following activities were carried out by ILRI:

In January, a proposal was written on ILRI's behalf by Carol Kerven and titled: Identification of policies and technologies to increase producer's income from wool, fiber, and pelts: Kazakstan and Turkmenistan.

A letter of agreement between Macauley Land Use Research Institute (MLURJ) was recently signed. The agreement describes the work to be done in the above two countries in collaboration with the national partners.

In Kazakstan we will be collaborating with the Institute of Sheep Breeding, Almaty Kazakstan. The scientists we will be collaborating with are: Nurlan Malmakov, Sheep Specialist, breeding of Merino and other breeds with wool potential and Serik Aryngaziev, specialist on angora-type goats.

In Turkmenistan, we will be collaborating with the Institute of Animal Husbandry, Ashgabat. Dr. Ovlyakuli Hodjakov, Karakul sheep breeding specialist will be the main collaborator. A marketing specialist needs to be identified for the region. A mission has been undertaken by the MLURI team beginning of May for about 10 days to interview main actors in private sector marketing of wool, fibers, and pelts. These include entrepreneurs buying, selling, and processing these items as well investors in the wool, fiber, or pelt industries.

*Highlights* ***of*** *the survey*

- Loss of export market connections and national facilities has led to a wide negative differential between domestic/international and current/historical prices for wools, other animal fibers and pelts. In the Soviet period, the fleece from one sheep was sufficient for a producer to buy a 50 kg sack of flour but would now be barley enough to purchase a loaf of bread. Producers in Kazakstan currently receive one quarter of the USA price paid for fine wool and a fraction of the Chinese price for cashmere fiber. The Karakul (Astrakhan lamb) pelts are sold by producers in Turkmenistan and Kazakstan at one tenth of the price received for Afghan or Namibian pelts. Narrowing domestic and international price gaps would offer an immediate incentive to increase production of more economically valuable types of livestock.

- The sharp decline in real income from wools, fibers and pelts immediately obvious to producers who can recall, only a decade past, when their incomes from these commodities was much higher. Opportunities for regaining some of this lost income is therefore more likely to be well received by producers than measures to introduce entirely new and untried income-generating activities.

**Table 1. Kazakstan wool, animal fiber and pelt prices in 2000 (USD)**

| Type of wool or animal fiber<br>Per kilogram or pelt | Producer price | Trader price |
|---|---|---|
| Coarse wool | 0.28 | Na |
| Semi-fine/fine wool | 0.50-0.70 | 1.5 |
| Camel hair | 0.4-0.5 | 1.0 |
| Goat hair, angora and mixed | 0.85-1.25 | Na |
| Goat hair, native downy type | 0.7-1.2 | 1.7 |
| Karakul black pelts | 1.4 (in 1999) | 15.0-20.0 |
| Sheep and goat skins | 0.70 | Na |

*Data from interviews. Trade prices are those received by trades when selling.*

**Table 2. Turkmenistan wool, animal fiber and pelt prices in 2000** (USD)

| Type of wool or animal fiber<br>Per kilogram or pelt | Producer price | Official trader's export price |
|---|---|---|
| 1st quality white Saraja wool | | 0.50 (traders) |
| White Saraja wool | 0.27 | 1.2 (official) |
| Karakul wool | 0.08 | 0.6-1.0 |
| Camel hair | 0.05-0.54 | 1.0 (official) 0.85-1.10 (traders) |
| Angora goat hair (mohair) | Na | 0.45-0.50 |
| Native goat hair | 0.27-0.54 | 0.35-0.45 (official)<br>1.70 (traders) |
| Black Karakul pelt | 2.7 | |
| 1sl grade Karakul pelt | | 8.0 (official) |
| 4lh to 2nd grade Karakul pelt | | 4.0 - 7.0 (official) |
| *Sur* Karakul pelt | | 15.0 (Ashgabat market) |

*Data from interviews. The official price is that set for exports by a state organization. Traders 'prices are those received by the trader when exporting.*

- Producers have been able to respond to new commercial opportunity for selling live animals to the domestic urban markets, which offer quite attractive prices. Supply is fairly sensitive to demand and prices for live animals are unlikely to rise significantly in the near future. Potential for meat exports is barred by international veterinary requirements. The main constraint for producers to increase meat output is the shortage, cost and low quality of feed stuffs (being addressed in ILRI's Module 1 "Increasing feed resources and improving utilization and conservation of natural resources").
- There is a depth national research experience on wools, fibers and pelts, inherited from the Soviet period. This experience offers an excellent foundation for collaborative research to upgrade national skills and make use of a valuable human resource. However, research institutes have been unable to respond to the new economic situation due to cutbacks in state funding, inappropriate methods for investigating private smallholder's priorities under market conditions, and lack of information on domestic and global market trends. Links between producers and researchers have been broken with

the collapse of the central planning system, and few channels currently exist to disseminate information and advice from researchers to producers. There is an opportunity for ILRI to apply its experience of strengthening the capacity of national research institutes and to improve the linkages between researchers and clients.

Due to the emphasis given in the Soviet period to developing new breeds and strains of wool-bearing small stock, there still exists a genetic fund for rehabilitating the wool, fiber and pelt industry. This genetic fund in immediate danger of being lost through uncontrolled breeding, lack of research support and financial disincentives for producers to preserve genetic resources.

**(ILRI)**

# Theme 5. Strengthening National Programs

## ***Sub-theme 5.1: National Research Organization and Management***

***Introduction***
ISNAR's presentation to the Program Steering Committee had two brief messages: 1) "Institutions matter" and 2) ISNAR must make strategic decisions about the nature of its future activities in Central Asia and the Caucasus.

***Why do Institutions Matter?***

The thesis of ISNAR's MTP 2001-2003 (recently submitted to the CGIAR) is "Institutions Matter." A corollary of this thesis is that "Institutions matter most for the poor!"

Knowledge is information upon which one can take action. It empowers the people who possess it. This has never been truer than today in a world where the division between rich and poor will be a divide between those who have access to information and the ability to act on it.

Unlike the rich and the organized, poor people do not have independent access to knowledge. Knowledge must have homes and publicly funded research, education, and extension organizations provide the home for generation and diffusion of knowledge serving poor people.

Public sector institutions have a special role: to generate knowledge that meets the needs of poor people and to ensure that the poor have access to it. They can work along with NGOs and other organizations to ensure that indigenous knowledge is not lost.

***Role-based and rule-based institutions***
We start with a distinction between "role-oriented" and "rule-oriented" institutions:

- Role-oriented institutions are institutions that are designed to perform a prescribed role in society, e.g. generate technology, disseminate information, and advise farmers and other users in its proper application.
- Rule-oriented institutions set the framework within which role-oriented institutions must operate. They may be formal (e.g. laws on intellectual property or signed agreements on behavior such as WTO) or informal customs and behaviors that are implicitly observed. .

ISNAR has 20 years of experience in strengthening the performance of "role-based institutions" and continues to assist governments in strengthening their research organizations. ISNAR also recognizes the importance that rule-based institutions have on the life of poor farmers: new global trading rules under WTO, intellectual property rights, and new political forms of decision making all change the way NARS do business. ISNAR helps interpret the implications of these institutions on poor farmers and works with NARS to identify strategic responses and practical programs. The emphasis is on the way national and regional institutions can perform better in new policy, economic, and institutional environments.

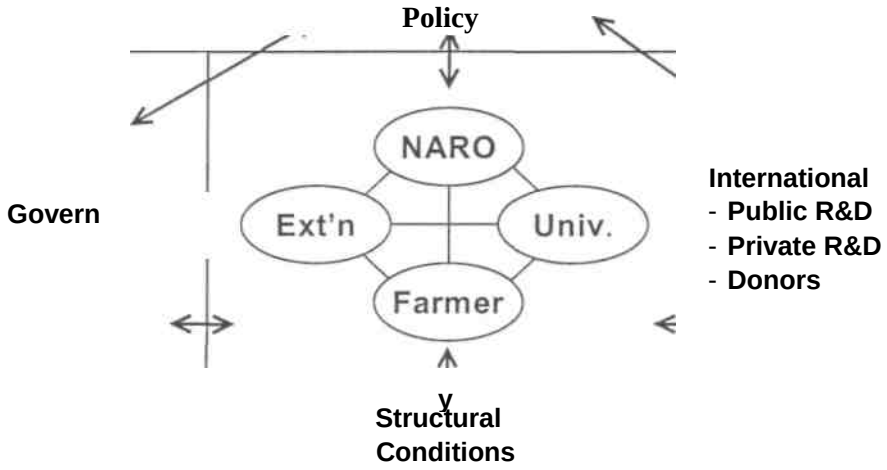
***A system's approach helps: The Agricultural Knowledge and Information Systems (AKSI)***
At a time when organizational structures are in flux and institutions are changing, it helps to work with a broad concept of a system. One such construct is the Agricultural Knowledge and Information System (AXIS). The particular one represented below is one that has been used in ISNAR work but there are many variants that can be applied.

A system is defined as a set of components coordinated to achieve a common objective. Therefore a system is defined first by its objective. The important elements of a system are its:

- Objectives
- Components
- Resources
- Management
- Environment.

A generic AKIS is shown in Figure 1 (below). The AXIS organizations are those that traditionally deal with agricultural research, extension and education. The goals to which they strive are set within a policy environment that is conditioned by domestic institutions and political processes and influenced by external scientific, economic, and political trends. The way the resources of the agricultural knowledge system are determined and managed is contingent on the specific objectives and circumstances of the country. There is no "best model" for structuring an AKIS, which is essentially an intellectual construct, not a blueprint. However, it is possible to apply systems thinking to develop the best arrangements for a given country at a given time.

## An AKIS in its Environment




In the case of Central Asia and the Caucasus, one can see critical changes in the underlying "structural conditions" have changed the markets, trading relationships, and relative prices of commodities. Access to new sources of inputs and technical knowledge change production possibilities, while new sources of financial support bring with them new ways of setting agendas. If we adopt the definition of "governance" as the way the internal and external systems are reconciled, we can see that patterns of governance also change.

At the risk of over-simplifying, we can think of two complementary approaches that have been taken to assisting with such processes. These are:

- Institutional design and development, and
- The evolutionary learning approach.

The institutional design and development approach emphasizes the use of a framework to guide thinking. However, institutional architects (especially those from outside) are often unaware of critical linkages and their "blueprints" prove to be inadequate. The evolutionary learning approach emphasizes the importance of having a clear policy framework within which a diversity of organizations can concentrate on shared objectives. The structures and mechanisms can evolve flexibly.

The AKIS institutions themselves are in a process of reform and new mechanisms such as competitive grant programs may serve as the oil that keeps the machinery running.

***ISNAR's Activity in Central Asia and the Caucasus***

ISNAR's activity in the region has been significantly reduced following the departure in August 1999 of its senior officer responsible for spearheading activities in the region. In recruiting an economist with a strong background in comparative systems and fluent Russian, ISNAR had positioned itself to give special attention to the region. The region was the only geographic/political region that had its own targeted project in the Medium Term Plan, entided '"Central Asia and the Caucasus: the double transition". Its purpose was to initiate ISNAR involvement in the region and to lay the research base for services to the countries of me region. ISNAR would seek to help countries of the region through access to information and institutional development advice as they establish flexible and responsive structure and policies for agricultural research, extension, and education.

Work in progress, in some cases ready for editing, includes the following documents dating from 1999:

Morgounov, A. and L. Zuidema.
*The Legacy of the Soviet Agricultural Research System for the Republics of Central Asia and the Caucasus*

Zuidema, L and M. Boyd.
*Agricultural Research in the Caucasus Region: A Regional Analysis*
*Agricultural Research in the Caucasus Region: Armenia Country Profile*
*Agricultural Research in the Caucasus Region: Azerbaijan Country Profile*
*Agricultural Research in the Caucasus Region: Georgia Country Profile*

Satybaldin, A.A. et al. (NACAR, KRI, EOAIC)
*Agricultural Research in the Republic of Kazakhstan: A Country Profile*

Boyd, M. and Zuidema, L.
*Reform of Agricultural Research, Education, and Extension in Georgia: 1998-1999*

The process of bringing these documents to completion following the departure of their authors from the institution is complex. However, they will all be published and made available to die region.

[1] ISNAR (2000) Institutions Matter: ISNAR Medium Term Plan 2001-2003. Project 14.

*Lessons from the first year*

ISNAR has learned several important lessons from this involvement in the region.

- *The importance of partners in the region.* Knowledge resides in the region. ISNAR may help partners view their information and knowledge in new ways. Without these partners, ISNAR cannot have knowledge of the region.
- *The need to set realistic targets.* The process of change is complex and there are many deviations along the way. It is necessary to set realistic objectives in terms of deliverable products and the time frame for delivery. This is true both for the studies that are undertaken and the change processes that are facilitated. This is especially true where both internal and external resources have to come on line at the same time.
- *The need to seek opportunities for collective learning.* With its limited staff resources, ISNAR must find ways of reaching its partners collectively. It cannot respond to individual requests that are process intensive in more than one country at a time. However, regional and sub-regional opportunities for information dissemination and training in new management tools should be actively embraced.
- *Overcome language as a constraint.* Rapid advances are being made in the region in the use of English as a language of communication. However, without staff members that are fluent in national languages or Russian as a lingua franca. ISNAR will remain at a disadvantage in providing service and training to the region. Translation as a temporary expedient is beyond the resources of a small institute such as ISNAR.

*Implications of recent changes in ISNAR and the CGIAR*

At the end of 1999, ISNAR was faced with a serious financial setback through the loss of a major donor. It was forced to re-examine its portfolio and reduce both the number of its projects and its staff complement. It reduced its total portfolio from 18 to 12 projects. In the absence of targeted funding for the six discontinued projects, ISNAR would freeze recruitment and re-consider action on the basis of available funding. Although the project on the "double transition" was one of the frozen projects, ISNAR remained in a position to service the region from other projects. The difference would be the following: rather than have targeted core funds for the region, ISNAR would examine each activity in competition with claims on the resources from other regions, particularly sub-Saharan Africa where its portfolio had come under resource pressure as well.

The implications of the recent changes in the CGIAR for ISNAR's activities in the region suggest that the following actions may be fruitful in maintaining momentum:

- *ISNAR Associates.* As the tools and approaches that ISNAR has available become more widely known it should be possible to begin to build a network of "ISNAR Associates" in the region. Associates are senior research managers who have practical experience with the use of ISNAR tools and approaches who can extend their experience to neighboring countries.
- *Collaborative research on key themes.* Research on key challenges for NARS is underway in ISNAR. Themes that may be of special relevance for the CAC region include the following:

  The impact of globalization on NARS and their seed sectors
  Financing of research Intellectual property rights
  Biosafety

Management of the change process. • *Training in research management. A* primary way of widening the reach of ISNAR approaches, and reinforcing the development of a network of associates, is to provide training in research management in the region. For ISNAR this potentially high payoff activity would be resource intensive. First it would require not just translation but also adaptation of training materials to the region. Second, it would require training of trainers who have the necessary research experience as well as pedagogical skills and management knowledge to be credible teachers.

***Conclusion***

This presentation ended with a number of possibilities for ISNAR and the region to maintain momentum in the face of immediate difficulties facing our collaboration. It is recognized that institutional development takes time, that it can only be done in partnership, and the problems we face may be opportunities for improved action.

***Sub-theme 5.2: Human Resources Development***

The activities on human resource development received emphasis in all the collaborative research activities in all the five program themes. These were achieved by organizing:

- Short- and long-term training courses in the region or at CG Centers
- On-the-job training
- Study visits to CG Centers or other advanced research institutions
- Participation in regional and international seminars, workshops and conferences

Different activities organized are listed in the Appendix.

***Sub-theme 5.3. Information Technology, Data Management, Information Exchange and Networking***

- ***Information technology and data management***

  Provided PCs and training on their use to national program scientists. Also, provided email facility to project activity leaders to facilitate communication

  A special program in the use of a software in wheat breeding was developed for sharing with the national programs

  Establish regional computerized dBase on priority forest species in the region

  Three modules of training support materials on "Ecogeographic survey", "Introduction into collecting", "Planning collecting mission" are translated into Russian.

  A computerized Germplasm Documentation Unit was established in the Uzbek Research Institute of Plant Industry, Botanica (near Tashkent).

- ***Information exchange and networking***

  Information exchange facilitated through the participation of the national program scientists in regional/international workshops/seminars/conferences, and regional network meetings/traveling workshops Provided scientific literature

In 1998/1999, four regional networks for CAC were established: (1) CAC Winter Wheat Improvement Network (CACWINET), (ii) Spring Wheat Improvement Network (SWNET), and (iii) Central Asia and the Trans-Caucasus for Plant Genetic Resources (CACTN-PGR), and (iv) Forest Genetic Resources Group of the CACTN-PGR (FGRG-CACTN-PGR). During 1999/2000, the following crop- and discipline-specific new regional networks were established in the region:

- CAC Barley Improvement Network (CACBINET)
  CAC Legume Improvement network (CACLINET)
- CAC On-farm Soil and Water Management Network (CAC-S&WNET)
- CAC Feed and Livestock Network (CAC-FLNET)

***Organized Regional Network Meetings:***
A Regional Forest Genetic Resources (FGR) Working Group Meeting of the CACTN-PGR, 16-18 August 2000, Tashkent, Uzbekistan by IPGRI-Tashkent. Heads of the National FGR Working Groups from Kazakstan, Kyrgyzstan, Tajikistan, and Uzbekistan attended the Meeting.
A Regional Fruit Genetic Resources (FruGR) Working Group Meeting of the CACTN-PGR, 16-18 August, Tashkent, Uzbekistan by IPGRI-Tashkent. Heads of the National FruGR Working Groups from Armenia, Azerbaijan, Georgia, Kazakstan, Kyrgyzstan, Tajikistan, and Uzbekistan attended the Meting.

- **Organized Regional Consultation Workshops**
  Organized 12 Regional consultation workshops

- **Organized Regional/International Seminars**
  The Program organized five International and two regional seminar.

- **Organized Regional Coordination and Planning Meetings**
  The Program organized nine regional planning and coordination meetings.

The Program during 1999/2000, which was the second year of the Program implementation, successfully implemented the approved planned activities. This was done jointly by the eight CA NARS and the nine CG Centers in collaboration also with other international organizations, with financial support form the CGIAR and the donors.

ATTACHMENTS

I. Activities Organized by the Program for Human Resources Development, September 1999 - August 2000

A. Participation in Training Courses Organized at the CG Centers and in the Regions

a. Short Training Courses

| | Title of the course | Dates | Place | Organizer | Number of trainees/Country |
|---|---|---|---|---|---|
| 1 | Seed Bank Management | 11-23 September 1999 | Aleppo Syria | ICARDA | 1 Georgia |
| 2 | DNA Molecular Marker Techniques for Crop Improvement | 12-23 September 1999 | Aleppo Syria | ICARDA | 1 Kazakstan |
| 3 | Utilization of expert Systems in Agricultural Research and Production | 10-21 October 1999 | Cairo, Egypt | Egypt/ ICARDA | 1 Kazakstan 1 Tajikistan 1 Armenia |
| 4 | Efficient Water Use in Agricultural Production | 10-21 October 1999 | Aleppo, Syria | ICARDA | 1 Uzbekistan |
| 5 | Marginal Water Management training course | 24 October-4 November 1999 | Aleppo, Syria | ICARDA | 1 Uzbekistan 1 Kyrgyzstan 1 Kazakstan 1 Tajikistan 1 Turkmenistan |
| 6 | GIS and Site Characterization individual training | 30 January - 15 February 2000 | Aleppo, Syria | ICARDA | 1 Uzbekistan 2 Kazakstan |
| 7 | Training on E-mail and Internet Use | 15-20 March 2000 | Almaty, Kazakstan | CIMMYT | 18 Kazakstan |
| 8 | Regional Training Course on Food and Forage Legume Improvement | 27 March-4 April | Tashkent, Uzbekistan | ICARDA | 1 Armenia 1 Azerbaijan 1 Georgia 1 Kazakstan 1 Kyrgyzstan 1 Tajikistan 1 Turkmenistan 2 Uzbekistan |
| 9 | Modern Approaches in Wheat Improvement | 10-13 April 2000 | Almaty, Kazakstan | CIMMYT | 20 Kazakstan |
| 10 | Regional Training Course on Soil and Water Management | 10-19 May, 2000 | Tashkent, Uzbekistan | ICARDA | 2 Armenia 1 Azerbaijan 2 Kazakstan 2 Kyrgyzstan 2 Tajikistan 2 Turkmenistan 4 Uzbekistan |

| | | | | | |
|---|---|---|---|---|---|
| 11 | Regional Training Course on On-farm Trials and Demonstrations | 23-26 May 2000 | Almaty, Kazakstan | CIMMYT | 12 Kazakstan 8 Kyrgyzstan 4 Azerbaijan 6 Tajikistan |
| 12 | National Training Course on GPS | 25 May 2000 | Tashkent, Uzbekistan | IPGRI | 6 Uzbekistan |
| 13 | A Regional Training Seminar on "Methodologies in Socioeconomic Research" | 12-16 June 2000 | Almaty, Kazakstan | ICARDA | 15 from 4 CA countries ??? |
| 14 | A Regional Training Workshop on "Range Management and Rehabilitation" | 19-23 June 2000 | Ashgabat, Turkmenistan | ICARDA | 15 from 4 CA countries ??'? |
| 15 | A Regional Training Course on "Conservation through Sustainable Use of Fruit Genetic Resources in Central Asia" | 21-25 August 2000 | Tashkent, Uzbekistan | IPGRI, FAO | 11 from Kazakstan, Kyrgyzstan, Tajikistan and Uzbekistan |

b. Long-term Training Courses

| | | | | | |
|---|---|---|---|---|---|
| 1 | Groundnut Improvement | August - October 1999 | Patancheru, India | ICRISAT | 1 Uzbekistan 1 Kyrgyzstan 1 Azerbaijan |
| 2 | Training course on Wheat Improvement | February - July 2000 | Mexico | CIMMYT | 2 Kazakstan 1 Tajikistan 1 Russia |

B. Participation in English Language Courses Organized in the CAC Region for CAC Scientists, September 1999 - August 2000

| | Title of the course | Dates | Place | Organizer | Number of trainees/Country |
|---|---|---|---|---|---|
| 1 | English Training course | October-January 2000 | Almaty, Kazakstan | CIMMYT | 4-Kazakstan 1 Tajikistan 2 Russia |
| ? | English Training course | December-March 2000 | Almaty, Kazakstan | ICARDA | 4 Kazakstan |
| 3 | English Training course | December-March 2000 | Bishkek, Kyrgyzstan | ICARDA | 8 Kyrgyzstan |
| 4 | English Training course | January-March 2000 | Tashkent, Uzbekistan | ICARDA CIMMYT ICRISAT | 10 Uzbekistan |

C. Participation in Study Visit Programs

| | Topic | Dates | Place | Organizer | Number of visiters/Country |
|---|---|---|---|---|---|
| 1 | Germplasm Evaluation | September-December 1999 | Aleppo, Syria | ICARDA | 1 Uzbekistan |
| 2 | Germplasm Documentation | 8-21 December 1999 | Aleppo, Syria | ICARDA | 1 Uzbekistan |
| 3 | Socioeconomics | April-May 2000 | Aleppo, Syria | ICARDA | 1 Kazakstan |

| | | | | | |
|---|---|---|---|---|---|
| 4 | Range Species | April-May 2000 | Aleppo, Syria | ICARDA | 1 Turkmenistan<br>1 Uzbekistan |
| 5 | Livestock Management | April-May 2000 | Aleppo, Syria | ICARDA | 1 Kyrgyzstan |
| 6 | Germplasm Evaluation, ICARDA | 8 May-8 July 2000 | Aleppo, Syria | ICARDA | 1 Armenia<br>1 Turkmenistan |
| 7 | Germplasm Evaluation | 1-9 June 2000 | Aleppo, Syria | ICARDA | 1 Armenia<br>1 Turkmenistan |

D. Participation in the International/Regional Conferences and Workshops a.

International

| | Title | Dates | Place | Organizer | Number of part/Country |
|---|---|---|---|---|---|
| 1 | International Workshop on "Conservation Tillage: A Viable Option for Sustainable Agriculture in Eurasia" | 20-24 September 1999 | Shortandy, Kazakstan | NACAR, FAO, CIMMYT, ICARDA | 21 from CAC countries |
| 2 | *Fourth USA/CIS Joint Conference on "Hydrology and Hydrogeology Issues for the 21st Century: Environment, Ecology, and Human Health "* | 7-10 November 1999 | San Francisco, USA | | 1 Uzbekistan |
| 3 | 6"[1] International Wheat Conference | 5-9 June 2000 | Budapest, Hungary | CIMMYT, ICARDA | 6 from CAC countries |
| 4 | International Conference on "Science and Technology for Managing Plant Genetic Diversity in the 21st Century" | 12-16 June 2000 | Kuala Lumpur, Malaysia | IPGRI | 1 Uzbekistan |
| 5 | International Conference "Sustainable Development of Agriculture in Kazakhstan, Siberia and Mongolia" | 17-21 July 2000 | Almaty, Kazakstan | NACAR, CIMMYT | 150 from CA, Russia and Mongolia<br>! |

b. Regional

| | Title of the course | Dates | Place | Organizer | Number of part./Country |
|---|---|---|---|---|---|
| 1 | ICARDA-CAC Joined Earth Day Celebrations in Tashkent | 21 April 2000 | Tashkent, Uzbekistan | ECOSAN, ICARDSA | |
| 2 | Regional Workshop "On-Farm Trials and Demonstrations for Technology Transfer" | 15-19 May 2000 | Almaty, Kazakstan | CIMMYT, NACAR | 30 from CA countries |

II. Participation in Regional Consultation Workshops/Meetings

| | Title of the course | Dates | Place | Organizer | Number of part./Country |
|---|---|---|---|---|---|
| 1 | A National Conference on "Development of Agricultural Knowledge Systems" | 9-10 November 1999 | Astana, Kazakstan | NACAR. World Bank | 40 from CAC |
| 2 | A workshop on "Integrated management of irrigated farming in Fergana valley" | 15-18 November 1999 | Tashkent, Uzbekistan | IWMI, SIC-ICWC | 30 from CA countries |
| | A National Workshop on Development of Seed Industry | 3 December 1999 | Biskek, Kyrgyzstan | MA and World Bank | 1 Kazakstan 12 Kyrgyzstan |
| 4 | Legume Crops Improvement Workshop | 27 March - 4 April, 2000 | Tashkent, Uzbekistan | ICARDA, USPCA | 1 Armenia 1 Azerbaijan 1 Georgia 2 Kazakstan 1 Kyrgyzstan 1 Tajikistan 1 Turkmenistan 3 Uzbekistan |
| 5 | A National Workshop on "Revitalization of cereals breeding, variety testing and early generation seed production in Tajikistan" | 4-7 May 200 | Dushanbe, Tajikistan | GTZ, CIMMYT | 20 Tajikistan |
| 6 | A Workshop on "Conducting Cereals On-Farm Trials and Demonstrations Plots" | 9-11 May 2000 | Uzbekistan | ICAPvDA, USPCA | 42 Uzbekistan |
| 7 | A cereal Traveling Workshop | 16-19 May 2000 | Azerbaijan | MA of Azerbaijan | 24 from CAC countries |
| 8 | A Training Workshop on Early Weaning | 22-26 May 2000 | Nurota, Uzbekistan | ICARDA, USPCA | 2 Kazakstan 2-Kyrgyzstan 2 Turkmenistan 4 Uzbekistan |
| 9 | Regional Workshop on "On-Farm Trials and Demonstrations for Technology Transfer" | 23-26 May 2000 | Almaty, Kazakstan | NACAR, CIMMYT, World Bank | 30 from CA countries |
| 10 | Field Day on Wheat On-farm Trials/Demonstrations | June 2000 | Almaty, S. Kazakstan | CIMMYT, NACAR | 150 Kazakstan |
| 11 | Workshop "Spring Wheat Breeding in Kazakhstan and Siberia" | July 20-21 2000 | Barnaul, Russia | ARIFB/GTZ/ CIMMYT | 6 Kazakstan |
| 12 | A Regional Training Workshop on "Range Management and | 19-23 June 2000 | Ashgabat, Turkmenistan | ICARDA | 15 from CA countries |

| | | | | | |
|---|---|---|---|---|---|
| | Management and Rehabilitation" | | | | |

III. Participation in Regional Coordination and Planning Meetings

| | Title of the course | Dates | Place | Organizer | Number of part./Country |
|---|---|---|---|---|---|
| 1 | Third CAC/ICARDA Annual Regional Coordination and Planning Meeting | 27-30 September 1999 | Tashkent, Uzbekistan | ICARDA, USPCA | 70 from CAC countries |
| 2 | The Steering Committee (SC) of the IFAD-supported project on "Integrated Feed and Livestock Production in the Steppes of Central Asia" | 1 October 1999 | Tashkent, Uzbekistan | ICARDA, PFU-CGIAR | 2 Uzbekistan 2 Kazakstan 2 Turkmenistan 2 Kyrgyzstan |
| 3 | The First Review and Planning Workshop on Groundnut in the CAC Region | 16-19 November 1999 | Tashkent, Uzbekistan | ICRISAT. PFU-CGIAR | 2 Armenia<br>3 Azerbaijan<br>3 Kyrgyzstan<br>2 Tajikistan<br>1 Turkmenistan<br>2 Uzbekistan |
| 4 | The Global Forum on Agricultural Research (GFAR) and Central Asia and Caucasus Consultation Meeting | 20-21 January 2000 | Tashkent, Uzbekistan | PFU-CGIAR, GFAR | 22 from CAC countries |
| 5 | *Inter-Regional Planning Meeting on Pomegranate* | 7-8 March 2000 | Medenine, Tunisia | IPGRI | 1 Turkmenistan |
| 6 | *Workshop on Developing Sustainable Farming Systems in the Caucasus* | 8-9 March 2000 | Tbilisi, Georgia | PFU-CGIAR | 2 Armenia 2 Azerbaijan 4 Georgia |
| 7 | *Stakeholders Meeting of the Project "On-farm Soil and Water Management for Sustainable Agricultural Systems in Central Asia"* | 2-4 April 2000 | Tel Hadya, Aleppo, Syria | ICARDA | 2-Kazakstan 2 Kyrgyzstan 2 Tajikistan 2 Turkmenistan 2 Uzbekistan |
| 8 | *Third CGIAR Program Steering Committee Meeting* | 30 May -1 June 2000 | Ashgabat, Turkmenistan | PFU-CGIAR. MAWR of Turkmenistan | 31 from CAC countries, CG Centers and Donors |
| 9 | A Meeting of the Winter Wheat East European Regional Yield Trial | 4 June 2000 | Budapest, Hungary | CIMMYT, ICARDA | 6 from CAC countries |

Attachment IV. Visits of CG Centers' Specialists and Stakeholders of the CGIAR Program for CAC to the Region,

a. During 1999

| Name | Dates | Country | Purpose of Visit |
|---|---|---|---|
| Dr. A. Morgounov (CIMMYT) | 01-02 September<br>03-04 September | Georgia<br>Azerbaijan | To discuss results of the past season and discuss and plan next season activities |
| Dr. L. Iniguez (ICARDA) | 02-15 September | Uzbekistan, Turkmenistan | To attend the National Coordination and Planning Meetings on IFAD-supported Project on "Integrated Livestock and Feed Production in the Steppes of Central Asia" in Tashkent (2-4 September), Ashgabat (7-9 September) and the Regional Meeting of the Project in Tashkent, 14 September. |
| Dr. S. Nigam (ICRISAT) | 08-18 September | Uzbekistan, Azerbaijan | To familiarise with the situation on groundnut cultivation |
| Dr. S. Padulosi (IPGRI) | 11-18 September | Uzbekistan | To observe collaborative research activity on melons, fruits and pistachio |
| Drs. Mahmoud Solh,<br>W. Erskine,<br>J. Valkoun,<br>R.S. Malhotra,<br>All Abd El-Moneim,<br>M. Pala,<br>F. Karajeh,<br>H. Ketata,<br>L. Iniguez,<br>E. Thomson, all of them from ICARDA; and<br>Dr. Christian Hoste (GFAR) | 27-30 September | Uzbekistan | To participate in the Third ICARDA/CAC Annual Regional Coordination and Planning Meetings |
| Dr. Enka Meng (CIMMYT) | 30 September -2 October | Kyrgyzstan | To familiarize with the agricultural production systems and farm structures in the country |
| Mr. R. Culver, Mr. R. Benton (Armenian Technology Group) | 26 September -5 October | Kazakstan, Kyrgyzstan, Uzbekistan | To explore possibilities of a collaborative technology transfer project in the region |
| Dr. A. Morgounov | 4-18 October | Tajikistan | To discuss bilateral relations with local scientists |

| | | | |
|---|---|---|---|
| Dr. Erica Meng (CIMMYT) | 10 October | Kazakstan | To familiarize with the agricultural production systems and farm structures in the country |
| Dr. Victor Shevtsov (ICARDA) | 11-14 October | Kazakstan | To discuss planting plans for the 1999/2000 crop season |
| Dr. Eddy de Pauw (ICARDA) | 11-12 November | Uzbekistan, Kazakstan | To meet with local collaborators in the Soil and Water Project and to work on the mapping (through GIS use) of the two selected research sites of Boykozan (Uzbekistan) and Sorbulak (Kazakhstan) |
| Drs. S. Rajaram, Erica Meng (CIMMYT) | 8-12 November | Kazakstan | To take part in the National Conference on " Development of Agricultural Knowledge Systems" |
| Drs. Shyam Nigam, Narendra Saxena (ICRICAT) | 14-21 November | Uzbekistan | To organize and participate in the workshop on "Groundnut in Central Asia and Caucasus" |
| Drs. S. Prathapar, C. Perry, V. Horinkova, D. Muhammad, Y. Chemin, A. Choudhry, W. Zaman (IWMI) | 15-18 November | Uzbekistan | To develop a project proposal on «Integrated management of irrigated farming in Fergana valley» in Tashkent |
| Dr.M.Bounejmate | 11-24 December | Kazakstan, Kyrgyzstan, Uzbekistan | To follow up the progress in activities of the IF AD supported project "IFLP-CA"- Integrated Feed and Livestock Production in the Steppes of Central Asia |

**b. During 2000**

| Name | Dates | Country | Purpose of Visit |
|---|---|---|---|
| Dr. Christian Hoste (GFAR)<br>Mr Mohammed Roozitalab (AARINENA)<br>Mr Valery Popovtsev (MAF of Russia) | 18-23 January | Tashkent,Uzbekistan | To attend the GFAR Consultation Meeting for CAC |
| Dr Anthony Pritchard (Consultant to PFU) | 24-31 January | Tashkent, Uzbekistan | To draft the strategy document for CGIAR "Collaborative Research Program **for** Sustainable Agricultural Development in Central Asia and Caucasus |

| | | | |
|---|---|---|---|
| Dr A.Morgounov (CIMMYT) | 24-28 January | Tashkent, Uzbekistan | To discuss the results of the last season and made some corrections in work-plan for 2000 |
| Dr. M. El-Bohssini (ICARDA)<br>Dr M.Skinner<br>Dr. B.Parker (University of Vermont, USA) | 1-15 February | Kazahstan<br>Uzbekistan | To participate in the collection Mission of Sunn Pest |
| Ms. Olga Metya (CIMMYT) | 21-27 February | Kazakstan | To provide training for accounting and usage of financial software to relevant staff in Almaty |
| Dr. Mira Djunusova (KAA) | 25-27 February | Kazakstan | To discuss the results of the last year germplasm testing and plans for the future |
| Dr. Nunddin Abdurakhmanov | 27 March | Tashkent, Uzbekistan | To discuss further activities and strengthening of collaboration in studying, conservation and use of fruit genetic resources |
| Dr. Rajmder S. Malhotra<br>Dr. Ali Abd El-Moneim (ICARDA) | 26-31 March | Uzbekistan | To organize a training course on "Food and Forage Legume Improvement" |
| Dr. Rajmder S. Malhotra<br>Dr. Ah Abd El-Moneim | 1 -4 April | Uzbekistan | To organize a training course on "Food and Forage Legume Improvement" |
| Acad. Bobo Sanginov<br>Dr. Abdujalil Sanginov | 7 April | Tashkent, Uzbekistan | To discuss further activities and strengthening of collaboration in studying, conservation and use of plant genetic resources in Tajikistan |
| Dr. J. Srivastava Dr. A. Kasseba Scott Christiansen Andrea Christiansen | 9 April | Kazakstan | To discuss the current situation in agriculture in Kazakhstan and definition of priorities for the future World Bank Project on Agricultural Support Services. To visit The on-farm trail and demonstration site conducted in the framework of the World Bank IDF grant project in Almaty region and discuss the impact of the new technologies for production |
| Dr. Mukhtar Nasyrov Dr. Bakhtiyar Mardonov | 12 April | Tashkent, Uzbekistan | To invite CGIAR Centers to make presentation and to acquaint students of the University with their activities, as well as to discuss possibility of IPGRI-CWANA scientists' visit to Samarkand to familiarize students from Samarkand State |

| | | | |
|---|---|---|---|
| | | | University |
| Dr. Jit. Snvastava | 21-22 April | Tashkent, Uzbekistan | To familiarize with the ongoing activities of ICARDA and the CGIAR Program in CAC. To visit two sites of the cereal on-farm trials in Jizzakh region. |
| Dr. Colin Pigin<br>Dr. Clive Francis<br>Dr. Ken Street | 24-27 May | Uzbekistan | To evaluate progress made within the ACIAR-funded genetic resources project |
| Dr. Amor Yahyaoui<br>Mr. K. Nazari | 08-25 June | Azerbaij an<br>Uzbekistan<br>Kyrgyzstan | To identify possibility to establish network for wheat yellow rust in the region |
| Dr. Olga Karnafil | 08-27 June | Armenia<br>Azerbaijan<br>Georgia<br>Uzbekistan | To work on breed characterizations in cattle |
| Mrs. A. McNab | 08-27 June | Kazakstan<br>Kyrgyzstan | To learn about agricultural production, economic situation, and the status of collaboration with CIMMYT. The visits were made to farms, research institutions, Offices of CIMMYT, ICARDA and PFU in the region. |
| Dr. A. Aw-Hassan | 12-19 June | Kazakstan | To conduct a training workshop under the IFL-CA Project |
| Dr. M. Bounejmate (ICARDA) | 16-23 June | Turkmenistan | To conduct a regional training workshop on "Range management and rehabilitation" under the aegis of the IFAD-supported project on "Integrated Feed and Livestock Production in the Steppes of Central Asia" |
| Prof. Iwao Kabori | 18-20 June | Tashkent, Uzbekistan | To discuss the issues related to preparations for a possible workshop in Uzbekistan |
| Mr. Kai Wegerich | 02-09 July | Uzbekistan | To establish contacts with relevant institutes, which advised and helped to set up Water User Association in Uzbekistan |
| Dr. K. Durah | 24-29 July | Uzbekistan<br>Kazakstan | To seek the possibility of establishment of electronic networks in the institutions of Central Asia |
| Dr. P.Wall (CIMMYT-Bolivia) | 1-5 August | Kazakstan | To discuss a possible on-farm testing of new agronomy technologies (conservation and zero tillage), and possible approaches to rehabilitation of |

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| | | | deserted abandoned lands |
| Dr. F. Karajeh<br>Dr L. Iniguez<br>Dr Muhi Hilah | 16-31 August | Central Asia countries | To participate in the National Planning and Coordination Meetings for the IFAD-IFL-CA and ADB-SWM-CA projects |
| Dr. S. Prathapar<br>Mrs. V. Horinkova<br>Dr. S. Ghazaryan<br>Prof. D. Malik | 20-27 August | Tashkent, Uzbekistan | To attend a workshop for the SDC-supported project on "Integrated Management of Irrigated Agriculture in the Ferghana Valley" |

**Attachment V. Publications from the PROGRAM, 1999/2000**

A document on "CGIAR Strategy for the collaborative research for sustainable agricultural development in Central Asia and the Caucasus", developed by CG Centers in collaboration with PFU in Tashkent. 54 p. (English, Russian).

Proceedings of the Conference on Diversification of Cereals Production in Eurasia, Shortandy, August 24-25, 1999. CIMMYT-Kazakstan. 201 p. (Russian).

Databases on recent literature on wheat and scientists involved in wheat research in Georgia. CIMMYT. (English, Russian).

IPGRI Newsletter for Central & West Asia and North Africa, Issue No 21, IPGRI, (Russian).

List of papers available in the National Agricultural Library devoted to locusts and their control. CIMMYT-Kazakstan. (Russian)

"CAC News", No 4. PFU (English, Russian).