"SUSTAINABLE AGRICULTURAL PRACTICES IN THE DROUGHT AFFECTED REGION OF KARAKALPAKSTAN"

REPORT ON FAO TCP PROJECT UZB/2903

Submitted by

International Center for Agricultural Research in the Dry Areas (ICARDA)

CAC Regional Office, Tashkent, Uzbekistan

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EXECUTIVE SUMMARY

After the 1999 drought, in 2000 and 2001, Northwest Uzbekistan experienced the worst drought and water shortage in living memory. The Autonomous Republic of Karakalpakstan (KK), which is located at the tail-end of the Amudarya River, and includes its delta into the Aral Sea, was particularly affected.

For these reasons, there is an urgent need to pilot changes in irrigation and agricultural practices in the region in order to address the issue of declining water availability - this is a high priority for the Governments of Uzbekistan and KK. Farmers have limited experience in water conservation practices and utilizing salt and more drought tolerant crops. The government does not have the relevant technical expertise, but recognizes the need for radical change in both agricultural policy and practices for the region. It is therefore FAO was requested assistance in introducing conservation-effective water and soil management practices and introducing more drought and salt tolerant crops on a pilot scale, for possible adoption on a wider scale.

It was agreed that a proposed TCP will introduce, on a pilot scale, an integrated package of more sustainable conservation agricultural practices, including maintaining soil cover, direct planting with minimal soil disturbance, appropriate crop rotations, soil mechanization techniques and on-farm water management through improved land leveling, drainage and water saving technologies as well as water control and crop irrigation scheduling using deficit irrigation practices and saline soil leaching, with the primary objective of utilizing the scarce water resources in an efficient and sustainable manner.

The overall objective of the project is to demonstrate alternative, profitable and more sustainable forms of agricultural production methods such as appropriate water and soil conservation practices and Conservation Agriculture (CA) for small individual farmers in KK.

The project has been executed by the MAWR of GOKK, with on-site technical guidance and support provided through the contractual services of ICARDA and competent national and regional institutes and agencies. The contract included assistance in the formation and strengthening of a water user association (WUA), improved on-farm water management, conservation agriculture and integrated crop management.

The site selection was jointly made by representatives from GOKK, FAO technical staff and ICARDA at the start of the project, satisfying major criteria of the Project Document. Although the Chimbay site didn't meet some criteria it was jointly approved because this site was the best from those surveyed in terms of commitment of the local Government and farmers.

The Project will be implemented mainly in five demonstration pilot farms in Chimbay district. The farmers were selected based on following criteria: typical farm size, typical cropping system, they are compactly located around Mayjap and Sokharik canals, reliability of the irrigation system and availability of well irrigated and drained land for crop production; close distance/access to local market.

For improvement of irrigation system at the site sub-soiling and land leveling was made on 20 ha. Sub-soiling was done with a ripper 60-70 cm deep, according to the recommendation of specialists from the Nukus branch of SANIIRI approved by FAO

technical staff. The sub-soiling was followed by land leveling using laser device “SAUL – 1” provided by the Project; scraper and bulldozer. Six water points were constructed at the canal irrigating site area to improve water discharge measuring and accounting.

On 7 December 2004, structure and steering committee of WUA, as well as its Constitution were discussed and approved by participants of the meeting. Chairman of the K. Auezov Farmers Association Mr. Marat Khudaybergenov was elected as a chairman of WUA of Shokh-arik canal which is serving the area including the Project site.

For crop diversification, farmers were advised to grow more legumes but they were not ready to accept at once this concept and they were not sure about the market. Seven crops were tried, out of which sunflower occupied the largest area followed by sesame and sorghum. Unexpectedly, the most profitable crop proved to be carrots. In general, considering that farmers in Chimbay used to stick to cotton and wheat, the data obtained indicate that additional income can be obtained from alternative crops sown in summer on otherwise fallow land.

After sub-soiling and land leveling winter wheat of salinity resistant variety Dostlik was planted on 20 ha with consequent cutting furrows at 120 cm spacing to fit spacing between tractors wheels for permanent beds sowing practice next year after harvest of winter wheat.

13 bread winter wheat varieties (introduced from abroad, local and from other regions) were planted for comparative study at “Satniyaz” farm. The wheat varieties, grown under improved irrigation and adequate fertilization, will be tested to identify the best adapted to the local conditions of Chimbay district with major emphasis on tolerance to soil salinity. The varieties will be demonstrated to the neighbor farmers around project area and farmers will be able to select best variety for sowing in their fields.

Socioeconomic study has indicated that pilot farmers are happy that they were selected to be part of the Project. The farmers from neighbor farms are keen to join team working with the Project. They mostly appreciated land leveling activity and installation of water gates in view of expected introduction of payment for water. They also accepted an idea of crop diversification and this activity will be highly appreciated by farmers especially considering assistance in purchasing good seeds. As to conservation tillage farmers have doubts whether no-tillage will work on their soils characterized by high density and salinity.

National Consultants were nominated by the GOU and approved by FAO. Three Project Workshops were organized: Awareness Creating workshop, Training workshop for project national consultants and Training Workshop on conservation agriculture and improved water management for farmers 2004 involving some 20 farmers and 10 technicians. Three field days were organized for farmers and specialists.

In all, in spite of delayed start of the project, the team led by National Coordinator Dr. R. Ikramov under technical backstopping from ICARDA-CAC office was able to accomplish major outputs planed in the Project Document, and made good start for more successfulimplementation of the workplan in 2005, the second year of the Project.

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PREFACE

After the 1999 drought, in 2000 and 2001, Northwest Uzbekistan experienced the worst drought and water shortage in living memory. The Autonomous Republic of Karakalpakstan (KK), which is located at the tail-end of the Amudarya River, and includes its delta into the Aral Sea, was particularly affected. The area is naturally arid and, with an annual rainfall of only 110 mm, humans, animals and agriculture are almost entirely dependent on the residual flow in the Amudarya River for survival. River flow fell dramatically and the consequent impact on the rural population, livestock and crop agriculture was disastrous, with an emergency situation prevailing in many areas, particularly in northern districts.

The origins of this disaster were both man-made and natural. The main cause is mismanagement of water resources in the river basin, compounded by diminishing snow and glacier melt. There is general consensus amongst scientists and farmers that water availability at the tail end of the Amudarya River is in decline.

The three main crops grown in KK are cotton, wheat and rice. In former Soviet Union time in Chimbay located in the northern part of KK, cotton was a major agricultural crop. About 60 percent of the total irrigated land was devoted to cotton. Other crops rice, alfalfa, maize were grown on remaining 40 percent. Rice and cotton dominate in the region and are demanding much water than other crops. Alternative crops were not planted in large area in the Karakalpakistan and in Chimbay district in particular.

Conservation agriculture (CA) based on minimum tillage techniques should be introduced for crop establishment in order to reduce the tractor and machinery requirements per hectare, conserve soil moisture through reduced cultivation and improve yields. Field grading and leveling both need to be performed much more effectively in order to improve efficiency of irrigation and water utilization by crops.

For these reasons, there is an urgent need to pilot changes in irrigation and agricultural practices in the region in order to address the issue of declining water availability - this is a high priority for the Governments of Uzbekistan and KK. Farmers have limited experience in water conservation practices and utilizing salt and more drought tolerant crops. The government does not have the relevant technical expertise, but recognizes the need for radical change in both agricultural policy and practices for the region. It is therefore FAO was requested assistance in introducing conservation-effective water and soil management practices and introducing more drought and salt tolerant crops on a pilot scale, for possible adoption on a wider scale.

It was agreed that a proposed project will introduce, on a pilot scale, an integrated package of more sustainable agricultural practices, including CA practices and on-farm water management with the primary objective of utilizing the scarce water resources in an efficient and sustainable manner. CA practices will include introduction of practices in maintaining soil cover, direct planting/seeding with minimal soil disturbance, appropriate crop rotations, soil mechanization techniques and on-farm water management through improved land leveling, drainage and water saving technologies as well as water control and crop irrigation scheduling using deficit irrigation practices and saline soil leaching, with the primary objective of utilizing the scarce water resources in an efficient and sustainable manner.

I. PROJECT OUTLINE

I.1. Goals and Objectives

The overall objective of the project is to demonstrate alternative, profitable and more sustainable forms of agricultural production methods such as appropriate water and soil conservation practices and Conservation Agriculture (CA) for small independent farmers in KK.

More specifically, the immediate project objectives in the proposed pilot area are to:

- provide appropriate training to farmers and extension workers in the adoption of water conservation technologies, improved irrigation management and CA practices;
- adopt and test water saving technologies of irrigation, drainage and land reclamation, and define appropriate irrigation management practices that will ensure a more effective water supply, improve on-farm water use efficiency, ensure a timely and appropriate water supply to irrigated crops and prevent salinity;
- introduce and test machinery and technologies compatible with conservation agriculture and for timely agricultural practices including appropriate training in the use, repair and maintenance;
- introduce alternative crops and cropping systems that will optimize productivity under present limited water and salinity conditions;
- define agricultural practices and inputs that will increase and intensify the production;
- provide quality seed of salt and water stress tolerant varieties for the crops being introduced under the project;
- introduce sustainable systems of farm production, including forage production and livestock;
- provide experience and results, which can be replicated in other areas of KK and Uzbekistan.

I.2. Planed outputs

The outputs planned from this assistance were as follows:

- improved irrigation and on-farm water management practices;
- better drainage and other control methods to moderate the effects of soil salinity;
- improved crops productivity through integrated crop management and CA, in particular, salt and water stress tolerant cultivars, timing of irrigation application during crop establishment and later in the season, the use of permanent beds with crops sown on shoulders, and appropriate fertilizer use and application;
- more diverse crop products for small-scale processing and better marketing ;
- some 50 farmers and around 10 technicians trained in the philosophy and approach developed on the pilot farms;
- lower and more efficient water utilization for the new crop rotations introduced, as compared to traditional mono-cropping systems; and
- recommendations to extend the pilot farm approach into further regional and national programmes linked to international donor agencies working along similar lines in KK and Uzbekistan.

Implementation Arrangements:

The project was executed by the MAWR of GOKK, with on-site technical guidance and support provided through the contractual services of ICARDA and competent national and regional institutes and agencies. The contract included assistance in the formation and strengthening of a water user association (WUA), improved on-farm water management, conservation agriculture and integrated crop management.

GOU with concurrence from FAO appointed a National Project Coordinator Dr. R. Ikramov, who worked through his regional staff in KK Dr. E. Kurbanbayev located on-site and providing full-time supervision during implementation of the project.

ICARDA Contribution and Supporting Arrangements:

ICARDA's services in the implementation of the project have been completed through a formal contractual agreement, for which adequate resources were allocated in the project. It was contracted to take responsibility for the provision of technical inputs, including field monitoring, for the activities in KK. It was also requested to facilitate the smooth operations of the project. Dr. M. Suleimenov, Assistant Regional Coordinator, ICARDA-CAC was appointed as TCP Coordinator from ICARDA.

I.3. Site Selection

The site selection was jointly made by representatives from GOKK, Dr. R. Ikramov, the National Project Coordinator, FAO technical staff and Dr. M. Suleimenov, ICARDA at the start of the project, satisfying major criteria in the Project Document:

- occupied by 5 private family farms;
- assured supply of irrigation water (80 percent probability). The site is located in the northern portion of KK, close to the main supply canal;
- reasonable proximity to Nukus town (within one hour's travel time), and readily accessible by road,
- private ownership of the land;
- exemption from the state controlled production system (state orders) was not arranged and under circumstances farmers didn't want it because they are feeling more comfortable working under contract system with the State which is providing inputs and procures the produce;
- both upstream and on-site irrigation infrastructure are not in good condition. The water delivery system to the project site and within the selected hydraulic unit must be in sufficiently good condition to ensure delivery of irrigation water to all farmers. Water control structures (diversion gates, weirs, etc) were not functioning satisfactorily. But this is common situation all across KK.

Although the Chimbay site didn't meet some criteria it was jointly approved because this site was the best from those surveyed in terms of commitment of the local Government and farmers.

I.4. National Consultants

National Project Coordinator Dr. R.Ikramov has been frequently visiting the project site in Chimbay. He has done monitoring of the ongoing project activities, such as land

preparation, laser leveling, planting of wheat, irrigation and etc. Upon nomination made by National Center of Agricultural Research (Dr. Sh. Nurmatov) and National Project Coordinator, 5 national consultants were approved by FAO: Dr. Niyatbay Khodjanov – Consultant for Land and Water Management, Nukus Branch SANIIRI, Dr. Bakhitbay Aytbergenov - Consultant for Soil Management and Land Karakalpak Branch Uzbek SPCA, Mr. Rashid Koshekov - Consultant for Land and Water Management, Chairman Klzketken Irrigation System, Dr. Sarsenbay Shamshetov – Director, Karakalpak Branch Uzbek SPCA, Consultant for Mechanization-engineer, Dr. Erejeb Kurbanbaev – Cosultant for Irrigation, Director, Karakalpak branch of SANIIRI. Also Dr. K. Allamuratov was appointed on position of Consultant on Agronomy and soil Conservation but he never joined the team. Reports of national Consultants will be presented elsewhere.

In general selection of National Consultants was done by the GOU (Uzbek Scientific Production center of Agriculture) and in some cases was not based on expertise in particular areas of the Project.

II. CHARACTERIZATION OF THE PROJECT SITE

II. 1. General situation in farm sector

Back in Soviet era all people located in the site area were working at a State Farm "Kasym Auezov". After Uzbekistan got independence in 1991 the state farms were transferred into shirkats with essentially the same management stile under control of the Government except introducing family renting land for cropping on a contract basis with the shirkat management. The agricultural business in Shimbay as in other parts of KK was not a big success because of significantly reduced support from the Government. Thus, shirkats were hardly surviving till 2000 when the region was badly affected by severe drought leading to complete crop failure and consequently to bankrupts of the shirkats. This accelerated a process of dissolution of shirkats and distributing land shares to shirkat staff allowing them to run individual farms with regular size of 15 ha of irrigated cropland.

During time since collapse of Soviet Union no tractors, combines and other equipment was supplied to shirkats. That's why when the assets of the shirkat were distributed majority of emerging got left just with piece of land and some obsolete equipment. Availability of machinery is very poor and most farmers do not have own machinery renting tractors from MTS (Machine and Tractor Service). Moreover, most of the machinery is outdated and has very poor capacity to carry out field works. For example, out of 5 tractors only 2 were found suitable for field works. Therefore only some of the project farmers own a tractor, mostly old one which needs repairs every day during and after the work. The others rent services from the local MTS or from those few farmers who have a tractor. A farmer with a tractor would serve 2 to 3 neighbouring farmers. The limitation in machinery capacity is also a reason for growing just one crop per year, either a winter or a summer crop. There is no double cropping practice after wheat harvest.

Today in Karakalpakstan, most farmers do not have enough experience and knowledge about improved water management and irrigation technologies. Poor condition of irrigation system also constraints appropriate irrigation and consequently crop yields. There is a cotton monoculture in the area of Chimbay district. Second crop is winter wheat. Some farmers grow rice and sunflower. But double cropping is not practiced.

Chimbay is in the northern zone of the Karakalpakistan. Chimbay's climate is classified as severe continental with hot summers and cool winters. Summer temperatures are often surpass 45°C; winter temperature in January on average is about -8°C, with absolute minimum as low as -40°C. According to the data of the Karakalpak Research Institute of Crop and Land Management (KRICLM) located in Chimbay, the annual long-term precipitation is 110 mm, distributed as 18mm in fall (September- November), 60 mm in winter (December-March), 24 mm in spring (April-May) and 8 mm in summer (June-August).

Water resources are in short supply in most of Chimbay District. The three canals supplying Chimbay District are Mayjap, Shoharik, Aytgejap which originate from large canal Kyzketken of the Amudarya River. Ground water resources are polluted by untreated sewage water and by drainage water, which contains high levels of agrochemicals and minerals.

In transition period, soils in Chimbay continue losing fertility under low input farming system in the region. Currently the pilot farmers are applying almost no fertilizer and organic matter decreased during last 10 years from 1.1 % to 0.6 %. Water and wind erosion are the main reasons of soil degradation. Soil erosion negatively affects all crops. Soil protection against erosion is one the main issue of Conservation Agriculture which unfortunately was never introduced to farming practices in the region.

II. 2. Characterization of pilot farms

The pilot farms at the site were selected jointly by a group consisting of Dr. R. Ikramov, National Coordinator, Drs. Thomas, T. Friedrich and J. Munoz (FAO), Dr. M. Suleimenov (ICARDA) as well as with participation of representatives of all stakeholders in the region during visit to Chimbay on 14 May 2004.

The Project will be implemented mainly in five demonstration pilot farms in Chimbay district. The farmers were selected based on following criteria: typical farm size, typical cropping system, they are compactly located around Mayjap and Sokharik canals, reliability of the irrigation system and availability of well irrigated and drained land for crop production; close distance/access to local market. Based on the aforementioned criteria, five farmers have been identified and involved to the project activities. Four of them are young men ready to meet challenges. These farms are: Kipchakbay (41 ha), Aytjantore (15 ha), Satniyaz (38.6 ha), Davronbek (25.4 ha) and Kuvvat (50 ha) (See attachments: Figure 1).

At the beginning of the proposed project implementation, the selected pilot farmers were interviewed in following questions: foundation year of the farm, land use structure at project starting time, current cropping practice, application of fertilizer, herbicides, and insecticides during vegetation period of crops, farm machinery and livestock numbers.

Kipchakbay farm. Total agricultural land is 41 ha and all is irrigated land. Agricultural machinery equipment in Kipchakbay farm is following: 2 tractors one of them TTZ-80 (three wheels) this is a proper tractor and another one rented tractor T-28-X-4 (three wheels) from the MTP for using during the vegetation period. Also farmer has home made plough, 1-cotton seeder, 1- field cultivator, 1-chisel cultivator, 1-greyder and 1-trailer. Only this year farmer got a new TTZ-80 tractor through a special leasing company in Tashkent with a leasing period of 7 years, 20% pre-payment procedure and an interest rate of 6%. For agricultural equipment the lease is for 2-3 years with 50% down-payment. Flock structure: 4 cattle, 6 sheep and 10 poultries.

Current cropping situation is as follows: cotton was sown in 28 ha and remaining 13 ha were left fallow. On project recommendation he planted sunflower on 3 ha. The reality is that the farmer had not enough resources to grow any other crops on remaining 10 ha. The point is that farmers are encouraged to grow cotton because this is a strategic crop for which the Government provides plans but also it provides subsidized inputs and credit and procurement plan. For crops other than strategic the farmer has to take care on his own for which he has freedom to take decision but no resources. During the discussion the farmer agreed to change above indicated cropping practice to new recommended rotation: wheat + double crop vegetables, wheat + double cropping with maize, sunflower and sorghum. Alfalfa will be sown on at least 5 ha. The farmer believes that the proposed crop rotation will be more profitable than current practice in this farm.

Aytjantore farm. The farm is founded during the drought of year 2001after the shirkat got bankrupted. Total area is 15 ha all irrigated. Number of agricultural machinery in this farm is less than on Kipchakbay's. The farmer has TTZ-80 (three wheels) and T-28-X4 (three wheels) tractors, small home-made plough, field cultivator and trailer. Flock structure is: 6-cattle, 20-sheep and 10 chickens.

The cropping practice is the same as on Kipchakbay's: cotton has been planted on 12 ha leaving 3 ha fallow which was later sown with sunflower on recommendation of the project. There is no real crop rotation in this farm. Farm received some fertilizer for contracted cotton through Chimbay state chemical supplier and shared the fertilizer to both cotton and sunflower.

Satniyaz farm. The foundation year of the farm is 2000. Total agricultural land is 38.6 ha all irrigated. Mayjap and Shokharik canals are supplying water to the farmer's field from both sides. The farmer has only one tractor T-28-X4 (three wheels), 1-harrow, 1-field cultivator and one trailer. The farm has more domestic animals than Kipchakbay and Davronbek farms but less than Aytjantore and Kuvvat farms. The number of livestock is following: 3 cattle, 15 sheep, and 10 chickens.

Current cropping system included planting cotton continuosly. Farmer has planted cotton in 26.8 ha. On suggestion of the project he later planted on fallow land some mung been and carrots.

Davronbek farm was founded in 2000. Total area is 25.4 ha including 21 ha of irrigated land and 4.5 ha of range land. The farmer has a tractor MTZ-80 (three wheels), 1 harrow, 1 field cultivator and 1 trailer. There is some livestock: just one horse and one cow.

The current cropping system consists of continuous cotton, occupying two thirds of cropland leaving rest fallow. On recommendation of the project 7 ha has been planted with sesame, sunflower and millet. Recommended rotation in project would be cotton, wheat, summer crops (vegetables, maize, sunflower, sorghum, soybean) and alfalfa.

Kuvvat farm was founded in 1998 year, one of the first farms established not only in the project area but in the Chimbay district. The farm is the largest one in the project. Total area 50 ha all irrigated. The farm is much better equipped with machinery: 1 tractor T-4-A (crawler), 1 tractor UMZ (three wheels), 1 tractor T-28-X4 (three wheels), home-made plough, cotton seeder, chisel, field cultivator, trailer. He has a 10 cattle herd and 15 sheep flock as well as 20 chickens.

In May 2004, farmer has sown cotton on 35 ha of irrigated land. In remaining 15 ha on recommendation of the project alternative crops have been sown: sunflower, sorghum, sesame and melons.

II. 3. Soil Conditions

According to the project objectives in the selected 56.7 ha, pilot farms fields were proposed to be surveyed to identify contents of nutrient components in the soil i.e. total nitrogen, active form of phosphorus, potassium and humus.

On the base of soil analyses the agrochemistry maps of the project demonstration site for the nutrient components such as nitrogen, phosphorus, potassium and humus were

made (See attachments: Figures 9, 10, 11 and 12). The recommendations on fertilizer application were drafted according to the agro-chemistry map.

Sixty four soil samples were obtained for studying soil physical and mechanical properties. The samples were taken from 7 fields at 1 meter depth in every 10 cm for determining the soil density. The value of the bulk density of the soil fluctuates from 1.4 to 1.6 g/cm³. The highest bulk density is noted on the depth of 20-40 cm.

Over the past 12 years, more than 50 % of fields in whole Chimbay district have been ranked as very low and low in P_2O_5 supply. Phosphorus efficiency is greatest when applied with the seed, providing the amount does not injure the germinating seedling but positively affect for germination. Farmers in the Project area actually didn't apply phosphorus fertilizers since collapse of Soviet Union. At the Project site, an annual dose of phosphorus (ammophos) was applied with a fertilizer spreader NURI-0.5 with rate 300 kg/ha and disked twice before planting winter wheat.

Almost all irrigated areas of the project pilot site are located between two canals. The ground water table goes up to the surface of the soil and take an active part in the soil formation processes. When the both canals are operated the ground water level (GWL) is going up from 91 cm to 216 cm (Table 1). Mineralization (M) of ground water is rather high and fluctuates from 1,9 g/l to 5.0 g/l.

Table 1. Level of the pilot site ground water and its mineralization (2004)

	Months												Average
	1	2	3	4	5	6	7	8	9	10	11	12	
GWL	155	149	137	133	129	91	162	165	191	216	230	248	167cm
M	4,99	4,99	4,99	4,99	2,63	2,63	2,63	1,90	1,91	1,91	1,99	2,30	3.35%

According to the data of the project pilot site's irrigated areas are considered to be of slightly saline soil and the value of soil salinity fluctuates from 0.199% to 0.637%. The content of Cl ranges from 0.03 to 0,065 %, which is close to maximum allowable concentration (0.04%) for these conditions. Salt in the soil is concentrated in the 0-20 cm layer and its value goes down in the lower horizons. In general the salt content in all the territories of the pilot site is not very high, with the exception of field No 3. The salt content in the upper layer increases in between irrigation periods and reaches 1.2 %.

III. ACTIVITIES

The following activities were planed in the Project Document:

1. Adoption of water saving technologies of irrigation, drainage and salinity management.
2. Introduction of new prototypes and modification of existing planters/drills (1), sprayers and harvester combines in the central machinery pool, for direct drilling of the crops with no-tillage to be grown under the new project.
3. Screen cultivars of salt and water stress tolerant crops for best adaptation to local conditions. Using identified cultivars, establish demonstration trials to determine: i) optimum crop establishment practices including timing of irrigation application and direct sowing; ii) possible use of beds with crops sown on shoulders for increased productivity and water use efficiency; iii) best crop sequence and water management for higher water use efficiency and salt control; iv) appropriate fertilizer use and application.
4. Socio-economic studies of adoption of recommended water saving and soil conservation technologies, and crop diversification.
5. Training of the private farmers involved in the project together with extension staff on integrated crop management, improved irrigation and water conservation practices with key topics related to the introduction of new range of crops, weed control (use of chemicals), crop residues/cover crops, crop rotations, direct drilling, irrigation frequency, harvest, and crop storage.
6. Twelve field days (six per season) bringing together participating/neighbouring farmers, extension agents and researchers in the field to observe and discuss key field demonstrations. Organized traveling workshops to adjacent countries to study experience on water saving and soil conservation technologies in small farming systems.

III. 1 Adoption of Water Saving Technologies of Irrigation, Drainage and Salinity Management

III. 1. 1. Status of the irrigation and drainage system

One of the main objectives of the new implemented project is to demonstrate water improvement and water saving technologies and build water points in the demonstration pilot site. This will help farmers to get timely access to water, to use it efficiently for crop production, and produce more food with less water under circumstances of actual or economic water scarcity. According to national consultants report, it is expected that from spring next year water might be sold to the farmers. The water points will improve:

- Farm irrigation practices;
- Management techniques that give farmers timely access to water; and
- Consultancies and institutions that help farmers to take advantage of the above advances.

Irrigation systems and irrigated fields are considered to be of semi-engineering type and have relatively good land leveling and slight to medium soil salinity. They are not enough equipped with engineering and hydro-engineering structures. It should be

mentioned that ditches are excessively long and are confusingly located. Drainage network is constructed not as drainage with the appropriate inter-drainage parameters but as a by-wash canal for discharging excessive wastewater and filtration waters. Irrigation network of the project demonstration site is taking water from the Shokarik canal that is originated from large Kegeili canal. The main parameters of the Shokarik canal are represented in table 2. The linear circuit and profile structure of the Shokarik canal is represented in Figures 1, 2, 3 (See attachments: according to survey data of 2004).

Table 2. The main hydraulic characteristics of the Shokarik canal and its water points

Name of the canal	Flow discharge, $м^3/s$	Length, km	Width on top, m	Depth, m	Water intakes
Shokarik	6.0	22	11	1.7	71
Maiyab	0.6	4.2	6	1.3	17

The Shokarik canal's length is 22 km and all its structures are of non-engineering type. It is poorly reinforced and overgrown with aquatic plants and weeds. It requires capital reconstruction. The canal is functioned without supporting regime and does not command as regards of the irrigated areas. The sub canal May-yab originated from the main canal Shokarik and at full admission enables irrigation of suspended irrigated areas in unsupported regime (See attachments: Figure 3). The canal is in fairly good condition.

There are two water distributors, which takes water from two sides: both from the Shokarik main canal and from the May-yab sub-canal. The two canals supply water for 162 ha. The other site of irrigated area is taking water straightly from the Shokarik and May-yab sub canals by means of construction of temporary ditches (See attachments: Figure 3). In general, there are 71 structures of different type in the Shokarik canal system (table 3).

Table 3. Availability of hydro-engineering constructions on the Shokarik and May-yab canals

Name of a canal	Total number of hydro-technical structures	Including			
		Bridges	Headworks	Culverts	Water intakes
Shokarik	78	2	1	4	71
Maiyab	23	1	1	4	17

As it is obvious from table 3, the total number of water points from 2 canals makes up 88 pieces. Total number of water points of the 50 ha of the demonstration site is 13, that is 1 water point supplies 6.3 ha with water. It exceeds optimal rate three times.

Collector-drainage network of the pilot site Northern part goes to inter-farm collector КС – 3-25-9-2, which is the left bank outlet of inter-farm collector КС – 3. A tail drain line is built on the territory of the demonstration site, the primary function of which is the discharging of filtration water from the canal (as intercepting drain) of irrigated fields. The main parameters of the collector and the drainage systems are represented in table 4.

Table 4. The main hydraulic parameters of the collector and drainage

Name of drainage and collectors	Discharge rate, m^3/s	Width, m	Depth, m	Length, km	Water flow velocity, m/s
Collector КС -3-25-9-2	0.7	26	0.6	1.2	0.202
Drain line D – 4	0.06	8.6	0.2	1.8	0.216

Both the collector КС-3-25-9-2, and the drain line D-4 itself require the reconstruction along the full length, especially the drain line D-4 needs deepening of its bottom and repairing of the pilot site structures.

According to the terms of reference the detailed survey of the demonstration site area (50 ha) was carried out and on the basis of quadratic survey cut-and-fill-quantity of a specific field was determined.

Along with this, in the process of the pilot site survey it was revealed that the canal is not equipped with hydrometric devices and the water from the source of irrigation is taken by means of pipes. It should be mentioned that the water-resources assessment is not completed. The temporary feeders are put at random and their size is higher than the normative sizes.

Specialists from Nukus branch of SANIIRI have built 6 water points in the Mayjap canal which supplies water to the demonstration project site (see the picture).

A Land and Water management consultant Mr. Rashid Koshekov is preparing drainage systems and collectors to be used the next season for planting spring crops and identification of needs for improvement of irrigation and drainage infrastructure the coming year.

Project workplan includes establishment of a Water User's Association (WUA) in Chimbay site. Consultant for Land and Water Management and Chairman Kegeyli-Klzketken Irrigation System Rashid Koshekov has drafted a policy of Water User Association which included project pilot farmers and other neighbor farmers around project site. WUA will be provide equal distribution of water between farms, enduring water supplies, decreasing water loosing and etc.

On 7 Decembeer 2004, structure and steering committee of WUA were discussed and approved by participants of meeting. Chairman of the K. Auezov Farmers Association Mr. Marat Khudaybergenov was elected as a chairman of WUA of Shokh-arik canal. The creation of Water Users' Association is important for farmers and farmers' groups to exercise their right to the use of water as well as to efficiently concentrating their efforts and means for joint actions aimed at the optimum utilization of water resources.

III. 1. 2. Land Leveling

Land leveling facilitates uniform application of irrigation water and optimizes nutrient-water interactions for higher productivity. Land leveling by a laser-assisted precision land-leveling system can save up to 20 % irrigation water and can improve crop yields. It is a precursor technology that will enhance benefits of zero-tillage and any other crop establishment system such as bed planting system.

According to approved by FAO technical staff workplan, the soil preparation for planting winter wheat started from sub-soiling and laser leveling. Because of delayed funding field works started also with great delay effectively from 2nd October 2004.

At first a topography map for all 50 ha site was designed. The design was done by the specialists from Nukus branch of SANIIRI. Leveling of fields was carried out based on the map. One specialist (Kuvanchbek) from Kegeyli-Kyzketken irrigation system joined the field team and undertook all field leveling works.

The 7th demonstration pilot field was weedy fallow. Before land leveling, the weedy fallow field was cleaned up by eradicating weeds to ensure get good quality land preparation works. Weed stems were cut by grass-mowing machine mounted to T-28-X4 (See attachment: Picture 1).

In Chimbay district, cotton is the most widespread crop grown continuously. In the project site farmers agreed to plant some winter wheat after cotton on 13 ha. Before land leveling activities in the cotton field, cotton stubble was removed by hand to ensure quality of land leveling works. On the “Satniyaz” farm, carrot field was cleaned by hand before plowing of ground surface of soil.

The land preparation equipment consisted of moldboard plow, sub-soiler, laser leveling device, land leveling machines. Sub-soling was done by tractor Magnum with a ripper (RN-61) 60-70 cm deep, according to the recommendation of specialists from the Nukus branch of SANIIRI. The sub-soiling was followed by land leveling using laser device “SAUL – 1”; scraper DZ-87-1, and bulldozer DZ-110 – V (See attachment: Picture 2).

III. 1. 3. Soil salinity management

In the project site, soil salinity restricted the growth of wheat seriously. The group got acquainted with current situation of demonstration fields in the project site and discussed soil salinity problem in the Chimbay district and in project farmer’s fields.

Saline soils must be managed with great care otherwise serious problems can persist for many years. The problem can spread rapidly and affect neighbor’s fields or contaminate the local watershed or groundwater. The solutions to salinity problems are often location specific and should be treated on a case by case basis for best results. Management programs that deal with salinity include:

- various surface drainage techniques
- green manuring
- planting deep rooted, salt-tolerant forage crops (like deep-rooted alfalfa; bed planted wheat and rye)

The salt in the project site has come out and wheat plants died on salt affected pars of the field. After discussions with project national consultants, it was decided to irrigate wheat fields by furrow during leaching process. On the other hand, cleaning of the collectors and drainage canals around the project demonstration site have started.

III.1.4. Introduction of New Prototypes and Modification of Existing Equipment

Because of delayed start of the Project and long lasting procedure of purchasing equipment, the Zero tillage planter arrived Uzbekistan only at the end of the year 2004, while raised bed planters and no-till drills from India, as well as sprayer from Cyprus didn't arrive yet.

Based on instructions from Dr. T. Friedrich, with efforts of Dr. Sarsenbay Shamshetov a new furrow cutting device was designed with 2.4m track and distance between furrows 1.2 m. The new furrower successfully opened furrows in the all planted area of winter wheat (See attachment: Picture 3).

III. 2. Screening Cultivars of Salt and Water Stress Tolerant Crops

The activity was planed to include screening and using identified cultivars, establish demonstration trials to determine: i) optimum crop establishment practices including timing of irrigation application and direct sowing; ii) possible use of beds with crops sown on shoulders for increased productivity and water use efficiency; iii) best crop sequence and water management for higher water use efficiency and salt control; iv) appropriate fertilizer use and application.

III. 2. 1. Summer crops

There were no crop rotations in the project site area. In the time of States farms, area was planted to cotton in rotation with alfalfa. Cotton was occupying up to 80% of cropland. The rest of cropland was dedicated to alfalfa and other forages. After dissolution of Soviet Union, state farms were reorganized in shirkats working under strict governmental control. After drought in 2000-2001 shirkats got bankrupted and its members were given opportunity to run individual farms. As cotton and wheat are main contracted crops by the Government, the farmers in this area switched to cotton monoculture relying on supply of inputs through Governmental channels.

It was recommended by the project to plant summer crops on otherwise fallow land: Mungbean, Sunflower, Millet, Sorghum, Sesame, Melon and Carrots in the end of June 2004). Sowing was done by hand. Pre-sowing irrigation was given on the rate of 600-800 m^3/ha;

This year was the first year of the Project and start up of the Project coincided with very hard time for farmers who received opportunity to run farms individually but under very harsh environment with poor resources hardly surviving in developing market oriented economy. This is why it was not easy to try to implement any improved cropping practices in such an environment. As usual in such cases, farmers were expecting that assistance will be provided by the project in terms of material resources.

At the Kipchakbay farm, 3 ha of sunflower were broadcasted by hand which is common practice these days on small farms, on 14th of June at seeding rate 10 kg/ha. Topsoil samples were taken from all project area fields for chemical analysis by national consultant Dr. Bakhitbay Aytbergenov. Nitrogen fertilizer at the rate of 21 kg N/ha was applied during the vegetation period at a booting stage of sunflower crop. The crop was harvested by hand because farmer had no money to rent a harvester combine CASE available at the MTS. The sunflower baskets were cut and taken to the farmer's house for drying and threshing.

The yield of sunflower was 1.1 t/ha and total yield for 3 ha was 3.3 ton. Harvested sunflower seeds will be prepared by the farmer to sell in the domestic market which is located in the Chimbay district (Table 5).

Table 5. Area and yield of sunflower at the Kipchakbay farm in 2004

	Crop	Planting date	Seed rate kg/ha	Fertilizer kg/ha (N)	Area ha	Yield t/ha	Total yield ton
1	Sunflower	12/06/04	10	21	3.0	1.1	3.3

At the Satniyaz farm three different crops have been planted in summer: carrots, mungbean and the sunflower. The nitrogen fertilizer at a rate of 70 kg N/ha was applied in accordance with recommendation of project agronomist in mid-August. While the vegetation period of the carrot was attacked with insects and pesticide *Stefein* was applied to control the insects. He collected not bad yields as contrasted to poor technology (Table 6).

Table 6. Area and yield of summer crops planted in Satniyaz farm in 2004

	Name of crops	Planting date	Seed rate kg/ha	Fertilizer kg/ha (N)	Area ha	Yield t/ha	Total yield ton
1	Carrot	21/06/04	2	70	0.7	24	16.8
2	Mung bean	25/06/04	16.0	-	0.8	0.8	0.56

There was obtained quite good yield of carrots (24 t/ha) in current year and the farmer Satniyaz sold the carrot yield in the market of Chimbay district in October, when the price of carrot was pretty good ($70 per 1 ton) and received income of US$ 1176 from area of 0.7 ha which was rather good benefit for farmer. Carrot was irrigated four times.

Mung bean was planted on 15 June in 0.8 ha. During the vegetation period the crop was irrigated just once at a flowering stage. The yield of Mung bean was 0.8 t/ha and total yield was 0.56 t. It wasn't bad if one considers that technology included just one irrigation and no fertilizers.

Farmer Aytjantore has planted 3 ha of sunflower just like Kipchakbay but the yield of sunflower in this farmer was higher than at Kipchakbay's by 36% (Table 7).

Table 7. Area and yield of sunflower in Aytjantore's farm in 2004

	Name of crops	Planting date	Seed rate kg/ha	Fertilizer kg/ha (N)	Area ha	Yield t/ha	Total yield ton
1	Sunflower	05/06/04	10.0	120	3.0	1.5	4.5

The reasons of higher crop productivity in this farm were the following: farmer has bought seeds of the good hybrid line "Sambred 254" from Karakalpak-Moldova joint stock company located in Nukus; sunflower crop has been irrigated twice: prior to sowing and second irrigation was applied during the flowering stage of the crop. Considering that nitrogen is the most critical factor for high yields of all agricultural crops in irrigated conditions of Chimbay, Aytjantore made application of fertilizer twice at a rate of 60 kg N/ha: fifty percent of nitrogen was side-dressed at booting stage and remained fifty percent of nitrogen was provided at flowering stage.

Table 8. Area and yield of summer crops in Davronbek farm in 2004.

	Name of crops	Planting date	Seed rate kg/ha	Fertilizer kg/ha (N)	Area ha	Yield t/ha	Total yield ton
1	Millet	10/06/04	16	-	0.5	1.1	0.55
2	Sesame	02/06/04	14	-	3.0	0.4	1.2

Farmer Davronbek has sown sesame on 3 ha and millet on 0.5 ha area as summer crops on otherwise fallow land. Millet was irrigated twice at tillering and at flowering stages while sesame was irrigated just once at flowering stage. The crop yields were not high but considering poor technology they were satisfactory (Table 8).

The yield of millet was 1.1 t/ha and sesame was 0.4 t/ha. Both crops are on demand: proso millet is traditional food of Karakalpak and Kazakh people. The price of proso millet is at least 50% higher than wheat but a few farmers grow proso but everybody grows wheat. Under better technologies this crop is good cash crop in this region. Sesame even at this yield might be profitable considering high prices.

Farmer Rahmetulla at a Kuvvat farm planted three different summer crops: sesame on 2.0 ha, melon on 1.0 ha and sorghum on 2.5 ha (Table 9).

Table 9. Area and yield of summer crops planted in Kuvvat in 2004.

	Name of crops	Planting date	Seed rate kg/ha	Fertilizer kg/ha (N)	Area ha	Yield t/ha	Total yield ton
1	Sorghum	15/06/04	10	100	2.5	1.1	2.75
2	Melon	11/06/04	3.0	-	1.0	9.1	9.1
	Sesame	27/05/04	14	-	2.5	0.6	1.5

The yield of sesame in Kuvvat farm out yielded Davronbek's by 0.2 t/ha thanks to earlier planting date and better emergence rate. The yield of sorghum was not high but it was satisfactory for rather poor technology.

In total farmers were more likely to sow sunflower which is better known crop (Table 10).

Table 10. Area of summer crops on Project farms, ha

#	Farm	Sunflower	Mung bean	Carrots	Sorghum	Millet	Sesame	Melon	Total area, ha
1	Kipchakbay	3.0							3.0
2	Satniyaz		0.8	0.7					1.5
3	Ayjantore	3.0							3.0
4	Davronbek					0.5	3.0		3.5
5	Kuvvat				2.5			1.0	3.5
	Total area	6.0	0.8	0.7	2.5	0.5	3.0	1.0	14.5

Farmers were advised to grow more legumes but they were not ready to accept at once this concept and they were not sure about the market. Seven crops were tried, out of which sunflower occupied the largest area followed by sesame and sorghum. Unexpectedly, the most profitable crop proved to be carrots (Table 11).

Carrots were planted only by Satniyaz and it paid back very good. In this report we didn't calculate net profit because all cost of production included hand work, which farmers actually don't count involving family members and some casual labor. Certainly, growing carrots is labor consuming and other farmers didn't like to grow them. Melons are also good cash crop followed by sunflower.

Table 11. Income obtained from summer crops

Farm and crop	Crop area, ha	Yield t/ha	Total yield, t	Price, '000 soum/t	Total income, '000	Income in $US	Income $ per 1 ha
Kipchakbay							
Sunflower	3.0	1.1	3.3	250	825	785	262
Satniyaz							
Mung bean	0.8	0.8	0.64	250	160	150	187
Carrot	0.7	24	16.8	70	1176	1119	1598
Ayjantore							
Sunflower	3.0	1.5	4.5	250	1125	1070	357
Davronbek							
Millet	0.5	1.1	0.55	160	88	84	167
Sesame	3.0	0.4	1.2	500	600	571	190
Kuvvat							
Sorghum	2.5	1.1	2.75	200	550	523	209
Melon	1.0	9.1	9.1	60	546	519	519

In general, considering that farmers in Chimbay usually stick to cotton and wheat, the data obtained indicate that additional income can be obtained from alternative crops sown in summer on otherwise fallow land.

III. 3. 2. Planting winter wheat

Wheat seeds were treated by chemical (Vitavax -200) before planting in order to prevent from diseases during emergence period of wheat.

The agricultural equipment used for planting were a double disk drill SZ-3.6 and a fertilizer spreader NURI-0.5 operated by Mr. Barlykbay from Kipchakbay farm, who has a tractor. He planted all 20 ha of winter wheat in the project site by his own leased tractor. The winter wheat fields were conditionally numbered as 2, 3, 4, 5, 7 and the fields are located at two demonstration farms: Kipchakbay and Satniyaz. The #2, 3, 4 fields belong to Kipchakbay and #5, 7 fields to Satniyaz . Mr. Satniyaz has a tractor with trailer to transport seeds, fertilizer, and some equipment from one place to another.

Soil salinity is major constraint for high crop yields in the area. Plant varieties vary in how well they tolerate salt-affected soils. Plant breeders from Sirdarya branch of a Research Institute of Cereals and Legumes under Irrigation identified bread wheat variety Dostlik as most tolerant to soil salinity widespread in Sirdarya province. The variety Dostlik was purchased by the Project and brought to Chimbay from Sirdarya and was sown in 20 ha of project area at rate of 200 kg/ha in mid-November which was a bit late as recommended adequate time for sowing winter wheat is between 20 September-10 October. Delayed sowing happened because of delayed land leveling works

because it started late and lasted long because of obsolete tractors available for land leveling works.

In order to get normal emergence of seedlings and density of wheat stand on all 20 ha irrigation furrows were cut by furrow opener. The depth of seeding was from 4 to 5 cm and seed quality was good. Irrigation furrows were placed accurately with the spacing fit to future raised and permanent beds. Considering double cropping in summer 2005 after harvest of winter wheat, the spacing of the major furrows was at 1.2 meter, that is for a 2.4 m wide track tractor with a center furrow. This mounted furrower is made in Chimbay for future use in the project site.

III. 3. 3. Winter wheat variety testing

13 bread wheat varieties (introduced from abroad, local and state registered) were planted on demonstration trial by hand at “Satniyaz” farm. The wheat varieties, grown under improved irrigation and adequate fertilization, will be tested to identify the best adapted to the local conditions of Chimbay district. The varieties will be demonstrated to the neighbor farmers around project area and farmers will be able to select best variety for sowing in their fields. The varieties are planted in demonstration trials in the project site as winter crop in mid of November.

The varieties planted for demonstration included those developed recently by plant breeders from the Karakalpak Research Institute of Crop and Land Management: “Julduz”, “Saule” and “Amy”. These varieties are well adapted to the weather conditions of Chimbay district but they might be not the best to withstand soil salinity. Beside this, several registered bread wheat varieties were sown at the project site for comparative studies: Sanzar-8, Yangiovul, Andijon-1, Marjon, Ok-bugdoy, Chillaki, Yanbosh as well as well known Russian varieties Polovchanka, and Kroshka sown everywhere in Uzbekistan.

Winter wheat emergence was satisfactory but not very good as planting was done with great delay. Later observations indicated that wheat emergence in third field at Kipchakbay’s was poor because of saline seepage which happened because of poorly working drainage system. In February 2005, we are going to begin the preparation of the field to plant spring crops most likely alfalfa.

Conservation tillage will be tested using imported equipment from abroad because this technology is not available in Uzbekistan. The equipment arrived from Brazil and is expected to come from India.

III. 4. Socio-Economic Studies of Adoption of Recommended Technologies

Socioeconomic studies aimed study of farmers perceptions on farming under newly developed social environment as well as their attitude to adoption of recommended water saving and soil conservation technologies, and crop diversification.

Socioeconomic study of adoption crop diversification strategy indicated that farmers have different perspective on the same issue. First, all of them are working in very hard socioeconomic environment. They were given opportunity but under such a difficult condition with so many constraints that challenges are unbelievable for successful farming. On one hand the shirkat was dissolved when it got bankrupted and have received no valuable assets except the guy who was a chairman of the shirkat and

established his own farm Kuvvat. On the hand legacy of the Soviet system is there affecting their mindset. It means that they are not prepared for entrepreneurial approach to business although some of them better than others. They are not very young and not very old under average age of 45 years old.

The eldest was Mr. Rakhmetulla, 52, the former chairman of the shirkat. The fact about him is that he past away during summer. He died with no clear statement about his disease and without careful medicinal treatment. He seemed to be in a very bad mood all the years after collapse of the Soviet Union, because he was educated person gradated from irrigation Institute and worked actively as water management specialist and was appointed manager of the Collective farm later reelected as Chairman of the shirkat. He probably was very much unset about bankruptcy of the shirkat during dry years. In the system where he worked he had to take all responsibility for management of the shirkat irrespective of natural disaster. No doubt that he was given hard time from the Government officials. When the shirkat was dissolved he succeeded to establish his own individual farm in much better economical conditions than the others but that was absolutely another business than management of the big farm where hundreds of people depend on you every day. To be responsible just for a few hectares with one obsolete tractor, after you were thinking in terms thousands of hectares and dozens of tractors and trucks with automatic supply of all inputs, made very big difference. He tried to find another occupation as water management specialist but it didn't help. He was not really sick he just lost interest in this life.

Mr. Aytjantore, 47 was a chief agronomist at the shirkat. He also found himself in a strange situation with responsibility for a small cropland area. But responsibility of shirkat agronomist are not comparable with the Manager of the shirkat they are much lower. As agronomist he seems to be more attracted to the Project activities and enjoys being involved actively participating in discussions during workshops and field days. He was the only farmer who understood importance of legumes and agreed to start growing soybeans from the next year. He also is favoring dedicate some area for alfalfa. He has off the farm source of income leasing a minibus car to other people. Ha also has relatively large livestock herd with which his kids are busy. He is energetic person and probably will be a good team member for the Project.

Mr. Satniyaz, 46 was a truck driver in the past. He is very energetic and hardworking person probably the best with dedication to farming business. He has no other source of income rather than farming. He enjoys working in the Project and is a good asset.

Mr. Barlykbay (Kipchakbay farm), 34 was driving tractors at the shirkat. He is the youngest but not most hardworking team member. His wife Mrs. Bagly Utegenova is head of the farm doing all managerial work. She came forward with idea to buy a tractor on a long-term lease base.

Mr. Kosybay (Davronbek farm), 44 was worker of the shirkat. He is quite reluctant to farming activities and seems to be not enjoying the business. He doesn't have any other source of income.

There are no rich farmers in the project site. According to farmers, to be considered rich farmer need to own irrigated land of about 100 ha, up to 100 heads of sheep, and around 15 cattle. However, more importantly farmers need to have access to irrigation water and resources to conduct field works timely.

All of them were very positive to land leveling activity but because of limited funds the area selected was as large as 20 ha and covered only cropland of Kipchakbay, Aytjantore and Satniyaz. The reason they were happy was expressed by them in a way that they see possibility of water saving in view of talked about policies introducing payment for water for irrigation. The same attitude of farmers was to establishment of water measuring and water distribution controlling devices. They appreciated technology of portable plastic irrigation shoots demonstrated by Dr. V. Shaposhnikov but said they have no resources to buy them. As to irrigation technology demonstrated to them during workshop by Dr. Novikova, they said that the technology of irrigating from two sides is good but under real situation with water pressure at the canal outlets it will not work.

Adoption of conservation tillage seems to be more questionable for farmers. They never heard from anybody that one can farm without proper plowing the land. It goes without saying they say that one has to plow land for seedbed preparation. Otherwise one can not expect good crop yield. They don't have good experience with wheat but cotton needs deep tillage they say. Another issue soil density which is very high in the area and they look at plowing as a way to reduced soil bulk density. Third issue is soil salinity which became main constraint for high crop productivity. Farmers believe that soil must be deeply plowed up and then worked by leaching to control soil salinity from the surface.

Crop diversification is a new issue. Farmers got used to think only about cotton. For other crops they had no equipment, lack of knowledge about growing and marketing and no resources to buy inputs. Cotton and wheat are controlled by the Government which in turn provides credit to buy subsidized inputs. For crops other than cotton and wheat one has to go to market and purchase seeds and inputs which is problematic under circumstances.

When this issue of raising summer crops on fallow land they started talking about constraints first: no resources, no seeds and no inputs. Sunflower proved to be the crop which was more familiar for production, processing and for marketing. This is why on two farms (Kypchakbay and Aytjantore) they made up their minds to grow 3 ha of sunflower each. They said that for growing sesame and melons one needs well prepared land which was available at two farms: Kuvvat and Davronbek. Satniyaz made up his mind to sow carrots, which is labor consuming and other farmers avoided this crop, but Satniyaz is very hardworking guy and he involved his family members as well as some hired labor for weeding. And it was a success as carrots provided the highest incomes to farmer. Famers werenot keen to grow mungbean which as distinct from other parts of Uzbekistan is not so popular food in KK and they were afraid that processing and marketing will be difficult. Proso millet is very popular food in KK but somehow farmers proved to be not prepared to grow this crop which shows once more that they lack entrepreneurship character in farming business.

IV. CAPACITY BUILDING

The Project document requested to organize training of the private farmers involved in the project together with extension staff on integrated crop management, improved irrigation and water conservation practices with key topics related to the introduction of new range of crops, weed control (use of chemicals), crop residues/cover crops, crop rotations, direct drilling, irrigation frequency, harvest, and crop storage.

Twelve field days (six per season) were also in a workplan to bring together participating and neighbor farmers, extension agents and researchers in the field to observe and discuss key field demonstrations. It was also proposed to organize traveling workshops to adjacent countries to study experience on water saving and soil conservation technologies in small farming systems.

The project aimed at creating general awareness for sustainable agricultural practices such as improved irrigation water management and Conservation Agriculture and strengthening the capability and skills of farmers, extension agents, and staff of MAWR, in developing crop production through diversification and reduced tillage practices, water saving irrigation, drainage and land reclamation along sustainable, environmentally friendly and profitable lines. This was planed to be achieved through three workshops (inception, mid-term and final) to discuss the work plan and review progress achieved.

IV. 1. Workshops

Policymakers from the MAWR, participating farmers and researchers were invited to discuss the project-concept and the project work plan. They also participated in three field days throughout the cropping season.

An Awareness Creating workshop was organized on 13-14 May. It was attended by Government officials (Dr. S. Nurmatov, Deputy Minister of Agriculture, Uzbekistan), Officials from the Government of Karakalpakstan, FAO group (Drs. T. Bachman, T. Friedrich and G. Munoz), ICARDA (Dr. M. Suleimenov), National Coordinator Dr. R. Ikramov, farmers, scientists and other stakeholders. The workshop participants were introduced the Concept of the Project Document and discussed possible activities and project sites. Later team members including representatives of FAO, ICARDA and National coordinator visited several sites and identified Chimbay as the best possible site for the project. This decision was approved by the Government of Karakalpakstan and Governor of Chimbay (Minutes attached in appendix-1).

A training workshop for National Consultants was conducted on 10 August with the aim to get National Consultants better oriented and for guiding them to develop individual workplans to meet the goals of the Project. It was attended by five national Consultants. They were instructed by Drs. M. Suleimenov, ICARDA, R. Ikramov, National Coordinator, Dr. S. Shamshetov, Head of Agricultural Research System of KK and A. Nurbekov, ICARDA (Minutes attached in appendix-2).

To prepare for on-farm training, formal training courses were organized for participating farmers and researchers/technicians to address concepts of improved community water management, technical aspects of land and crop management under CA as well as participatory research and extension methodology.

All on-farm training has been carried out within the Water User Associations (WUA). The local CA-experts accompanied the project farmers in a joint learning process. There were regular on-farm training sessions and field demonstrations to which farmers, extension staff and MAWR staff has been invited. Neighboring farming communities have been encouraged to participate in observing the field tests so as to initiate a farmer- to-farmer extension and exchange.

A training workshop on Conservation agriculture and improved water management practices was conducted on 6 December 2004 in Nukus (See the attachments: Picture -4). It was attended by 35 participants including 15 farmers, government officials, scientists and representatives of other stakeholders. In the seminar, instructors presented papers on conservation agriculture practices based on the world experiences and improved water irrigation technologies. Instructors included National Consultants and invited scientists from SANIIRI (Minutes attached in appendix-3).

During the first planting season, two selected local CA specialists (one mechanization and one cropping systems specialist) were planed to undertake a four-week study tour to Mexico to exchange experience with local farmers and experts who are practicing mechanized production systems under irrigated CA-technology.

This activity was not completed because training in Mexico was rejected by GOU representative requesting to arrange training at nearby countries. Later opportunity was to organize training in Turkey on zero tillage. However nominated scientists could attend because time of the course was postponed and coincided with time of planting winter wheat in October. Thus nominated scientists were not allowed to travel at that time.

IV. 2. Field Days

On 9 August a field day for 15 farmers was organized by Drs. A. Nurbekov, S. Shamshetov and Mr. R. Koshekov. The goal of the Field Day was to get farmers involved in the development of the Project and learn about their views on the Project and their needs assessment (See the attachments: Picture -5).

On 15 October another field Day for 15 farmers was organized by Drs. A. Nurbekov, R. Ikramov and Mr. R. Koshekov with goal to train farmers to land leveling techniques and irrigation methods.

On 7 December field day was organized at the Project site. 30 farmers and other stakeholders from the district attended the field day started by meeting at a K. Auezov farm association's office led by Mr. R.Koshekov. Mr. Jorge Rotermund, Drs. A.Novikova, V.Shaposhnikov and A.Nurbekov also attended (See the attachments: Picture -6).

The group established WUA and visited winter wheat fields and discussed the current situation of wheat plants.

V. OUTPUTS AND CONCLUSIONS

V. 1. Outputs

The following outputs have been obtained in first project year:

- Site selection was made jointly by a group consisted of representatives of GOU, FAO, and ICARDA in Chimbay district, northern Karakalpakstan.
- National Consultants were nominated by the GOU and approved by FAO.
- Three Project Workshops were organized: Awareness Creating workshop , Training workshop for project national consultants and Training Workshop on Conservation agriculture and improved water management for farmers 2004 involving some 20 farmers and 10 technicians.
- Three field days were organized for farmers and specialists: on 9 August, 15 October and on 7 December
- Survey of the Project site and monitoring made by NGO “Eco Priaraliye”.
- More diverse crop products by planting summer crops such as sorghum, sunflower, millet, carrot, sesame, melon for small-scale processing and marketing.
- WUA established consisting of farmers. Steering Committee and Chairman of the WUA elected and Constitution approved.
- Laser land leveling made on 20 ha which is the base for improved irrigation practices.
- Drainage canal in the site area has been cleaned to better drainage and prevent soil salinity seepage.
- Winter wheat was planted on area of 20 ha with application of fertilizers and using seeds of salinity tolerant variety Dostlik provided by the project. Thirteen wheat varieties were planted for comparative study on salinity tolerance and demonstration.
- During the field visits and field works on project sites all works were done together with farmers and in general they are happy that they were selected. Some neighbor farmers while attending workshops and field days expressed their willingness to join the Project if possible. The authorities of the district including Governor are supportive. Local TV covered one Field Day and interviewed Leading National Consultant Dr. S. Shamshetov (See the attachments: Picture -7).

V. 2. Conclusions

- The Project implementation started with considerable delay which affected negatively its implementation.
- The “Project Awareness Creating” workshop and Two training workshops were organized.
- National Consultants were nominated.
- Training of two National scientists to CA methodologies was not implemented.
- Site survey identified major constraints for successful farming. In spite of these difficulties the Project helped farmers to improve their livelihood by assisting them in improving soil, water and crop management.

- Project activities started with arranging planting of summer crops on each of the pilot farm. Sowing of sunflower, mungbean, melons and vegetables was profitable and provided some cash benefits to farmers.
- Major Project activities started in October by sub-soiling and laser technology of land leveling. It was completed with delay because of late funding and lack of good quality tractors and equipment.
- Planting of winter wheat was done with certain delay.
- Raised bed planters from Brazil No-tillage equipment arrived Uzbekistan at the end of the year and No-till equipment from India as well as sprayers didn't arrive yet. This equipment will be used for planting crops in spring and summer.

V. 3. Lessons and Suggestions

The TCP started with considerable delay and has been implemented with difficulties associated with some natural constraints because of very difficult financial situation in farm sector. However, implementation of the project could have been more successful and there are several issues which might be improved for more successful work during second year.

Most of equipment will be in place and this will give opportunity to do work without delays. However it is necessary to improve procedure of providing funds in time for implementation of Project activities. During the previous period the procedure was quite long lasting. As a result of this some important field works were done with considerable delay, which in agriculture may lead to complete failure.

One of Project activities not completed is training of two National scientists to Conservation Agriculture. One of constraints is lack of specialists with English. Even if two specialists went to Turkey they wouldn't learn much as they don't speak English. Suggestion is to send two specialists and one interpreter to India for two weeks. The money allocated for this activity will be enough.

ATTACHMENTS

Figure 1. Map of demonstration farm's and their location in the K. Avezov named after farm association of Chimbay district

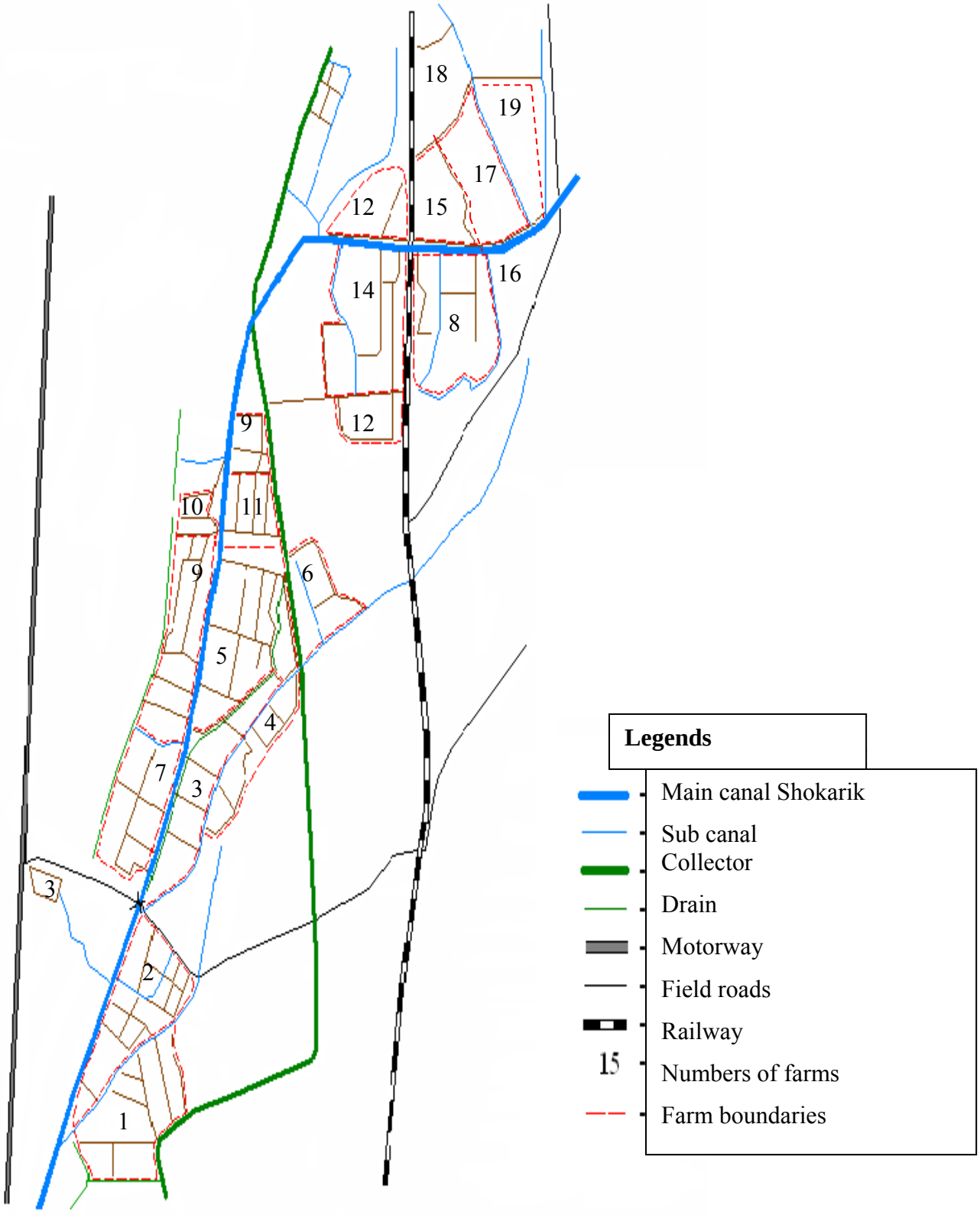


Figure 2. Map of demonstration site

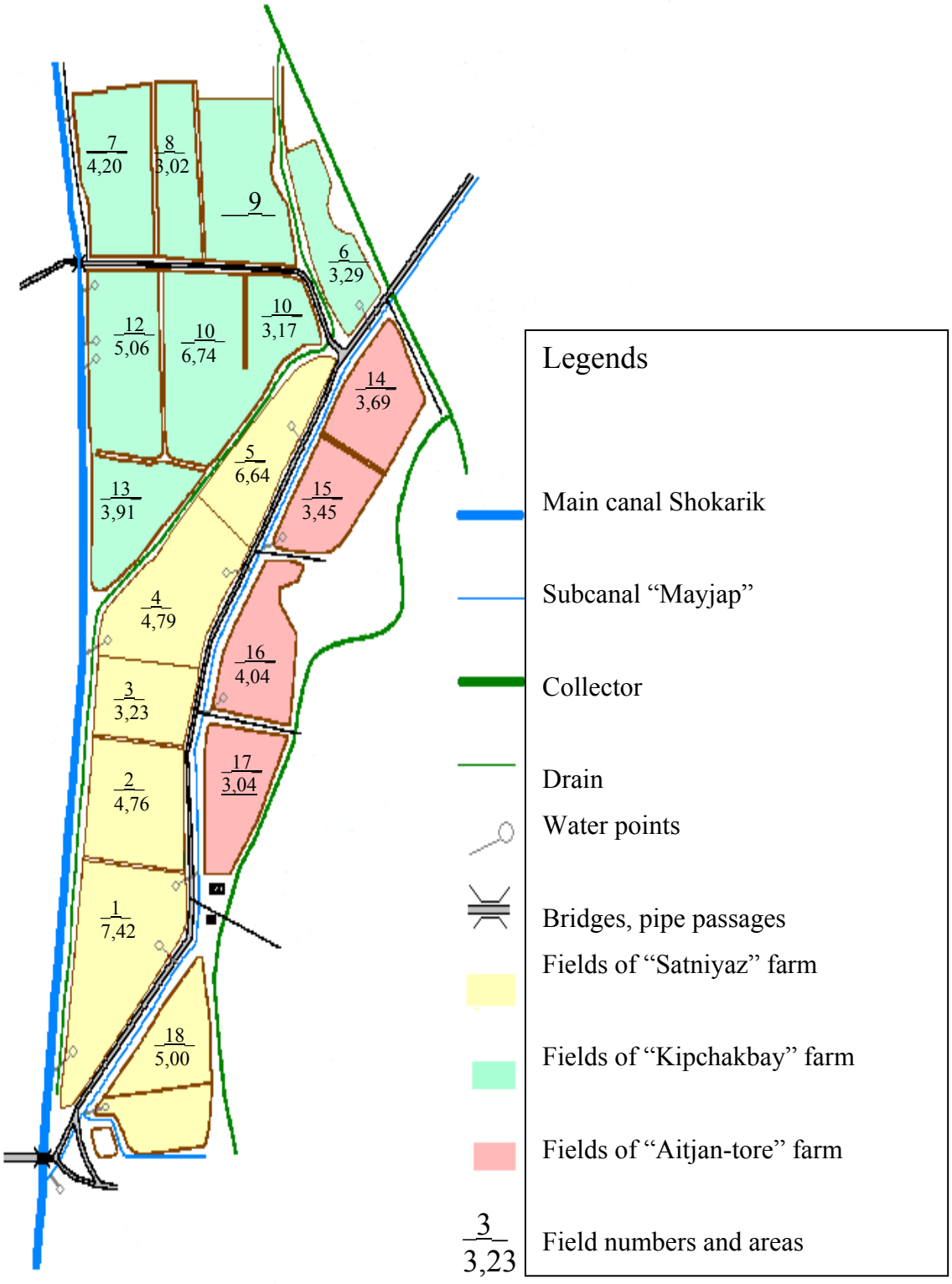
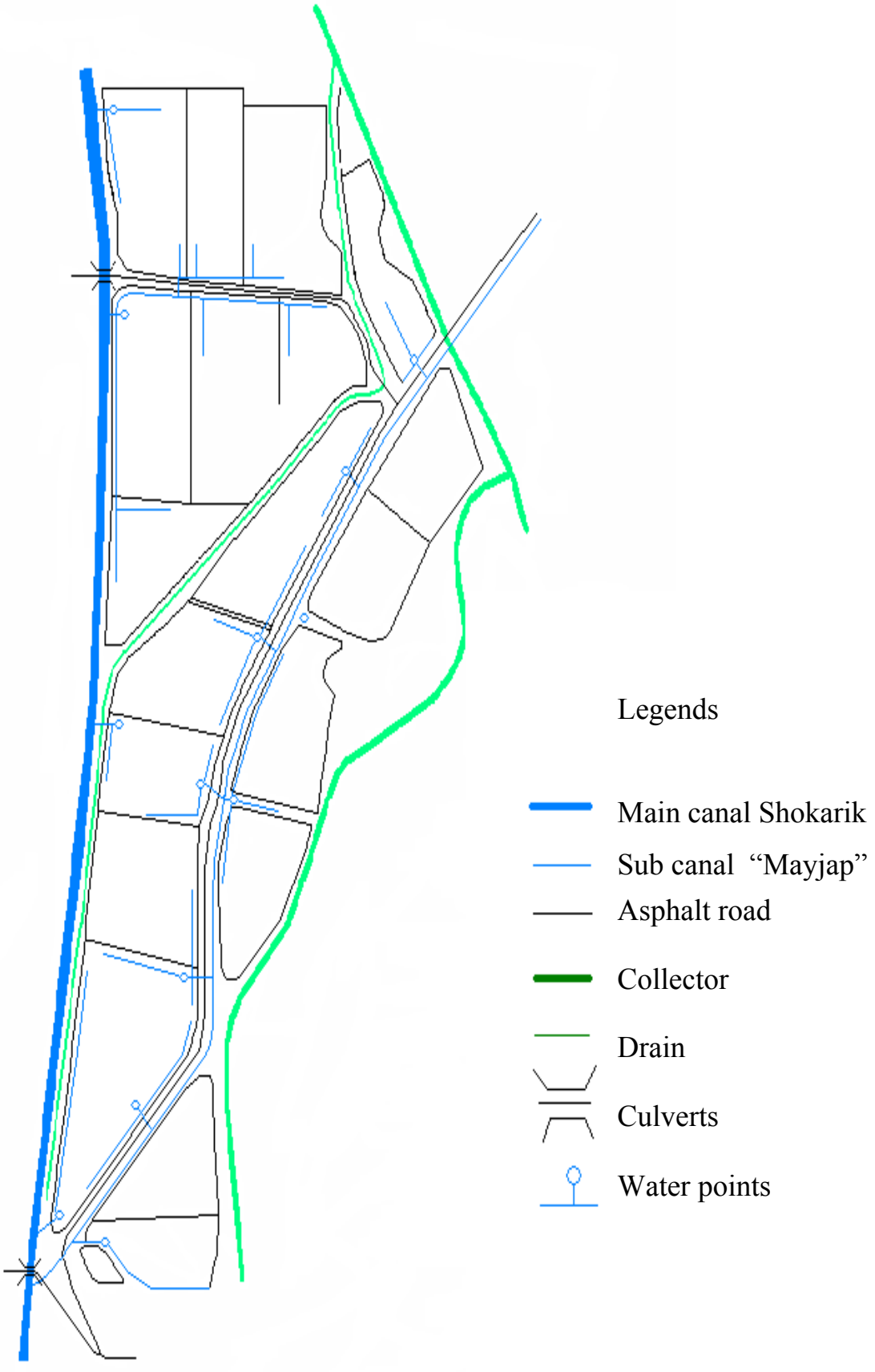
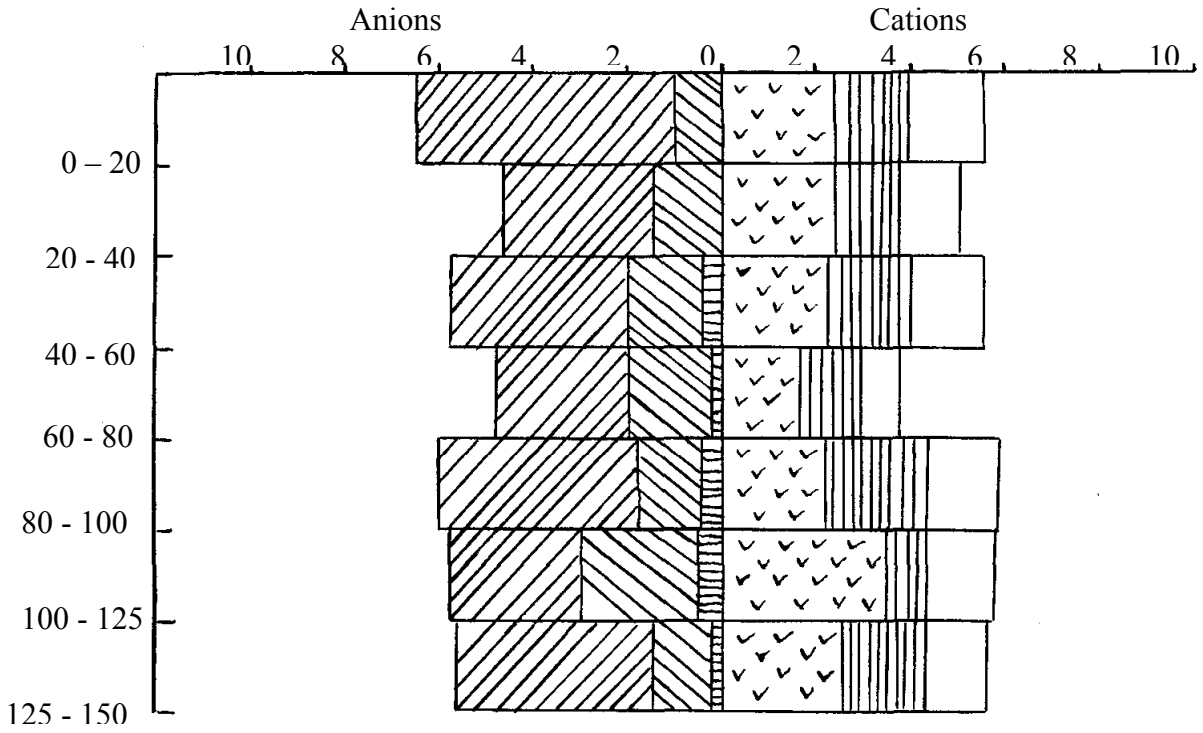


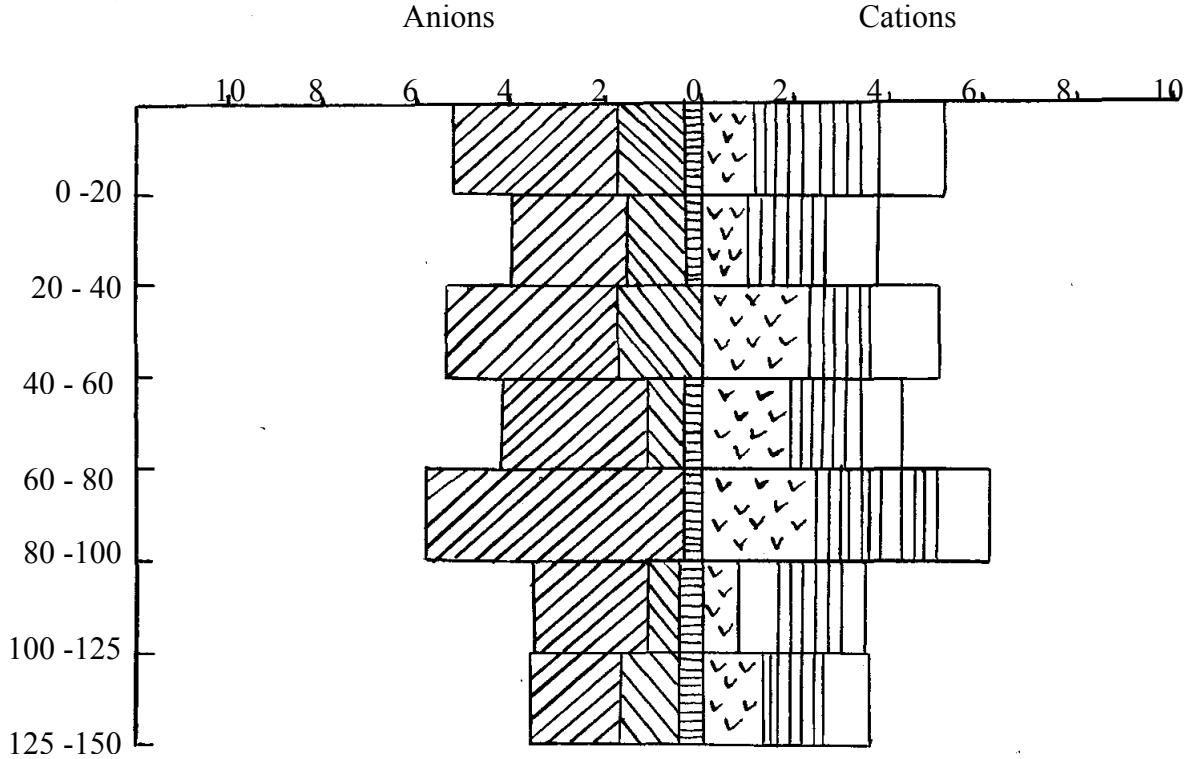
Figure 3. Map of temporary ditches



Field № 6



Field № 7



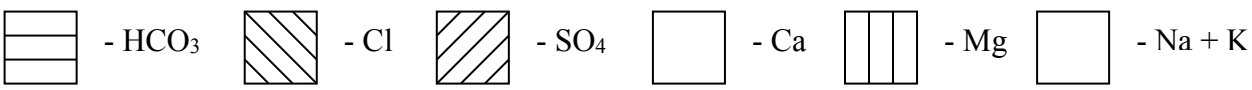


Figure 6. Salinity content of soil in the project pilot site fields

№ fields	Horizon, cm.	Salt ions, (%) mg/equiv						solids, %
		HCO_3	Cl	SO_4	Ca	Mg	Na+K	
1	2	3	4	5	6	7	8	9
2	0-20	0,003	0,042	0,214	0,030	0,019	0,055	0,376
		0,050	0,620	2,000	1,000	0,750	0,870	
	20-40	0,003	0,045	0,142	0,030	0,015	0,035	0,275
		0,050	0,560	2,430	1,200	1,160	0,680	
	40-60	0,005	0,026	0113	0,028	0,010	0,019	0,210
		0,080	0,500	1,580	1,100	0,910	0,150	
	60-80	0,007	0,034	0,147	0,026	0,015	0,015	0,276
		0,110	1,350	1,210	1,100	1,160,	0,570	
	80-100	0,205	0,036	0,093	0,023	0,014	0,031	0,199
		0,080	1,180	1,870	1,00	1,00	1,14	
	100-125	0,003	0,041	0,154	0,034	0,012	0,039	0,306
		0,140	1,800	2,870	2,00	1,25	1,560	
	125-150	0,007	0,037	0,156	0,023	0,011	0,035	0,289
		0,080	1,690	3,930	1,250	2,25	2,200	
3	0-20	0,012	0,044	0,239	0,023	0,035	0,033	1,012
		0,190	1,410	4,610	2,30	1,410	2,50	
	20-40	0,016	0,060	0,226	0,043	0,032	0,031	0,561
		0,260	2,48	3,97	2,50	2,08	2,130	
	40-60	0,020	0,032	0,252	0,041	0,016	0,034	0,592
		0,320	0,950	7,08	6,00	0,580	0,970	
	60-80	0,024	0,039	0,232	0,065	0,011	0,058	0,477
		0,370	0,840	7,910	3,90	1,660	3,560	
	80-100	0,023	0,055	0,235	0,057	0,018	0,057	0,454
		0,390	1,070	7,870	4,40	2,160	2,880	
	100-125	0,022	0,038	0,226	0,070	0,025	0,032	0,453
		0,370	0,950	4,540	2,500	1,910	1,44	
	125-150	0,024	0,032	0,230	0,91	0,027	0,032	0,624
		0,370	0,790	4,500	2,400	1,250	2,070	
4	0-20	0,004	0,057	0,220	0,083	0,030	0,020	0,605
		0,140	0890	5,570	2,500	1,470	1,630	
	20-40	0-009	0,047	0,240	0,087	0,030	0,038	0,637
		0,140	1,230	3,120	2,500	1,170	1,280	
	40-60	0,022	0,053	0,198	0,048	0,018	0,043	0,365
		0,360	1,460	3,820	2,300	1,750	1,590	
	60-80	0,112	0,065	0,185	0,049	0,017	0,027	0,340
		0,190	1,690	2,670	1,750	1,250	0,80	
	80-100	0,018	0,060	0,199	0,064	0,019	0,065	0,468
		0,290	1,460	4,220	2,200	2,250	1,520	
	100-125	0,030	0,055	0,167	0,045	0,015	0,029	0,361
		0490	2,400	2,750	3,500	1,750	1,400	
	125-150	0,013	0,039	0,162	0,037	0,020	0,035	0,328
		0,210	1,290	4,240	2,600	1,660	1,490	
1	2	3	4	5	6	7	8	9
6	0-20	0,017	0,030	0,237	0,060	0,029	0,020	0,533
		0,230	1,070	7,750	4,600	3,16	1,29	

	20-40	0,021	0,034	0,310	0,076	0,055	0,018	0,619
		0610	6,760	5,770	3,00	4,50	4,64	
	40-60	0,016	0,030	0,259	0,084	0,045	0,017	0,481
		0,610	8,740	6,550	3,00	6,470	6,48	
	60-80	0,030	0,050	0,254	0,067	0,055	0,025	0,592
		0,490	4,090	11,11	5,75	5,92	4,220	
	80-100	0,016	0,038	0,227	0,028	0,024	0,029	0,322
		0,280	0,620	4,76	1,800	3,16	0,70	
	100-125	0,014	0,030	0,211	0,022	0,012	0,020	0,216
		0,310	0,620	2,120	0,90	1,50	0,65	
	125-150	0,019	0,025	0,213	0,033	0,016	0,016	0,270
		0,290	0,560	2,290	0,800	1,750	0,590	
7	0-20	0,022	0,064	0,154	0,051	0,023	0,034	0,452
		0,360	1,410	3,410	1,200	2,580	1,400	
	20-40	0,018	0,046	0,190	0,052	0,027	0,037	0,426
		0,290	1,120	2,390	1,000	1,660	1,140	
	40-60	0-008	0,046	0,161	0,026	0,006	0,030	0,215
		0,130	1,000	3,580	2,300	1,250	1,360	
	60-80	0,022	0,038	0,191	0,049	0,016	0,030	0,329
		0,360	0,790	3,020	1,900	1,410	0,800	
	80-100	0,024	0,038	0,211	0,041	0,016	0,040	0,347
		0,390	1,130	4,310	2,500	2,220	1,110	

Figure 7. Diagram of volume metric mass change before and after wheat planting

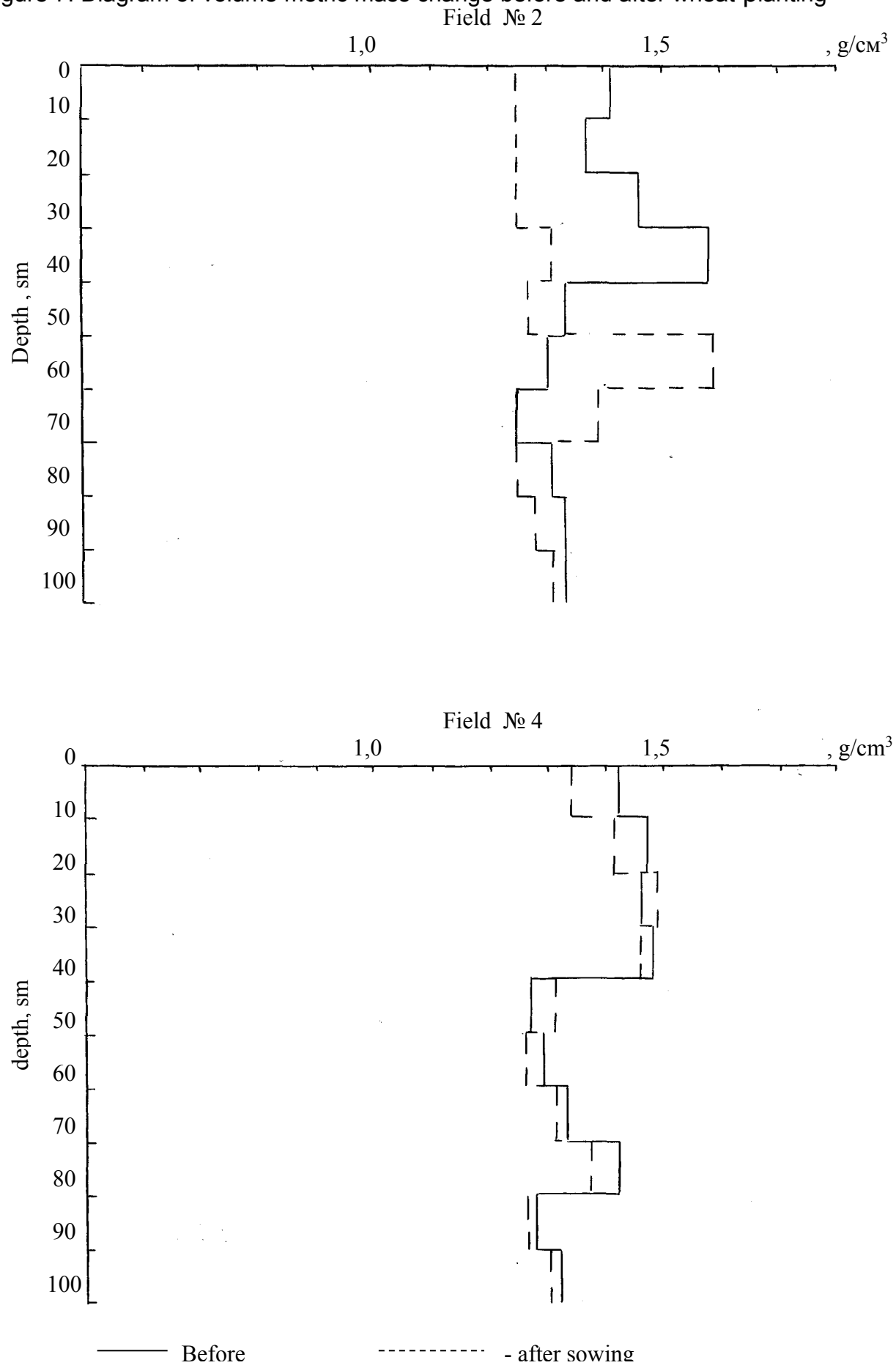


Figure 8. Diagram of moisture change before and after wheat planting

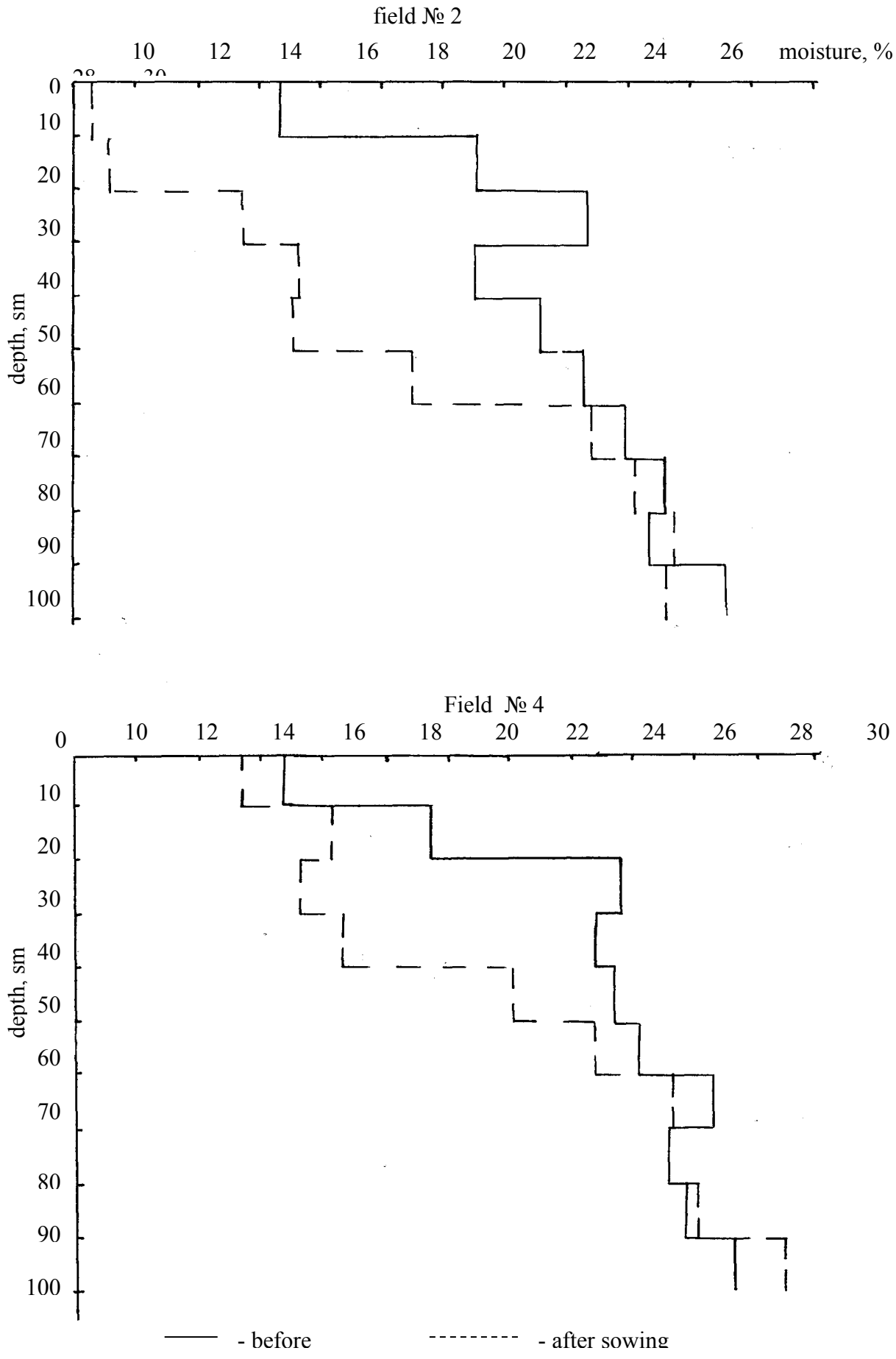


Figure 9. Agricultural chemistry map on phosphorus content in 0-40 cm layer of soil

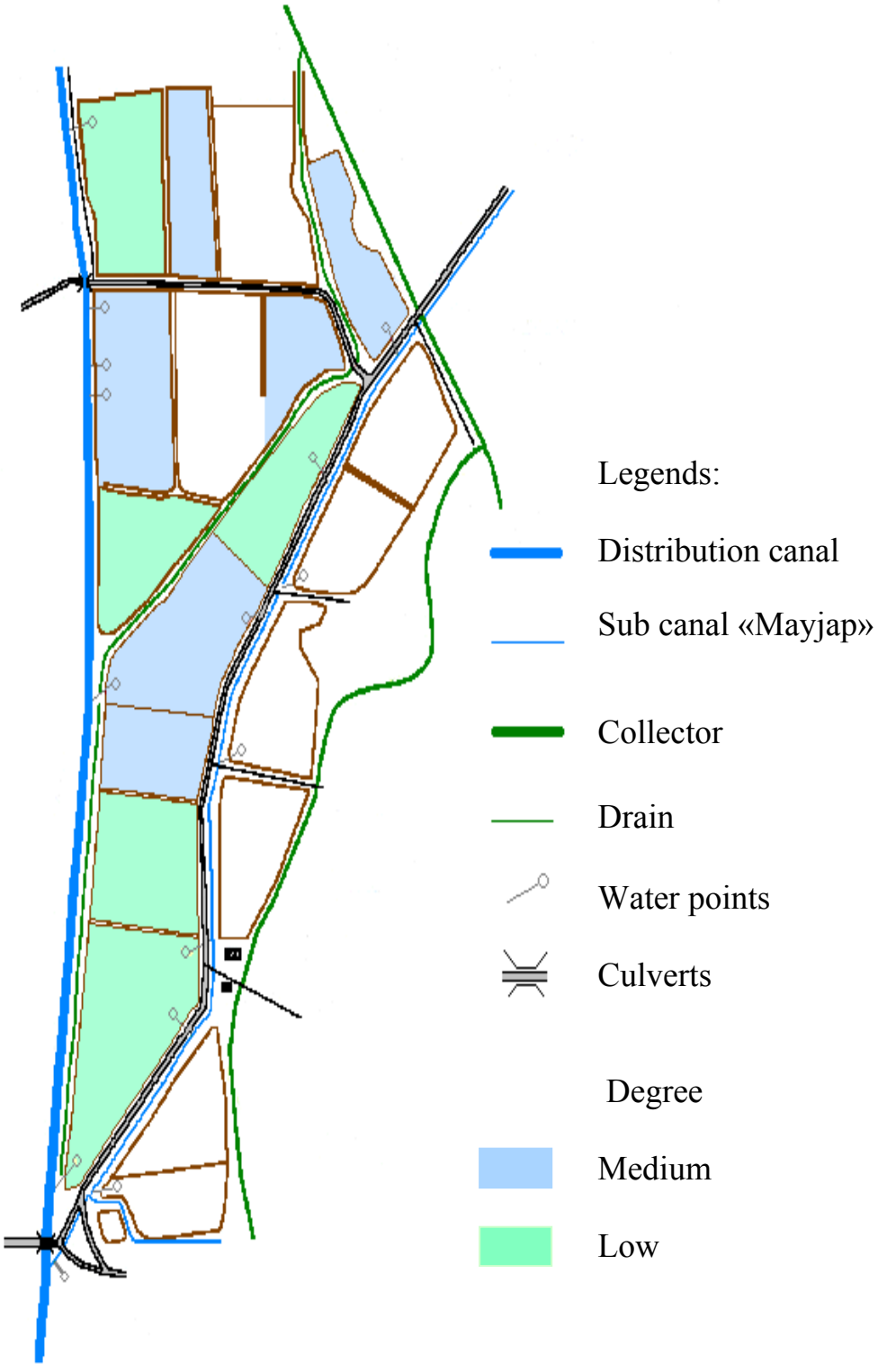


Figure 10. Agricultural chemistry map of active forms of potassium in 0 – 40 cm layer of soil

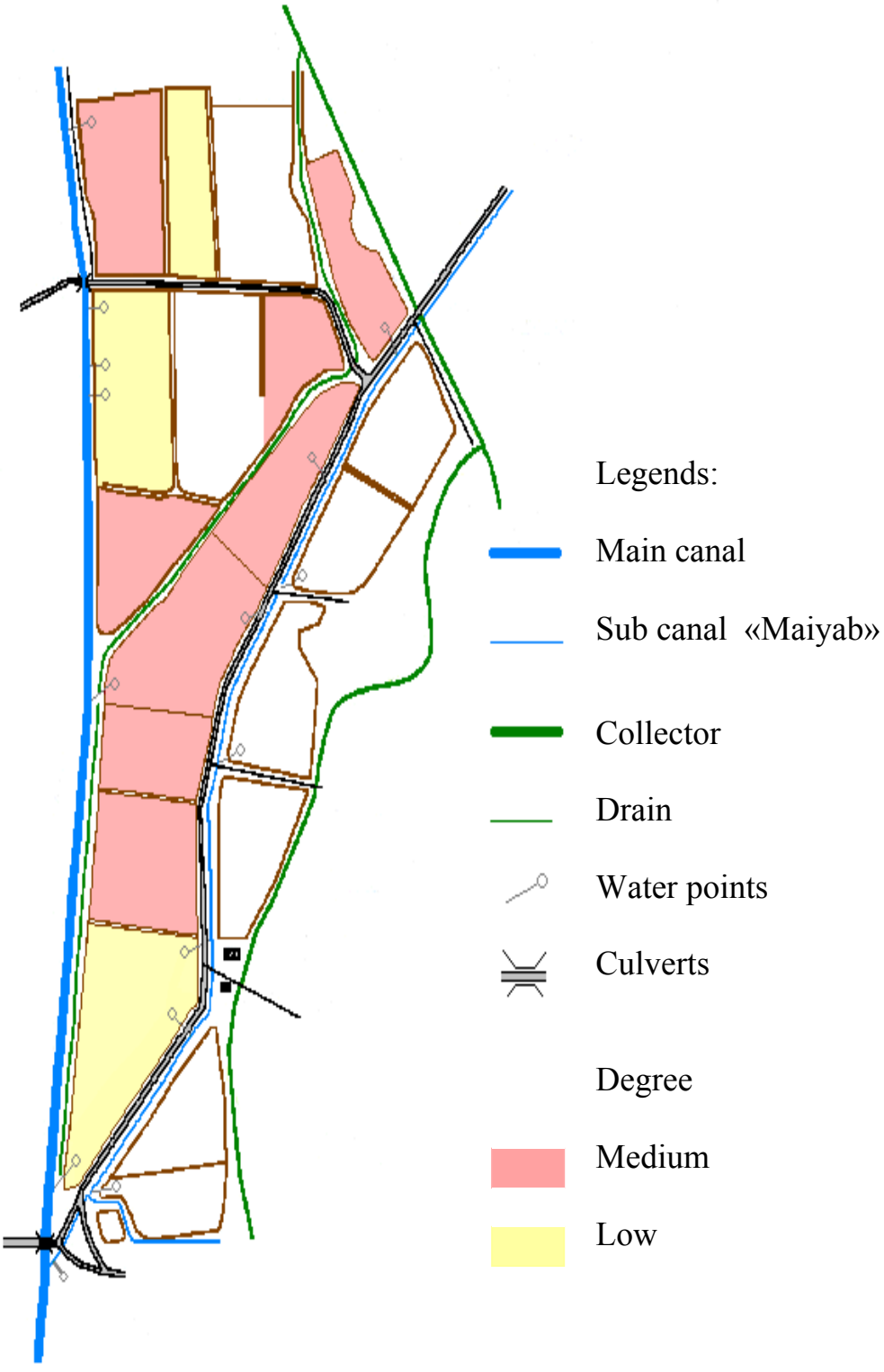


Figure 11. Agricultural chemistry map on humus content in 0 – 40 cm of soil's layer

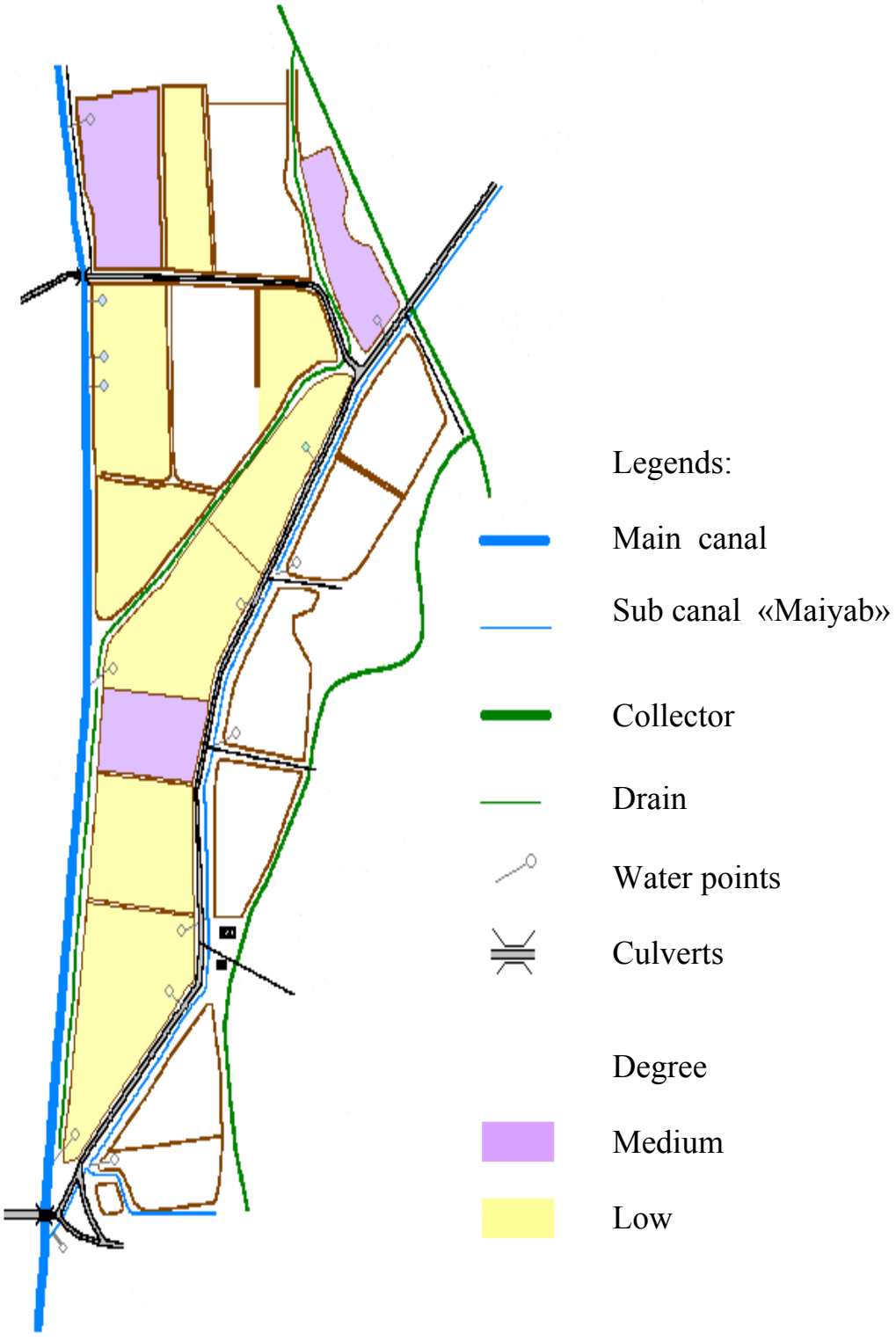
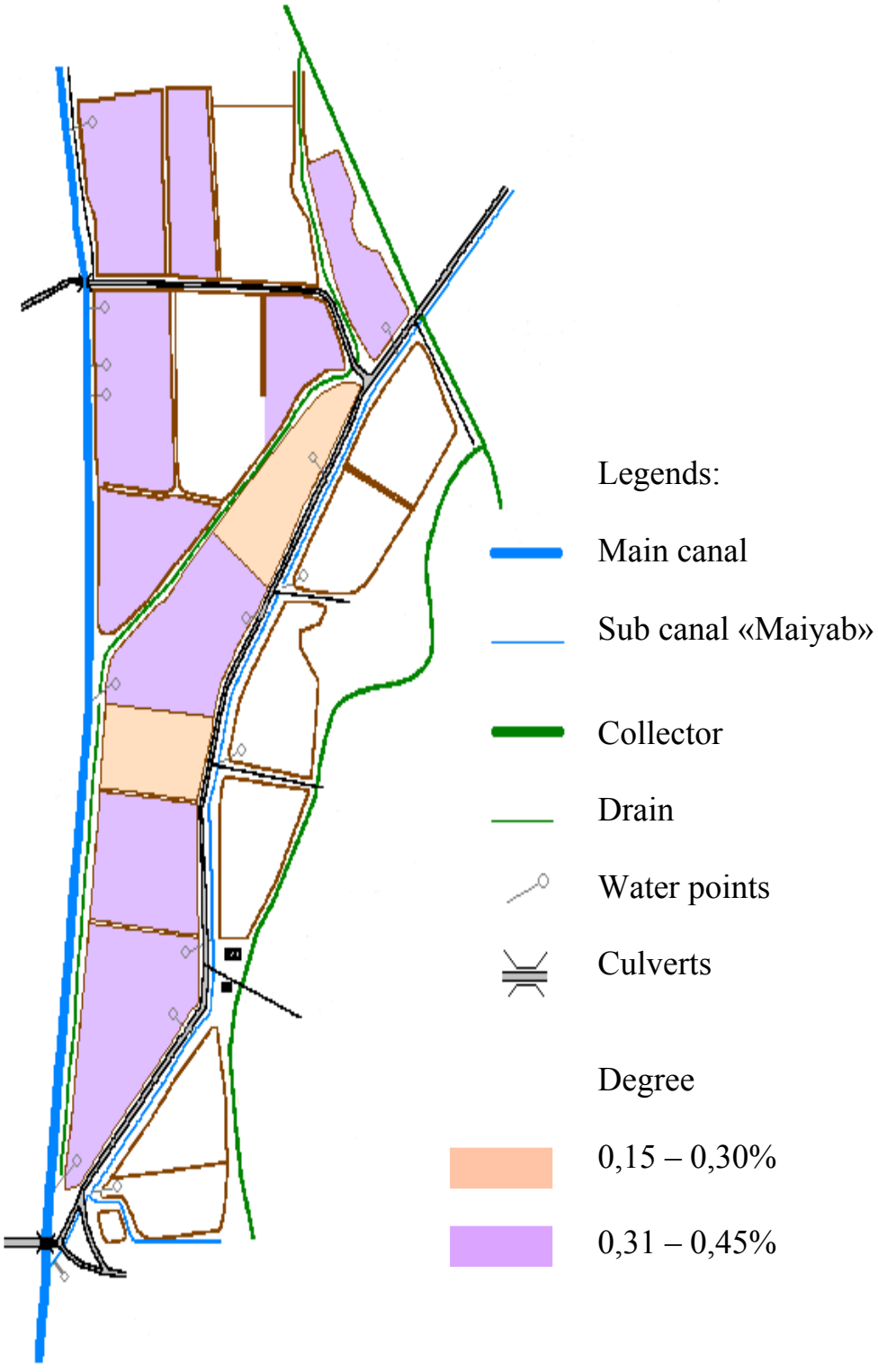


Figure 12. Agricultural chemistry map on total nitrogen content in 0 – 40 cm layer of soil



Picture 1. Grass cutting machine is working in the 7th field of project site

Picture 2. Scraper DZ-87-1 is leveling the project selected fields

Picture 3. Designed furrower opener is working on field.

Picture 4. Participants of the training workshop.

Picture 5. National project coordinator R.Ikramov and project national consultants are discussing project activities in the project pilot farm field.

Picture 6. Field day.

Picture 7. National consultant for mechanization professor S.Shamshetov is giving an interview to local TV.

APPENDICES

APPENDIX 1.

AWARENESS CREATING WORKSHOP

A two day Awareness Creating Workshop for FAO-TCP “Sustainable Agricultural Practices in Drought Affected Regions of Karakalpakstan” was conducted during 13-14 May 2004. It included a Meeting on 13 May in Nukus involving all stakeholders, visit to potential project sites, a workshop at the selected site Shymbay on 14 May including plenary session and group discussions.

AWARENESS CREATING WORKSHOP
FAO-TCP “Sustainable Agricultural Practices in Drought Affected Regions of Karakalpakstan”
13 May 2004, Nukus, Meeting room of the SANIIRI-KK

Chairman: Dr. M. Suleimenov, Co-chairman Dr. R. Ikramov

After an introduction made by Dr. M. Suleimenov floor was given to Dr. Sh. Nurmatov, Deputy Minister of Agriculture and Water Resources, Uzbekistan.

Dr. Sh. Nurmatov emphasized that the project was developed on request of the government of Uzbekistan after a sequence of dry years during 2000-2001 in Karakalpakistan. He said that he as DG of USPCA will be actively involved in implementation of the project as he was nominated by Prime-Minister of Uzbekistan as head of group of experts to assist to the government of Karakalpakstan to implement strategies on further development of agriculture in this republic. He wished success to the project.

In his statement Dr. T. Bachmann, leader of the FAO group said that the project for some reasons was postponed by half year and a lot of time was lost. Nevertheless the FAO group is committed to make all possible to meet the goal of the project; introduce world known practices to control drought and combat desertification in irrigated farming of Karakalpakstan.

Dr. R. Ikramov welcomed the FAO team and wished them success during implementation of the TCP. He said that as National Project Coordinator and DG of SANIIRI he will do his best organize all project activities approved during this trip.

Dr. M. Suleimenov introduced the project highlighting goals and objectives and strategies for implementation. He also emphasized that ICARDA will be responsible for technical backstopping of the project activities and work closely with the FAO group, National Coordinator and National Consultants.

Dr. T. Bachman briefed about agronomy issues in the project. He emphasized that conservation tillage practices actually unknown in Karakalpakstan will be introduced and tested. He said that some work on raised bed planting has been done jointly by TIIAME, GDF and CIMMYT in Khorezm. That experience will also be used for more successful implementation of the project. He also emphasized that crop diversification and improved irrigation practices will be introduced jointly but permanent bed planting will be a central point of the agronomy practices.

Dr. T. Friedrich has made presentation on aspects of mechanization of cropping practices. He also said that conservation tillage will be tested using imported equipment because this technology is not available in Uzbekistan. The equipment will be brought from Mexico where this kind of equipment has been manufactured and widely used. He will need to know what kind of tractors farmers use for field works to match size of planter to spacing between tractor wheels. He emphasized that for success of technology of permanent beds it is essential to keep all the time soil surface covered with plants or plant residue.

Dr. G. Munoz presented his views on irrigation practices used in KK and what should be done to improve them. He emphasized that there is no shortage of water moreover it looks like there is surplus of water because water use rates for irrigation are very high and can not be justified. Better land leveling and introduction of well known improved irrigation practices will be tried. Establishment and active work of Water Users Association will be one of important issues for adequate water management.

After coffee-break participants put questions to FAO officers. Most questions related to idea of introducing conservation tillage in KK which they found unrealistic because soil density is very high (as high as 1.4 g/cm^3) which requests deep plowing otherwise water percolation will be very poor. Drs. T. Bachmann and T. Friedrich emphasized that it has been talked about a great deal about this kind of problems in many countries but finally the technology proved to be suitable for all soil types.

Dr. E. Kurbanbayev in his intervention suggested reduce a project area in order to ensure good quality of irrigation management as the project funds are not allowing rehabilitation of irrigation and drainage infrastructure for the area of 500 ha.

Dr. S. Shamshetov emphasized that the project idea of introducing conservation tillage concept in KK is very interesting and attractive and he himself as mechanical

engineer is keen to participate in project activities although he also thinks that KK has unique very compacted soils

and it is difficult to imagine that it is possible to farm them without any plowing.

Dr. D. Edenbayev highlighted some activities carried out by him in a GTZ project. He said that some activities on improved agronomy practices including variety testing on salinity resistance gave good results on sorghum and wheat. He would be happy to be involved in the project.

Dr. R. Ikramov in closing remarks said appreciation to the FAO team and wished success during the rest of the trip. He said that further program of the workshop will include field visits and site selection as well as discussions about a detailed workplan.

After the meeting a group including the FAO team, Drs. R. Ikramov, M. Suleimenov, S. Shamshetov, E. Kurbanbayev and D. Edenbayev visited two potential sites in Nukus and Khojeyli districts (Site description is attached).

At the site Jambul, Khojeyli district the group visited crop fields, looked at tractors and machinery available. The FAO team was briefed about the site by Drs. Kurbanbayev and Edenbayev. They also answered questions with participation of Drs. Shamshetov and Ikramov. The site area belongs to private farmers emerging after dissolution of a collective farm. Unfortunately the team didn't meet farmers. The area was found to plant mostly cotton with poor emergence rate because of soil crust developed after heavy rains fallen on planted area. Farmers are organized in a Water Users Association. Some activities in the area were conducted by ICARDA on improved irrigation and crop diversification and with IWMI on organization and functioning of WUA.

The second site was a Shortanbay shirkat (collective type farm) in Nukus district (site description is attached). The site is a typical rice growing cropland although part of the fields was occupied by wheat and alfalfa. During the visit one of the fields was flooded by water and workers were applying fertilizers dropping them by hand into water. The team members asked some questions to the shirkat chairman, rather young person who felt uneasy answering questions and vanished quickly as the questions stopped. There are no farmers on the shirkat but leasers who don't own the land but are given opportunity to farm piece of land. They hire labor to do the job in the field on crop share contract basis very often from neighbor Khorezm region where labor is in abundance and they are recognized as good rice growers.

On 14 May the second day of the Awareness Creating Workshop was continued at Shymbay town, district center. The workshop was attended by 30 people representing all stakeholders of the district Shymbay including Mr. Maksat, District Governor, Mr. Juginis Kaipov, Director of the Low Amudarya Basin Management (includes two regions: KK and Khorezm), Mr. R. Koshekov, head of the Kyzketken watershed covering most of Shymbay district water supply system, also people from department of agriculture, water management, research institute, association of farmers and some farmers.

Dr. M. Suleimenov chaired the session and introduced the FAO team members, while Dr. E. Kurbanbayev introduced local participants.

The District governor Mr. Maksat briefed about the district agriculture. It is diversified farming system involving major crop as cotton. But cotton now occupies only one third of the cropland, second crop is wheat. The other crops include rice, sunflower, alfalfa, potato, vegetables and melons.

Dr. Thomas Bachmann, FAO told about the project goals and objectives and presented major project highlights. The team members answered questions and put their own questions to local specialists.

Mr. Rashid Koshekov, manager of a Kyzketken-Kegeyli irrigation scheme briefed about major characteristics of the Kz-Kg Scheme which is part of the Low-Amudarya Basin. Kz-Kg shceme covers 452 km long irrigation canals both main canals and secondary ones. It covers irrigation of 85,804 ha of cropland. The scheme management is responsible for maintenance of main and secondary canals and water distribution.

The group discussions were organized on the two following issues: 1) agronomy and mechanization and 2) water management.

Closing remarks were said by Mr. Maksat, Governor of Shymbay District, Dr. T. Bachmann, FAO, Dr. R. Ikramov, national Coordinator.

After the meeting, the group including the Governor and local key specialists visited several farms in a potentially project area and had a visit with a big group of local farmers. The

Leading farmer Mr. Rahmetulla Dauletmuratov proved to be a former chairman of the big farm. The other farmers met were young with cropland area of the order of 15-60 ha. Five farmers were selected to be fully involved in the project: Rahmetulla (41.3 ha), Kipchakbay (41.5 ha), Satniyaz (38.6 ha), Dauranbek (21.9 ha) and Aytzhantore (14.5 ha). Only one farmer Kipchakbay has a 80 h.p., 3 wheel tractor which he just recently purchased on leasing scheme. He also has plough, cultivator and cotton planter.

The group got acquainted with irrigation practices and found out that WUA was just established and needs a great deal of support. During discussions it was agreed that better land leveling is a must and the project should allocate funds for purchasing laser equipment for high quality of land leveling. Dr. T. Freidrich identified tractor's wheel spacing as wide as 240 cm to order a seeding machine for planting on permanent beds. He also visited a Machinery service to farmers to see type of combine harvesters. He found Case harvesters with rather wide tires and made up his mind to purchase another tires to modernize the combine for permanent beds.

Conclusions:

Out of three sites visited, the FAO team consulting Dr. R. Ikramov, National Coordinator, Dr. M. Suleimenov (ICARDA) as well as National Consultants came to selection of the Shymbay as the project site.
List of equipment will be revised by the FAO team deleting some items which proved to be of no practical benefit to KK and include some new items like laser equipment for land leveling, sub-soiler etc.
A local organization to be contracted to make site survey and monitoring will be identified. SANIIRI-KK could be one of suitable candidates for this activity.
The MAWR will provide nominations of 3 candidates per each position of National Consultants. The group decided that for each position 2 specialists could be hired on contract basis with both good theoretical and practical background.
A project office will be located in the facility of SANIIRI-KK, Nukus.
2 translators-interpreters will be identified on competitive basis one for oral (Nukus) and one for written (Tashkent) translations and hired on contract basis.
NC Dr. R. Ikramov will arrange quotations for purchase of equipment (land leveling, laser attachment for land leveling, sub-soiler) and submit them to UNDP for money transfer after approval.
The equipment to be imported will be ordered by FAO after proposed by Dr. T. Bachmann.
Most important field activities will start from September after seeding machine will arrive from Brazil. Meanwhile some activities can be started as sub-soiling and land leveling, planting of some summer crops as sunflower, sorghum, millet. Major requirement is to keep soil covered with plants or with crop residue.
The members of FAO team will prepare a revised workplan for the project.

Closing meeting with Mr. H. Jalalov, First deputy Minister, MAWR

The FAO team met with Mr. H. Jalalov, First Deputy Minister on 17 May. Members of the team have briefed Mr. H. Jalalov about their visit to KK and expressed appreciation to the Government of Uzbekistan for full support during their trip. Mr. H. Jalalov appreciated work done by the FAO team and wished to accelerate finalizing revised workplan and made a remark on study trip to Mexico. On his opinion may be more beneficial could be organizing travel to closer countries with more similarities in climate and type of agriculture.

List of participants

Awareness Creating Workshop, 13 May

1. Dr. Nurmatov Sherali – Deputy Minister, Ministry of Agriculture and Water Resources (MAWR), Republic Uzbekistan, and DG, USPCA, Tashkent
2. Dr. Shamshetov Sarsenbay – DG, KK affiliation of USPCA
3. Mr. Juzbaev Bakhtiyar – the Chief Agricultural Specialist, Council of Ministers, KK
4. Mr. Tajimuratov Babaniyaz – the Manager of Suenly irrigation canal;
5. Mr. Musaev Bakhir – Head of Department of Water Use, MAWR-KK
6. Mr. Kaipnazarov Maman – Head, Department of Mechanization, MAWR-KK
7. Dr. Aytjanov Uzakbay – the Director of KK Research Institute of Cropping Systems (KKRICS)
8. Dr. Toreniyazov Elmurat – the Deputy Director, KKRICS
9. Mr. Aminov Sadulla – the Mechanical-engineer, Teacher, Agricultural University
10. Dr. Edenbaev Davletbay – Private Firm “Sorghum”;
11. Dr. Kurbanbaev Erejep – Director, KK- SANIIRI;
12. Dr. Khojanov Nietbay – the Deputy Director, KK-SANIIRI;
13. Mr. Koshekov Rashid – the Manager of Kizketken-Kegeily watershed management of irrigation system;
14. Mr. Saburov Makset – Director of “Shortanbay” collective farm of Nukus region;
15. Mr. Allaniyazov Durisbergen – Manager of Kegeily irrigation canal;
16. Mr. Kdirniyazov Burkit – Manager, Hydro-geology expedition of the KK
17. Mr. Rahmetulla Dauletmuratov - Farmer
18. Dr. Ikramov Rakhimjon – National Project Coordinator, and DG, SANIIRI, Tashkent
19. Dr. Suleimenov Mekhlis – Asst. Regional Coordinator, ICARDA-CAC, Tashkent
20. Dr. Nurbekov Aziz – Agricultural University, Tashkent
21. Dr. Bachman Thomas – FAO
22. Dr. Freidriech Theodor – FAO
23. Dr. Munoz Giovani – FAO

AWARENESS CREATING WORKSHOP

FAO-TCP “Sustainable Agricultural Practices in Drought Affected Regions of Karakalpakstan”
13 May 2004, Nukus
Agenda
Chairman: Dr. M. Suleimenov, Co-chairman Dr. R. Ikramov

10:00-10:05	Mekhlis Suleimenov, Asst. Regional Coordinator, ICARDA-CAC	Introduction
10:05-10:15	Sherali Nurmatov, Dy. Minister, MAWR, RU	Welcome address
10:15-10:20	Thomas Bachman, leader of FAO team	Welcome address
10:20-10:25	Rakhimzhon Ikramov, National Coordinator	Welcome address
10:25-10:40	Mekhlis Suleimenov	Project concept
10:40-11:00	Thomas Bachman, FAO	Agronomy highlights
11:00-11:20	Theodor Friedriech, FAO	Machinery and equipment highlights
11:20-11:40	Munoz Giovani, FAO	Water management highlights
11:40-12:00	Coffee-break	
12:00-12:50	All participants	Discussion
12:50-13:00	Rakhimjon Ikramov	Closing remarks
13:00-14:00	All participants	Lunch

Site Characteristics

Chymbay. The site is located in a south-west part of a former “Kasim Avezov” collective farm of Chimbay region, at 14 - 16 km from Chimbay town, at 50 - 55 km from Nukus city.
Total area is 480 - 520 ha. The cropping structure of agricultural cultures was by the following sequence in 2003:

Winter wheat - 60 - 70 ha;
Lucerne - 40 - 50 ha;
Sorghum (corn) - 50 - 55 ha;
Cotton - 330 - 345 ha.

The state of irrigation infrastructure is satisfactory
The ground of experimental site by texture is as following:
Sandy loams - 200 ha;
Clay loams - 210 ha;
Heavy clay loams - 70 ha.
Soil salinity status is as following:
Weakly saline - 150 ha;
Medium saline - 287 ha;
Saline - 50 ha.
The basic structure of management is individual farming, farmers are members of WUA group (Water Users Association).

Jambul
The site is located in a south-east part of Khodjeily region, at 6- 7 km from Khodjeily town, 18-20 km from Nukus.
The cropping structure in 2003 was as follows:

Winter wheat - 90 ha;
Lucerne - 60 ha;
Sorghum and corn - 50 ha;
Cotton - 280 ha;
Vegetable-melon – 20 ha

The state of irrigation infrastructure is satisfied.

The soils at the site are of following texture:

Sandy loams - 160 ha;
Clay loams - 220 ha;
Heavy clay loams - 120 ha.

It is subdivided by soil salinity:

Weakly saline - 120 ha;
Medium saline - 310 ha;
Saline - 70 ha.

The basic structure of managing is individual farming, associated to WUA group.

Shortanbay

The site is located in a north-west part of "Shortanbay" shirkat (collective farm) of Nukus region, at approximately 10 - 11 km from its center and at 40-45 km from Nukus city. Total area is 450 - 470 ha. The cropping structure in 2003 was as follows:

Rice - 270 ha;
Lucerne - 80 ha;
Winter wheat - 70 ha;
Vegetable&melons - 30 - 35 ha.

The state of irrigation-meliorate net is satisfied.

The soil texture is following:

Sandy loams - 34 - 40 ha;
Clay loams - 320 ha;
Heavy clay loams - 110 ha.

It is subdivided by salinity state:

Weakly saline - 150 ha;
Moderately saline - 280 ha;
Saline - 50 ha.

The basic structure of managing is leased farming, there is no WUA.

APPENDIX II.

WORKSHOP WITH NATIONAL CONSULTANTS IN NUKUS.

In 10th of August 2004 Karakalpak branch of SANIIRI office hold a workshop with national consultants and some other colleagues from Nukus Branch of Tashkent State Agrarian University. In the meeting have participated following staff, members and responsible persons for implementing the proposed project activities. These are as follows:

1. Niyatbay Khodjanov – Consultant for Land and Water Management, Nukus Branch SANIIRI
2. Sadulla Aminov - Nukus Branch of Tashkent State Agrarian University
3. Orazbay Abillaev - Nukus Branch of Tashkent State Agrarian University
4. Bakhtioyr Jollibekov - Nukus Branch of Tashkent State Agrarian University
5. Kuenimjay Allamuratov - Consultant for Conservation Agriculture and Cropping Systems
6. Bakhitbay Aytbergenov - Consultant for Soil Management and Land Karakalpak Branch Uzbek SPCA
7. Rashid Koshekov - Consultant for Land and Water Management, Chairman Klzketken Irrigation System.
8. Tanzilla Bekimbetova – translator, Nukus Branch SANIIRI

9. Nurlan – Karakalpak Branch Uzbek SPCA
10. Sarsenbay Shamshetov – Director Karakalpak Branch Uzbek SPCA, Consultant for Mechanization-engineer
11. Erejeb Kurbanbaev – Consultant for Irrigation, Director Karakalpak branch SANIIRI
12. Mekhlis Suleimenov – Deputy regional coordinator ICARDA-CAC region
13. Aziz Nurbekov – ICARDA-CAC

Mekhlis Suleimenov has opened the meeting and briefly introduced to the participants the main objectives of the project and current project activities in project site. The speaker said that everybody can speak what they think about project objectives and current activities, prepared project workplan, implementation of conservation agriculture practices in the conditions of Karakalpakistan and etc. to better perform project activities in the pilot farms.

Sarsenbay Shamshetov: Conservation agriculture practices in the world better are performing in the USA, Canada, Brazil and other Latin American countries. The soils are aforementioned countries are not solid I think. In that case we have to think on specific soil climatic conditions of Karakalpakistan because specific gravity of soil in pilot farm is very solid. Solidity of soil in Karakalpakistan varies from 1.4 to 1.7 g/cm^3 it is very solid I think. I have conducted many trails to study soil solidity in this region. The best way against to soil solidity in this region is presowing irrigation or before planting irrigation for all crops and keep the soil moisture in 17-22 %. We can use subsoiler to be destroyed gyps layer in the soil and be successful realize the project activities in demonstration pilot farm. We should design a furrow opener to use in the project in drawing future raised and permanent bed planting in farm management.

Kuneimjay Allamuratov: In general I agree with the project workplan but I have some comments. We do not have harvester combine for harvest maize grain. According this instead of maize we can plant sorghum or soybean cultivars and select a new technology for each crop respectively.

Bakhitbay Aytbergenov: I have read the workplan. Save and increase soil fertility in the soil one of the main objectives of the not only proposed project but in Karakalpakistan too because soil fertility from the year to year decreasing inefficient use of farm management and etc. We can add some green manure crops such are rye, rape for crop rotation to increase soil fertility in the pilot farms' soil. For analyzing all soil samples we have laboratory equipments for analyses.

Erejeb Kurbanbaev – At first we should design topography map of 500 ha area including 50 hectare of the project site to demonstrate alternative profitable water use and agricultural crops. We must to leave some things after finishing our project activities. Most of you know that the USAID project had some mistakes in cotton rotation in Shokharik canal. To avoid the mistakes we have to create good and useful topography map for our project pilot farm. Exemption from the state controlled production system government quota project pilot farms during the implementation of the on going project. At least we should draft a contract between selected farmers and Project National Coordinator to avoid undesirable problems in the near future implementation of the project. We must design different type of improved irrigation technologies in five selected farmer's field and test them according to world conservation agriculture practices.

Rashid Koshekov: In order to better use water management between farms the project is focusing to create a Water User Associations of “Sokh-arik” canal. Currently we are preparing a policy of Water User Association (WUA). WUA is nongovernmental and no commercial organization which will be created by the farmers for rational use of water resources in the project. We did some work on this way. The involved farmers in this project will be use a new created hydrologic post for water measure from Mayjap canal. In additional we will be provided a meeting with WUA members and discussed how to improve quality of water use in the project area. We can monitor the current status of Mayjap and Shokharik canals, drainage system and collectors around the project pilot farm.

N.Khodjanov - Consultant for Land and Water Management, Nukus Branch of SANIIRI. The speaker briefly informed the participants with world crop rotation practices: In general, crop rotation improves chances for success with no-tillage system. Several long-term studies in the world show that a corn/soybean rotation improves the yield potential of no-till corn compared to continuous corn. With continuous no-till corn, several factors — including lower soil temperature and allelopathy — may cause the lower yield potential. Lower yields have been especially evident on poorly drained soil and high organic-matter soils. Small grains such as wheat and rye germinate at a much lower soil temperature than corn (1°C - 1.7°C), but they also benefit from crop rotation when residue is left on the soil surface. For small grains, the deleterious effects from monoculture are most likely due to allelopathy and disease buildup. The use of row cleaners may improve the germination, early growth rate, and potential yield of no-till crops planted without rotation. I think if we will follow the above mentioned issues we can achieve good results and can write recommendation in the soil climatic conditions of Karakalpakistan.

Bakhtiyor Jollibekov: In conditions of Karakalpakistan we did some no-tillage practices in the small plots and obtained good results. About our results on the base of scientific investigations we have published the book **“The methods of direct planting”** (**Jerdi audarmay egiu usullari**) with close support of CAFÉ international center. For further information please contact to me most of you know my home and office address where I work. Our Nukus branch of Tashkent State Agrarian University has a laboratory for analysis of soil samples. It is our pleasure to help you. We can analyze NPK, density of soil, physical properties of the soil and etc.

APPENDIX III.

A WORKSHOP TCP FAO PROJECT “SUSTAINABLE AGRICULTURAL PRACTICES IN THE DROUGHT AFFECTED REGION OF KARAKAPAKISTAN”

The workshop TCP FAO project “Sustainable agricultural practices in the drought affected region of Karakapakistan” was conducted during 6th of December 2004.

Chairman: Dr. M.Suleimenov, Co-chairman Dr.E.Kurbanbaev.

Dr. M.Suleimenov was opened the workshop and briefly introduced to the participants agenda and main objectives of the workshop and bring to account everybody to actively participate in the workshop.

E.Kurbanbaev was introduced representatives of ICARDA, project national consultants and other participants and invited guests of the seminar. He briefly highlighted activities

of the project in project site. The main objective of the project is train farmers to no tillage practices. Water saving technologies and new improved technologies will be introduced. He said that the project activities have started late than planed but they are succeed in the face of many difficulties wheat was planted on 20 ha area. The all planted wheat fields are leveled by laser leveling. Also they are now negotiating with Exclusive Committee of International Fund for Aral Sea (EC IFA) another project and total budget of 100000000 Uzbek soum for reconstruction of the Shokarik canal. In Karakalpakistan it is very difficult to change the crop diversification. He said in Karakalpakistan 60% of land for cotton and 40 % for other crops like rice, wheat and etc. Farmer doesn't have agricultural machinery for growing alternative crops. The farmers are that involved to the project and are not actively participated in the performance of the project activity when consultants have worked (field works as planting, watering, cultivating) in the project field some farmers did not come to help them. He emphasized that they have to make some clarification on the project implementation because some farmer does not know own responsibilities. They are owner of the land and the yield is going to their profit. The government has resolution to clean canals and fields around of wheat fields. The consultants of the project are performing of their job but farmers should support them in the field works. In the spring we are going to plant spring crops like green gram, sorghum, sunflower and etc. he said.

Nurbekov Aziz. In May 2004 we came to provide awareness creating workshop and to select project site. In that we have visited several places in the Karakalpakistan we went to Khojaly, Nukus and Chimbay and found the Chimbay best for project pilot site. Chimbay authorities and proposed project pilot farmers had big interested to the implementation of the project in Chimbay in that case the steering committee and FAO team have decided to start the project in Chimbay district in K.Auezov shirkat farm association. Seed of summer crops were taken from market and planted by farmers in June. All seed expenses were disbursed for farmers. During the vegetation period of the summer crops field are fertilized consequently for each crop at recommendation rate. Yield of summer crops were a little higher than other neighbor farmers around the project site. In September planting of winter wheat was late because the funds are delayed. Thanks to Dr. M.Suleimenov the ICARDA assistant regional coordinator the needed money provided for field activities to plant winter wheat on October. Breeders from Gallaaral Branch of Research Institute of Grain and Leguminous Crops under Irrigation have created several salt resistant varieties of bread wheat namely: "Dostlik" and "Turon". These varieties are already transmitted to State Variety Testing Committee and variety "Dostlik" from the 2004 has been released and recommended to plant for irrigated conditions in whole country. To assure to get good yields from wheat in the salted soils the winter wheat variety "Dostlik" have taken from Sirdarya to Chimbay and planted on 20 ha field in two project farmers namely Kipchakbay and Satniyaz farms. In additional the 13 wheat varieties are planted in demonstration fields. In vegetation period of wheat we can invite other neighbor farmers and the farmers will select the best wheat variety and we can multiply the seeds of selected variety. He also emphasized that crop diversification and improved irrigation practices will be introduced jointly but permanent bed planting will be central point of the agronomy events in the project activities. According aforementioned a laser leveling was done for all wheat planted fields. After harvesting of winter wheat double crops will be planted in permanent bed planting fields. He also said that conservation tillage will be tested using imported equipment from abroad because this technology is not familiar in Uzbekistan. The equipment will be brought from Brazil and India where this kind of equipment has been manufactured and widely used. The seeders are now on the way to Uzbekistan recently

they will come to Tashkent and we will bring them to Chimbay for future use in project activities. Yesterday, he said I have visited to Chimbay and sow the wheat fields. Current situation of the wheat in third field is not good because the salt is come out (the wheat fields to be like snow there) and wheat emergency is delaying. In February 2005 we are going to begin the field preparation activities to plant spring crops like alfalfa, soybean, green gram, maize and sorghum. Now most of farm machinery is staying in the farmer's house and they did not cleaned and washed the machinery after stopping the field activity. Also he briefed about wheat diseases. The most of cereal diseases are overwinter in the wild grasses around the wheat fields and may damage the wheat plant during the vegetation period. In that case the farmer should clean up the fields from wild grasses.

Koshekov Rashid. He said thank to FAO and ICARDA for trusting Chimbay people. The main objective of the proposed project is to improve the production of crops with less expenditure. At starting time of project activity in pilot farms were provided several discussions with farmer's staff for clarification the aim of the project. We should say that some delay was with planting of winter wheat because the tractors are old and we cannot finish the field preparation work on time. He also emphasized that the project farmers had passively worked in project activities. Might be they do not know land and farm machinery is belongs to them. I think we should provide more training courses to develop farmer's skills in the field of water management and conservation agriculture practices. He also pointed how to create Water User Association in project pilot farm and briefly introduced to the participants situation of WUA in whole Uzbekistan. A policy of WUA of Shokh-arik canal was drafted and prepared all files for the Ministry of Justice. You all know that from next year's spring water will sell to consumers. In that case creation of water user association is important issue not only for the project site but also for all farmers in Karakalpakistan.

Question from chairman of "Nur" farm: Do you build water points for other neighbor farm?

Answer R.Koshekov: For the question E.Kurbanbaev will answer because currently he is building the water points in project pilot farm.

E.Kurbanbaev: The canal heads/water points for other Sokh-arik canal farmers will build by another project with IFA.

Rashid Koshekov: Water will supply for all farmers of WUA they have water point or have not it does not matter.

The question of chairman of Jakhsilik farm: My farm is neighbor to the project pilot farm. My area is derelict land and I have used 5 ha from 38 ha of crop land and is planted cotton. I do not have enough farm machinery for use all 38 ha. Can you involve my farm to the project activity?

E.Kurbanbaev: We have selected 50 ha of project pilot farm. Might be we can involve your farm to another IFA project in that project we are going to create a demonstration site and we also think about you.

N.Khojanov. He made speech on water management and soil management in the project site. The speaker presented his experiences on irrigation practices used in project site in this year after planting of wheat and what should be done to improve them

in near the future. The farmer's field at first laser leveled and winter wheat planted on 20 ha. He said we have conducted soil analyzes the soil structure and soil salinity are identified. All analyzes have been done at laboratory of Nukus branch of SANIIRI. The soil salinity is chloride-sulphate the all data about it was done in report. He emphasized that 64 soil samples are taken from project site in 7 fields on the depth of 1.0 m in every 10 cm was identified soil density by cylinder method of Kachinski. The soil density was ranging from 1.38 cm^3 to 1.58 cm^3 I think this is very high dense. The high density of soil in 30-40 cm in arable layer is breaking growing of root system and negative affected to the soil leaching effectiveness. According to aforementioned the arable layer was subsoiled by RN-61 mounted to Magnum tractor. We have taken soil samples after the subsoiling and the data shows that the soil density is decreased in the arable layer. He also said about creation of WUA that will be control equal distribution water to the field.

Question: Did you plant wheat to the all 50 ha area?

Answer: No, we just did it on 20 ha and remaining for other 30 ha we will plant spring crop next year. We are planning to get two crop production a year.

Question: What about 500 ha project area I heard somebody said the project will be implemented in 500 ha?

E.Kurbanbaev: The total area of project site is 500 ha but demonstration site is just for 50 ha. Because our farmers does not have knowledge like farmers abroad and they do not have enough farm machinery for use and most of them are renting the machinery in drawing this we have selected the three farmers, to demonstrate conservation agriculture practices.

Question: My farm is located in the mid of Shokh-arik canal not in project site. I myself did the affluent and have planted 30 ha for cotton. We do have not water point for regulation of water. Is project support build the water point for my farm too?

Answer: The project has not funds for support other farms but we can tray to support with another project by IFA.

B.Aytbergenov. He briefly reported the results of soil analyze in the project site and proposed recommendation of new soil management practices in the project. He has proposed conduct no-tillage of soil definite place with stubble mulching. He said this method is improved volume metric mass of soil and soil structure.

Question: Is there any farm machinery for cutting crop stubble?

Answer: No, but we are thinking think about it.

R.Koshekov has reported a procedure creation of water user association in Sokh-arik canal. He emphasized that in 1999 creation of WUA began by territorial way. Currently in the Karakalpakistan established and functioned 72 WUA and it is occupied in 271 thousand ha. However most of WUA does not have office facility and funds for staff as so as the association was created on the base insolvent farms. The farms do not have enough budged that is way they did not transfer money and WUA is not working in whole Karakalpakistan at all.

V.Shaposhnikov: He made speech on improved methods of irrigation with transferred flume which is conducted in Sirdarya region. The new method is saving water and especially useful in the water shortage conditions of Karkalpakistan. The flumes are easy to transfer from one place to another place and easy to control water movement at floating time to furrows. The presentation was very interesting and farmers have asked how to order to get these flumes. He said that this year scientific production center SANIIRI is going to produce the flumes and you can contact to me I will inform you about it. Also he said they have agreement with company Sovplastital to produce production of plastic flumes instead of beton flumes.

A.Novikova emphasized the cross/counter irrigation method used in Khorezm region on cotton crop rotation and obtained interesting and impressible results. The water cross method is now used in 80 thousand ha. The method is saving water and can give good results only in laser leveled fields. This method can be used in 7th project field in the demonstration site because the field is laser leveled and furrowed. The participants have interested on this presentation and have offered use combination the flumes and cross irrigation in project site in Chimbay.

After the presentation of national consultants and invited scientists from SANIIRI the floor was given to project pilot farms representatives.

Khudaybergenov Marat, chairman of K.Auezov farm association. He emphasized that the project have started in Chimbay and this is a big chance and honourably for the Chimaby population and especially to me because I am a chairman of K.Auezov farm association. Though project is started a little bit late with some delay but we will do best to get good yield from all wheat fields. This seminar has clarified many unclear questions in the project. We have understood that we are working for our self and for family profit. Creation of WUA can help to effectively use of water resources in the region. Myself and other project farmers will provide all necessary agroevents on going project in Chimbay. During the implementation of the project farmers will be learned conservation agriculture practices and improved water saving technologies in Karakaplakistan. He also said the Governor of Chimbay district is supported project activities and day to day asking about project activities.

Bakhitbay chairman WUA. I am supporting Marat Khudaybergenov and would like ensure all participants of the seminar the project activities are performed well. 40 farmers are included to the WUA of Shokh-arik canal out of 33 farmers taking water from Shokh-arik canal and 7 farmers from Mayjap canal also originated from Shokh-arik canal. Creation of WUA of Shokh-arik canal and it may bring success to the implementation of the project.

Sapargul: My farm is located near the project demonstration site. My farm is profitable than other around farmers. I have net income about 4.6 ml. soum which is in special bank account. I hope the implementation of the project in our Chimbay district will gain not only for selected farms also for us because we can see new conservation technologies and improved water management technologies. I think crop diversification in this project is good idea and sunflower is the best adapted crop to the conditions of Chimbay. I have used the sunflower for many years and every year the yield of sunflower is high.

Barlikbay: Thanks to the project our fields are laser leveled but I have to say that some places are leveled not well. Winter wheat is planted in 13 ha. Collectors and drainage

systems in around of wheat field are not cleaned for last 10 years. When wheat field is watered and salt came out and some wheat emergence was died.

Question: What do you plant if you are not involved for state exemption?

Barlikbay: I do plant wheat and sunflower.

Sapargul: Sunflower and sesame. Also cotton is profitable crop but government is not paid on time and we loose time to get money from bank account. I think Green gram is not profitable crop in the conditions of Chimbay.

M.Suleimenov: I think, the workshop was useful for all of you and for us too. The participants are actively worked. Thank you very much for kind attention during the workshop.

List of participants

Name	Scientific Degree / Position	Organization
ICARDA		
Suleimenov Mekhlis	Academician, Assistant regional coordinator	International Center Agricultural Research in the Dry Areas
Nurbekov Aziz	PhD, Project officer	International Center Agricultural Research in the Dry Areas
National consultants		
Shamshetov Sarsenbay	Prof., Consultant for Mechanization-engineer	Director, Uzbek Scientific Production Center for Agriculture Karakalpak Branch
Kurbanbaev Erejeb	Prof., Consultant for Irrigation and water management	Director, Karakalpak Branch SANIIRI
Koshekov Rashid	Dr., Consultant for water and land management	Chairman Kegeyli-Kizketken Irrigation system
Khodjanov Niyatbay	Dr., Consultant for water and land management	Deputy director, Karakalpak Branch SANIIRI
Aytbergenov Bakhitbay	Consultant for Soil and land Management	Uzbek Scientific Production Center for Agriculture Karakalpak Branch
Project farmers		
Khudaybergenov Marat	Chairman	K.Auezov shirkat farm
Khojemetov Barlikbay	Chairman	Kipchakbay farm in Chimbay
Jumaniyazov Satniyaz	Chairman	Satniyaz farm in Chimbay
Toreev Artikbay	Chairman	Ayjantora farm in Chimbay
Kosibay	Chairman	Davronbek farm in Chimbay
Memebers of WUA		

Baymuratov Kurbanbay	Specialist WUA	Kizketken-Kegeyli Irrigation system,
Kurbaniyazov Perdebay	Chairman	"Kurbanniyaz ata" farm
Tilepov B.	Chairman	"Shokh-arik" farm
Bekbaulov Bakhitbay	Chairman	WUA "Suwchi"
Nazarimbetova Sapargul	Chairman	
Tolepbergenov P	Chairman	"Nur" farm
Arzibaev Sh	Chairman	"Shamid"
Otepbergenov X	Chairman	"Bakhit" farm
Berdimuratov J.	Chairman	"Berdimurat" farm
Khudaybergenov B.	Chairman	"Ayp usta"
Nukus branch Tashkent State Agrarian University		
Jollibekov Bakhtiyor	Prof., Head department of soil and agrokhemiks	Nukus branch Tashkent State Agrarian University
Abillaev Orazbay		
SPC SANIIRI		
Novikova Alla	Head laboratory	SCP SANIIRI
Shaposhnikov Vladimir	Senoir specialist	SCP SANIIRI
DED/GTZ		
Jorg Rotermund	Expert	DED/GTZ
Kamalova M.	translator	DED/GTZ
Eko-priarale		
Toremuratova Saadat	Director	Eko-priarale
Bekimbetova Tanziliya	specialist	Eko-priarale

WORKSHOP ON TCP FAO PROJECT 'SUSTAINABLE AGRICULTURAL PRACTICES IN THE DROUGHT AFFECTED REGION OF KARAKALPAKSTAN". NUKUS 6th of DECEMBER 2004

December (6)

09-10:30 **Opening Session**

Chairman: Minister Agriculture and Water Management of Karakalpakistan
Shankiev M., Governor Chimbay district,
Kayipov J., Chief lower reaches of the Amudarya river irrigation system for Khorezm and Karakalpakistan,
Academician M.Suleimenov, Assistant regional coordinator ICARDA in CAC

- *Prof. Ikramov R.K. National project coordinator*
- *Prof. Shamshetov Sh., Chairman Karakalpak branch UzSPSA,*
- *Prof. Kurbanabev E.K. Director Karakalpak branch SANIIRI*

10:30–11:00 Coffee Break and group Photograph

11:00 **Conservation agricultural practices**

11:00 *Prof. Shamshetov Sh.,- Consultant for mechanization engineer, Chairman Karakalpak branch UzSPSA A, -* ***New machinery for conservation agriculture.***

11:20 *Prof. E.Kurbanbaev – Consultant for irrigation, Director Karakalpak branch SANIIRI* – **Improved irrigation technologies for conservation agriculture**.

11:40 Dr.N.Khodjanov – Consultant for Land and Water Management, Nukus Branch SANIIRI – **Land and water management in project area.**

12:00 *Dr. B.Aytbergenov - Consultant for Soil and Land Management, Karakalpak Branch Uzbek SPCA* –**Results of soil analyses from project pilot area and recommendation on soil management practices.**

12:20 Prof. B.Jollibekov – **No tillage practices in Karakalpakstan.**

12:40…….Novikova
13:00-14:30 Lunch
14:30 *Shaposhnikov ……..*
14:50 *Chairman Dr.Koshekov* **Discussions on Creation of Water User Association and confirm a policy of the association. Minutes will be read and be approved by the members of the seminar.**.
16:00 Conclusions.
16:30
18:00 *Dinner*