PROJECT ON CONSERVATION AGRICULTURE IN IRRIGATED AREAS OF AZERBAIJAN, KAZAKHSTAN, TURKMENISTAN AND UZBEKISTAN

Work plan for 2011-2013

ICARDA and NARS of Azerbaijan, Kazakhstan and Uzbekistan

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1. GENERAL INTRODUCTION TO THE PROJECT

1.1 Project background

The Government of Turkey, represented by the Ministry of Agriculture and Rural Affairs (MARA) and FAO concluded, in mid-2006, an Agreement whereby setting up an FAO/Turkey Partnership Programme (FTPP) with an annual trust fund contribution of USD 2 million by the Government of Turkey over an initial period of five years (2007– 2011) at the benefit of the countries assisted by the FAO Sub regional Office for Central Asia (FAO/SEC).

The primary objectives of the FTPP, as described in the Partnership Framework Agreement (PFA) reported is to provide a substantive, financial and operational framework for active cooperation in the areas of food security and rural poverty reduction in the above beneficiary countries. The FTPP is demand-driven, as much as it responds to the priority problems identified by national and/or sub regional stakeholders and is expressed in the form of official requests. National ownership of all FTPP programmes and projects approved and implemented in each beneficiary country will be ensured by concerned governments driving the process of integration of the FTPP support within national development strategies and programmes.

In this respect, each beneficiary country will appoint a FTPP Focal Point at senior level, liaising and coordinating communications between the government and FAO. In addition, for each project, the concerned national or sub regional partner institution will appoint, on behalf of the government, a National Project Coordinator (NPC) as direct counterpart responsible for its implementation. The partner institution and the NPC will ensure appropriate follow.

The project "Conservation Agriculture in Irrigated Areas of Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan" is funded by the FAO/Turkey Partnership Programme (FTPP) established over an initial period of five years (2007 – 2011) at the benefit of the countries assisted by the FAO Sub regional Office for Central Asia (FAO/SEC).

The initial outline of this project was submitted by FAO for consideration by the Steering Committee of the FTPP and was approved with an estimated budget of USD 600 000.

As a result, the present Project Document has been prepared in light of the above outline and, after signature of the relevant Arrangement by the MARA of Turkey and FAO. The project became operational when Kazakhstan and Uzbekistan are signed the project document.

ICARDA is providing technical backstopping to the project on conservation agriculture as per a Letter of Agreement between FAO and ICARDA.

1.2. Project goal

The expected long-term impact of the project is focused on the improved rural livelihoods and food security through increased productivity of irrigated farming systems in four Central Asian countries - Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan - using the principles and practices of CA to achieve sustainable land and water management.

1.3. Stakeholders and Target Beneficiaries

Main project beneficiaries will be small farm households through increased profits and/or a reduced need to purchase food supplies on the market. Other project beneficiaries include farmer organizations, small implements manufacturer enterprises, research institutions, service providers, NGOs and input suppliers (seed, fertilizer nutrients, agrochemicals).

This action/research project aims at targeting the aforementioned beneficiaries through capacity development and accelerated dissemination of improved techniques and measures at farmer level utilizing a participatory approach.

The overall expected benefit of the project are to enhance the socioeconomic development of farmers, local stakeholders and selected private-sector firms and service providers, with spillover benefits to the whole society.

1.4. Institutional linkages

The project will be implemented in partnership with national programs in Azerbaijan, Kazakhstan and Uzbekistan. Each concerned country will appoint a National Project Coordinator (NPC) to be located on-site and to provide full-time orientation, coordination and supervision during project implementation. 12 National Consultants were selected and approved. Recruitment of subject matter specialists on crop production, water management, farm mechanization and economics, in each country, is completed. In general, selection of National Consultants was conducted by the governments of respective project countries and in all cases was based on expertise in particular areas of the Project. National consultants were recruited according to FAO procedures. The national consultant in crop management will work as a national project manager (NPM) and will coordinate all field activities including planting of crops, field days, field formal training courses, etc.

1.5. Project duration

The project is planned over a period of 24 months and will be based on past research activities of main partners in Azerbaijan, Kazakhstan, Uzbekistan and Turkmenistan. The legal duration of the project is planned for twenty four months, starting 1st of January 2011 and finishing 31st December 2012. The project duration can be extended up to three month to cover full two cropping season in order to have real two cropping seasons in the project sites. The current overall work plan is based on the assumption that the project will last for 24 months, excluding the inception phase (January – May 2011) and foreseen closing time of the project is June 2013.

2. ANALYSIS OF THE PROJECT SITES, SELECTION CRITERIA AND PROJECT DEMONSTRATION SITE

2.1. Selection criteria and selection of project sites

The selection criteria were developed by project regional coordinator and national consultants of the project in each country taking into account local conditions in agriculture of the participating countries in the project during the national seminars which were held February through March 2011 (annexes 1, 2 and 3). During the national seminars the project was briefly introduced to the local stakeholders and followed by partly controversial but overall constructive discussions on project sites, selection criteria, crop rotations and equipments to be purchased. Project regional coordinator and the project team and local counterparts agreed on project farms for each country. Time frame, work plan and detailed crop rotation system were prepared in the presence of selected farmers.

2.1.1. Selected farms in Azerbaijan

Ibragimov Ahmad, Jumshudov Ehtibar and Babaev Mehmon were selected as project farms in Azerbaijan. A total area of about 24 ha, distributed over 3 farms, were selected for the demonstration of permanent beds, diversified crop rotations and improved field irrigation (please see annex 1). Of the 3 selected project farmers one has an own tractor, the second owns some equipment, and a third one is renting a tractor.

2.1.2. Selected farms in Kazakhstan

Several individual farms were visited and then three individual farms (owned by Yusufjonov Gafurjon, Sattarkhonov Musakhon and Babakhodjaev Avazkhan) were selected according to selection criteria (please see annex 2) developed by project team taking into consideration local conditions in the South Kazakhstan province. All selected three farms are functioning under Production Cooperative Farm named after “Yassaviy”.

2.1.3. Selected farms in Uzbekistan

Uzbekistan project team and project regional coordinator visited farms around Beshkent town which is not far from Karshi city to select project farms according to selection criteria (Please see annex 3). After partly controversial and lively discussions three farms were selected (namely “Ismatova Farangiz Azamatovna”, “Kholov Sobir” and “Meyliev Sayli Yoldoshevich” (please see annex 3). Owner of a farm named after “Ismatova Farangiz Azamatovna” Ismatov Azamat showed a great enthusiasm and interest on conservation agriculture technologies.

2.2. Analysis of the project sites

2.2.1. Characterization of Selected project demonstration sites in Azerbaijan

The Republic of Azerbaijan has diverse agro-ecologic and climatic conditions. Traditionally, agriculture of Azerbaijan is based on high water consuming crops and water shortage is recorded during summer in many regions including Ter-Ter and Barde districts where the project demonstration field is established. One of the main constraints for further increase of agricultural production is limited irrigation water. Therefore adoption of improved irrigation technologies through conservation agriculture has become very important in the country.

Ter-Ter and Barde sites are located in Karabakh steppe in the southern subzone of the Ganja climatic region. Kura-Araks lowlands between rivers Kura, Kar-Karchai and Minor Caucasus. Long term mean rainfall is ranged between 300-400 mm and is occurring mostly in November-December in winter and March-April in spring season. There is almost no rain from July through-out September. The climate is continental with an average annual temperature of 13.4^0C. Summer temperatures often surpass 35°C; winter temperatures average about -3°C in January. Climate is different within the district - mild and semi-desert climates are specific to different regions. A ground water table is 3-10 m deep with TDS from 1-10 g/l. Soil is greybrown, heavy loam with organic matter content from 2.69-3.09% in topsoil. The whole area is served by earth canals providing surface irrigation for the cultivated crops.
The irrigation and drainage infrastructure is deteriorating since the country's independence in 1991. Before independence, the normal period for overall maintenance of the canals used to be around three years but since then maintenance has been very erratic and insufficient. Irrigation water flows constantly into most canals up to the tertiary level for most of the irrigation season as insufficient flow control infrastructure is in place. This of course leads to high water losses through the scheme. Water is provided to farmers for free and they do not participate in the management of the irrigation scheme.
The Project activities will be implemented in the three farms in the Ter-Ter and Barda district on South-Eastern part of the Azerbaijan. The effect of bed planting and no-till practices on productivity of winter wheat, maize, soy bean and also improved water management technologies of those crops through implementation of conservation agriculture will be studied in this site.

2.2.2. Characterization of Selected project demonstration sites in Kazakhstan

Agriculture has long been a major contributor to Kazakhstan's economy. Most of the farmland is privatized comprising mostly agricultural enterprises/individual farms, several agricultural co-operatives, joint-stock companies, limited partnerships and a few state-owned enterprises.
The crop production sector is dominated by cereal crops, mostly wheat, which accounts for 66% of the total crop output. Other important crops are fodder crops, potatoes and vegetables. Agriculture continues to be a major source of export with agricultural products constituting about 10% of total export revenue. Major agricultural exports include grain (50%), meat and wool. In 2000 the country exported 5.5 MT of wheat, mostly to Russia, down from 12 MT in 1991. Most domestic food supply is met from domestic production.
South-Kazakhstan territory is equal to 116 400 square kilometers (4, 4% of total Kazakhstan land size). Agricultural production in the province occupies 10 269 300 ha, of which 786 300 ha is under cultivation. 50% of the cultivated land is irrigated.
The climate is continental, with hot temperatures and low air humidity in summer time and cold and quiet unstable winter with low snow fall. Average frost-free period lasts for about 225 days. Average daily temperature is 16.9 C. Annual precipitation level is around 500 mm. However, rainfall varies strongly over the year. Precipitation starts to fall at the end of September and early October. The highest precipitation falls in winter and spring seasons (78%) followed by autumn (18%) and summer (4%).
Water deficiency has remained one of the most important issues in the irrigated crop sector of South Kazakhstan province. The province with its shallow groundwater level and saline soils needs water-saving technologies and efficient irrigation systems for diversified cropping systems. Currently, grain crops such as winter wheat are grown continuously after wheat or winter barley which is a good crop rotation system. In most cases, wheat and barley are irrigated by wild flooding resulting in crop kill due to rise of highly mineralized ground water and soil crusting. Effective alternative approaches can be improved irrigation practices such as bed-planting technology. There were some

on-farm research in the country has shown that bed planted crops have yielded better and consumed less irrigation water (about 40%) with lower seed rate, soil tillage and fuel expenses than flood irrigated crops. The soil is improved, especially on the top of the beds. Bed planting combined with reduced/zero tillage technologies looks promising to improve farming profitability, introduce better diversified rotations, reduce the turn-around period between harvesting and planting of the following crop to a minimum with a goal to produce two and more crops per year. The project will therefore also target crop diversification and conduct on-farm trials and demonstrations using alternative crops such as:
Cereals: sorghum
Leguminous: Mungbean, kidney bean, field pea.
The Project activities will be implemented in the three farms in the Sayram district on South Kazakhstan province. The effect of crop rotation and improved water management, through implementation of conservation agriculture practices, on productivity of cereals, legumes, will be studied in this site.

2.2.3. Characterization of Selected project demonstration sites in Uzbekistan

After achieving independence, Uzbekistan laid major emphasis on agricultural growth and efforts towards developing its own market economy. During this transition, large inefficient shirkat farms have been disintegrated and a number of small private farms have been established. Therefore, high input use technologies will not be suitable for these small farms. It is right time to look for an appropriate and realistic strategy by which the cropping intensity could be enhanced and diversification in agriculture could be achieved. For development of this new type of farms, there are constraints associated with limited potential and abilities in cropping, tillage methods, soil fertility improvement and on-farm water management. There is an urgent need to pilot changes in agricultural practices in the region in order to improve agricultural production in the irrigated areas of Uzbekistan.
Kashkadarya is located in southeast of the country, in the Kashkadarya River Basin and on the western edges of the Pamir-Alai Mountain Range. Main agricultural crops are cotton, winter wheat, vegetables and cocoon production. The agricultural input of the province makes slightly more than 10 percent of the Uzbekistan's total agricultural production. Livestock farming and sheep keeping are well developed in the mountainous areas.
There are several deserts and these are namely: the Karshi Desert covers the north and northwestern part of the province; the Nishon Desert covers the south whereas the Sundukly sands - the southwestern parts; the eastern part of the province consists of the Kitob-Kamashi foothills. There are three types of climate such as continental, partly subtropical and dry. The mountain ranges that have semi-rounded the province from northwest, east and south prevent the penetration of cold weather and create a convenient atmosphere for the condensation of the western humidity. Winters are warm and summers are hot and long. Average long term precipitation widely ranges among foothill, mountain and desert zones between 100 and 450 mm. The main river is the Kashkadarya River with its numerous streams coming from the mountains.
The Project activities will be implemented in the three farms in the Kasbi and Karshi districts on Kashkadarya province of Uzbekistan. The effect of bed planting and no-till practices on productivity of cereals, legumes and also integration of legumes and small cereals into cereal cropping systems will be studied in this site.

3. FIELD ACTIVITIES

3.1. FIELD ACTIVITIES IN AZERBAIJAN

3.1.1. Improved crop production and management through accelerated adoption of conservation agricultural practices

Location: Ter-ter and Barda districts

Collaborating scientists: Drs. Asad Musaev and Seymur Safarl

Scientists: Dr. Imran Jumshudov

Farmers: Ehtibar Jumshudov, Ahmad Ibragimov and Mehman Babaev

3.1.1.1. Effect of planting methods on productivity of winter wheat varieties in the irrigated conditions of Karabakh lowlands

Introduction

Nowadays, Bed planting systems, on wheat cultivation, are gaining importance in various environments of all over the world. Bed planting method is already started in the irrigated conditions of Azerbaijan and but area under bed planting system is very low compare mega planting practices which is widely distributed in the irrigated conditions of Azerbaijan. The introduction of this technique in North Mexico had improved the wheat grain yield by at least 10% and water economy by up to 35% in comparison with the conventional system (Aquino, 1998). Similar results can be achieved in the irrigated conditions of Azerbaijan by using winter wheat cultivation on beds.

Study objective

The objective of this experiment was to test two methods of planting and four different planting rate of bed planted winter wheat in irrigated conditions and to adopt the bed planting systems to irrigated conditions of Karabakh lowlands, in order to intensify wheat production in the Republic of Azerbaijan.

Methods and materials

The Bed Planting System will be compared to Flat Planting System based on conventional and seedbed preparation for planting winter wheat. The experiment will be conducted in the three farmers' field to evaluate field performance, productivity of the winter wheat and also economy and water use efficiency.

Experimental Design

a) Factors: Planting methods

1) Bed planting

2) Conventional planting

в) Factors: Varieties

1) Azamatli-95

2) Nurlu-99

3) Girmizigul

4) Aran

Experimental design

Randomized Complete Block Design will be used in the experiment. Replications – 4; plot size – 100 m^2 (2,5x20) for each treatment and number of farmers – 3. Standard agronomic practices and fertilizer doses will be applied for the crops. Analysis of variance (ANOVA) will be used to determine treatments' effect. Soil samples will be collected at 0-6 and 6-12 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting.

Observations

- Germination
- Tillering
- Booting
- Plant height
- Yield
- Water use efficiency
- Cost benefit analysis

Time frame for activities

Activities	2011			2012												2013								
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
Planting	**x**												**x**											
Fertilization					**x**	**x**											**x**	**x**						
Irrigation	**x**					**x**	**x**	**x**					**x**					**x**	**x**	**x**					
Harvesting									**x**												**x**			
Data Collection																								
Data editing and entry																								
Analysis																								
Report Writing																								
Article preparation																					**x**			
First draft report																					**x**			
Finalized report																						**x**		

Expected outputs

The best seeding rate will be recommended to be used in the farm conditions and introduced to the farms. On the basis of obtained results a research paper will be prepared to be published in Regional journal.

3.1.2. Crop rotations diversified with crops suitable for conservation agriculture

Location: Ter-ter and Barda districts

Collaborating scientists: Drs. Asad Musaev and Seymur Safarli

Scientists: Dr. Imran Jumshudov

Farmers: Ehtibar Jumshudov, Ahmad Ibragimov and Mehmon Babaev

3.1.2.1.Study short term crop rotation system in the irrigated conditions through application of conservation agriculture technologies in Karabax low lands

Introduction

It is well known that short-term rotations usually involve only annual crops, such as cereals, legumes, vegetables and etc. In many investigations on short-term rotations have been shown that there are many beneficial effects in this system of the rotation. For example, winter wheat or barley grown after legume crops usually performs better by 10 to 20 per cent (ranging from 0 to 50 per cent) than a cereal grown after a similar cereal crop. Also short term crop rotation can improve weed control in the field.

Study objective

The main objective of this experiment is to study short term crop rotations by using conservation agriculture practices and well adapted crops with full participation of farmers.

Methods and materials

Experimental design

This experiment will be conducted at the demo sites of the three project farmers. Randomized Compete Design will be used in the experiment. Replications – 4; plot size – 200 $м^2$ for each treatment and number of farmers – 3. Standard agronomic practices and fertilizer doses will be applied for the crops. Analysis of variance (ANOVA) will be used to determine treatments' effect. Soil samples will be collected at 0-6 and 6-12 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting.

Treatment

1. Wheat – continues
2. Wheat + Corn + Wheat + Soybean + Wheat + corn
3. Wheat + Cucumber + Wheat + Pearl millet + wheat

Observations

- Soil sampling before planting and after harvest
- Germination
- Tillering
- Booting
- Plant height
- Yield
- Cost benefit analysis

Time frame for activities

Activities	2011						2012												2013							
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Corn planting	**x**																									
Winter wheat planting				**x**												**x**										
Soy bean planting													**x**													
Pearl millet planting																									**x**	
Data Collection																										
Preparing article																										
Report Writing																										
Article preparation																									**x**	
First draft report																									**x**	
Finalized report																										**x**

Expected outputs

Best and well adapted short term crop rotation with conservation agriculture practices will be recommended to the farms of the country. A field day on crop rotation in the project demonstration site will be organized for farmers and policy makers during the cropping cycle to promote information exchange to encourage adoption in Azerbaijan. A poster on short-term crop rotation will be produced and also a research paper will be published in local Journal.

3.1.2.2.Effect of tillage on productivity of maize in the irrigated conditions of Azerbaijan

Introduction

Tillage is one of the important agronomic techniques in most agricultural crops while no-till is the most modern tillage technique which is a part of conservation agriculture. No-till controls soil erosion because the plant material protects the soil surface from high winds, rainfall and irrigation and prevents loosening and carrying away of soil elements. Touchton and Jonson (1982) conducted an experiment on the effect of 3 different methods of tillage and plantation on the yield of wheat and soybean. The 3 tillage methods included chisel, Moldboard plow and no tillage. The results were that the yield of soybean in the 2 mentioned tillage methods didn't differ, but yield of wheat in case of Plow with Chisel Plow was less than Moldboard plow. Taking this into account it is decided to study effect of tillage on productivity of no-till corn in the irrigated conditions of Karabakh lowlands.

Study objective

A main objective of this research is study effect of tillage on productivity of succeeding no-till corn in the irrigated conditions of Karabakh lowlands.

Methods and materials

The experiment will be repeated in 2012. French early maturing Maize hybrid will be planted after winter wheat by using no-till planter at the seeding rate 30 kg ha -1 in Ehtibar Jumshodov's farm.

Experimental design

The experiment was laid out in randomized complete block design. Plot size was 200 m^2 (25x8 m).

Treatment
Tillage treatments include conventional tillage or plough (CT) as control, minimum tillage with chiseling (MTC) and no-till (NT) respectively.

Observations
- Germination
- Number of grains per cop
- Number of cops per plant
- Hundred kernel weight - HKW
- Plant height
- Days to maturity
- Biomass yield
- Grain Yield

Time frame for research activities

Activities	2011						2012												2013							
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Corn planting	**x**												**x**												**x**	
Fertilization		**x**												**x**												**x**
Irrigation			**x**	**x**											**x**	**x**										
Data Collection																										
Preparing article																									**x**	
Report Writing																										
Article preparation																									**x**	
First draft report																									**x**	
Finalized report																										**x**

Expected outputs
Best tillage option will be assessed and will be recommended to be adopted in Karabakh low lands and introduced to the farms of the country. Economic impact of the conventional and no-till will be assessed. A research paper will be prepared for International Peer Reviewed Journal in 2013.

3.1.3. Raised-bed planting and land levelling technology adjusted and applied and lower and more efficient water utilization for the crop rotations introduced, as compared to traditional cropping systems

Location: Ter-ter and Barda districts

Collaborating scientists: Drs.Asad Musaev and Seymur Safarli

Scientists: Dr. Imran Jumshudov

Farmers: Ehtibar Jumshudov, Ahmad Ibragimov and Mehmon Babaev

3.1.3.1. Management water irrigation technologies through use of conservation agriculture practices

Introduction
Agricultural production in Azerbaijan is constrained by scarce water availability during winter wheat grown season. And also water use efficiency is very low and this of course leads to high water losses through the commonly used irrigation scheme in the country. There are a lot of disadvantages of the float irrigation and the main disadvantage of the float irrigation is the water losses and, consequently, coefficient of water use is very low. Water saving can be increased up to 30% by using bed planting method. There is a need for new irrigation practices such as furrow irrigation.

Study objective
To study the effect of improved irrigation technologies on winter wheat yield in the irrigated conditions of Karabakh lowlands.

Methods and materials
Treatment
1. Float irrigation (1200 m^3)
2. Furrow irrigation (600 m^3)
3. Float irrigation (1600 m^3)
4. Furrow irrigation (800 m^3)
5. Float irrigation (1800 m^3)
6. Furrow irrigation (900 m^3)

Experimental design
This experiment will be conducted at the demo sites of the three project farmers. Randomized Complete Block Design will be used in the experiment. Replications – 4; plot size – 200 m^2 for each treatment and number of farmers – 3. Standard agronomic practices and fertilizer doses will be applied for the crops. Analysis of variance (ANOVA) will be used to determine treatments' effect. Soil samples will be collected at 0-6 and 6-12 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting.

Observations
- Germination
- Tillering
- Plant height
- Soil moisture
- Yield
- Cost benefit analysis

Time frame for activities

Activities	2011			2012												2013								
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
Planting	**x**												**x**											

Fertilization					**x**	**x**											**x**	**x**						
Irrigation	**x**					**x**	**x**	**x**					**x**					**x**	**x**	**x**				
Harvesting									**x**												**x**			
Data Collection																								
Data editing and entry																								
Analysis																								
Report Writing																								
Article preparation																					**x**			
First draft report																					**x**			
Finalized report																						**x**		

Expected outputs
The best improved irrigation technology will be identified and will be recommended to be adopted in Karabakh low lands and introduced to the farms of the country. A research paper will be published in local journal. For all activities, field days, formal and field training courses will be organized for farmers and policy makers during the cropping cycle to promote information exchange and encourage adoption.

3.1.4. Economic analysis

Location: Ter-ter, Barda districts

Collaborating scientists: Drs. Asad Musaev and Akif Valiev,

Scientists: Dr. Imran Jumshudov

Farmers: Ehtibar Jumshudov, Ahmad Ibragimov and Mehmon Babaev

3.1.4.1. A comparison study input costs under conservation agriculture and conventional technologies in Azerbaijan

Introduction
An important component of the project is to estimate the financial benefits of the new technologies at the farmer-level. A comparison of input costs under CA and traditional technologies will be undertaken in the selected project demonstration sites. Farmers in the region are now becoming increasingly aware of CA as a new, promising technology.

Study objective
The specific objectives of the study are:

- To collect data on selected project sites
- To monitor growing conditions of crops on selected farms (demonstration and control plots)
- To analyze production costs of introduced CA technology

Methodology

The study area includes three integrated research sites situated in irrigated Ter-ter and Barda districts. Data will be collected from three project and three control villages representing different crop production systems. Households or farmers will be selected randomly across the project villages. The sample will include 40 households including participating farmers from 3 project villages and 40 from control villages.

Time frame for activities (June 2011 – July 2012)

Activities	**2011**							**2012**										
	J	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Informal survey				**x**															
Questionnaire designing				**x**															
Data Collection					**x**														
Data editing and entry						**x**													
Analysis						**x**													
Preparing an article																		**x**	
Report Writing							**x**	**x**											
First draft report															**x**	**x**			
Finalized report																			**x**

Expected outputs
Farmers' perceptions and preference will be monitored. Economic impact of the traditional and conservation agriculture technologies will be assessed. The results of the survey will be presented during field days and formal training courses by the national consultant on socio economics. At the end of the project a research paper will be published in local peer reviewed Journal and also a poster will be published.

3.2. FIELD ACTIVITIES IN KAZAKHSTAN

3.2.1. Improved crop production and management through accelerated adoption of conservation agricultural practices

Location: Sayram district, South-Kazakhstan

Collaborating scientists: Prof. Dossymbek Siddik, Drs. Ajar Karabalayeva, Rahim Medeubayev

Scientists:

Farmers: Dr. A.Babakhodjaev, Mr.Sattarkhonov Musakhon and Mr. G.Yusufjanov

3.2.1.1 Effect of planting rate on productivity of bed planted maize in irrigated conditions of South Kazakhstan province.

Introduction

In South Kazakhstan population growth rate is very high compare to other province of Republic of Kazakhstan. In this particular case there is need to increase food production in the province by improving cultivation of agricultural crops including forage crops.
A major crop planted in the region, as succeeding crop, is a dual propose maize and is very important to supply livestock with fresh forage in the second half summer. Maize growing technology on permanent beds is not studied yet and is a new approach in maize cultivation management in the region. In the conditions of free market economy there is a need to develop new resources saving technologies such as no-till, minimum tillage and improved water saving technologies at the same time maximum use of promising varieties and hybrids which can be given high productivity forage crops by using warm period of vegetation period and bio-climatical potential of the region.

Study objective
To test different planting rate of bed planted maize in irrigated conditions of South Kazakhstan province.

Methods and materials
During the vegetation period following soil sampling will be carried out:

- Soil samples will be collected at 0-100 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting;
- Main nutrition elements will be determined by the Granvald-Lyaju and Machigin methods

Experimental design
The experimental design will be Randomized Complete Block Design with four replicates. Individual plot size will be 1250 m^2. Analysis of variance (ANOVA) will be used to determine treatments' effect.

Treatment

1. Bed planted maize – 40,000
2. Bed planted maize – 50,000
3. Bed planted maize – 60,000
4. Bed planted maize – 70,000
5. Bed planted maize – 80,000
6. Bed planted maize – 90,000

Observations

- Germination
- 9-10 leaves
- 13-14 leaves
- Days to paniculation
- Days to flowering
- Days to milky-wax maturity
- Number of leaves per plant
- Biomass yield
- Cost benefit analysis

Time frame activities

Activities	2011	2012	2013

	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Mazie seeding		x									x									x							
Irrigation												x	x		x									x	x		x
Fertilization												x	x		x									x	x		x
Harvesting					x												x										
Data collection and analyzing						x	x					x	x	x	x	x	x				x	x	x	x	x	x	
Reporting																		x									
Report Writing							x												x								x
First draft report																											**x**
Finalized report																											**x**

Expected outputs
It is expected that the best planting rate of maize will be validated by the farmers groups, and an expanded programme will have been prepared for farmers living in nearby districts through field days, field training course. A paper will be prepared for local journal.

3.2.2. Crop rotations diversified with crops suitable for conservation agriculture

Location: Sayram district, South-Kazakhstan Province

Collaborating scientists: Prof. Dossymbek Siddik, Drs. Ajar Karabalayeva, Rahim Medeubayev

Scientists:

Farmers: Dr. A.Babakhodjaev, Mr.Sattarkhonov Musakhon and Mr. G.Yusufjanov

3.2.2.1. The effect of no-till practices on productivity of crops under short-term cereal crop rotation in the irrigated conditions of Southern Kazakhstan.

Introduction
Conservation agriculture practices greatly influence the environment on positive way. Crop rotation is main principle of conservation agriculture while short-term cereal-legume crop rotation system is good for farmers and good for the environment as well and also have a great potential to increase agricultural production through implementation of no-till practices. And also short-term crop rotation system can improve soil quality by increasing soil organic matter levels in the upper layers of the soil. Within a crop rotation, different root systems influence different soil horizons and improve the efficiency of the soil nutrient use. In general, the soil structure becomes more stable (Bot & Benites, 2005). Many crops can be used for short-term crop rotation system in the irrigated conditions of South-Kazakhstan province. Several agricultural crops were selected and these are namely wheat, maize, mungbean, rape, soy bean, and bersim are used for short-term crop rotation. Wheat crop is the easiest crop to begin conservation agriculture while after wheat harvest succeeding crops can be cultivated.

Study objective
The objective of the experiment is to explore the possibilities for short-term crop rotation increases in cereal-legume production through implementation of no-till practice and to improve soil fertility in the demo site.

Methods and materials

A short-term cereal-legume crop rotation experiment will be initiated in 2012 at Experimental Station of South-West Kazakhstan Research Institute of Livestock and Crop Production in South-Kazakhstan province.

Treatment

Three 3-year crop rotations will be included in the study. All fields in all rotations are represented each year. The three crop rotations are:

1) MzWwMbRSb: Maize-Winter wheat-mungbean-rape-soybean
2) SbWwKbFp: Soy bean-Winter wheat-Kidney bean-Field pea
3) MzWwSbWw: Maize-Winter wheat-Soy bean-winter wheat

Experimental design

Experimental design is a randomized complete block design with four replicates. Plot area is 20 × 7.2 m and the size will be 144 m^2. Analysis of variance (ANOVA) will be used to determine treatments' effect.

Observations

- Soil sampling before planting and end after harvesting
- Seed germination
- Plant density '
- Pods per plant
- Grain per pod
- Days to flowering
- Days to maturity
- Grains per m2
- Grain Yield
- Biomass yield
- Cost benefit analysis

Time frame activities

Activities	2012												2013											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Maize planting			x												x									
Soy bean planting				x												x								
Winter wheat planting										x												x		
Mung bean planting							x												x					
Kidney bean							x												x					
Field pea											x												x	
Irrigation and fertilization				x		x		x		x	x	x				x		x		x		x	x	x
Data collection and analyzing			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x						
Reporting												x							x					
Report Writing												x							x					
First draft report																			**x**					
Finalized report																				**x**				

Expected outputs

Short-term crop rotation, through implementation of no-till practice, will be indentified and will be recommended to the farmers of South-Kazakhstan province through field days and field training courses. A research paper will be prepared for submission for international peer reviewed journal.

3.2.2.2 Effect of planting methods and seeding rates on productivity winter wheat in the irrigated conditions of South-Kazakhstan province

Introduction

The bed-planting technology is growing crops on raised beds and using the beds permanently with consecutive crops which adds to the benefits of zero-till to bed planting and is a more sustainable system (Nurbekov 2008). Most research in the RWC has used beds about 70 cm apart two beds can be made between the two tractor tires. The main benefit of bed planting is water savings. Bed planting would provide the benefits of water saving in systems of surface irrigation. Under CA, the beds would be converted into permanent beds whereas any soil tillage would be limited to a periodic cleaning and reshaping of the furrows. A few researches were done on winter wheat seeding rate under bed planting system in the irrigated conditions of South-Kazakhstan but all research done by locally made bed planter. This is the first research on study effect of seeding rate on productivity of bed planted winter wheat with using new Brazilian no-till drill adjusted to bed planting.

Study objective

The objective of this experiment was to test two planting method and four seeding rates of bed planted winter wheat in irrigated conditions and to adopt the bed planting systems to irrigated conditions of South-Kazakhstan.

Methods and materials

The Bed Planting System is compared to Flat Planting System based on conventional and seedbed preparation for seeding winter wheat. The experiment will be conducted in the three farmers' field to evaluate field performance, productivity of the winter wheat and also economy and water use efficiency.

Treatment

1. Wheat planting on flats (200 kg ha -1) – control
2. Wheat planting on beds (100 kg ha -1)
3. Wheat planting on beds (120 kg ha -1)
4. Wheat planting on beds (140 kg ha -1)

Experimental design

This experiment will be conducted at the demo sites of the three project farmers. Randomized Complete Design will be used in the experiment. Replications – 4; plot size – 100 m^2 (2,5x20) hectare for each treatment and number of farmers – 3. Standard agronomic practices and fertilizer doses will be applied for the crops. Analysis of variance (ANOVA) will be used to determine treatments' effect. Soil samples will be collected at 0-6 and 6-12 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting.

Observations

- Germination
- Tillering
- Booting

- Plant height
- Yield
- Water use efficiency
- Cost benefit analysis

Time frame activities

Activities	2011			2012												2013											
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Winter wheat planting	x												x												x		
Irrigation						x	x											x	x								
Fertilization		x				x	x							x				x	x							x	
Data collection and			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x									
Reporting												x									x						
Report Writing												x									x						
First draft report																					**x**						
Finalized report																						**x**					

Expected outputs

The best seeding rate will be recommended to be used in the farm conditions and introduced to the farms. A paper will be prepared for submission for international peer reviewed journal.

3.2.2.3. Effect of tillage on productivity of winter wheat in irrigated conditions of South-Kazakhstan province

Introduction

No-till has certain advantages, as it prevents soil erosion, reduces water loss and decreases crop cultivation costs in comparison with conventional soil tillage with a plough. Under no-till system soil biota can build and maintain soil pore networks. Since the soil is never tilled the soil structure changes. A system of continuous macro pores is established, facilitating water infiltration and aeration of the soil as well as root penetration into deeper zones. Soil organic matter contents increases with higher values near the surface, gradually declining at increases depth. Soil macro- and micro- fauna and flora is re-established resulting in better soil fertility. In this study, different methods of soil preparation included the conventional method of the region with keeping the vegetative remains in the field with plowing and tillage and without plowing or tillage, was investigated.

Study objective

The objective of this experiment is to see effect of different tillage on productivity of winter wheat in South-Kazakhstan province.

Methods and materials

The experiment will be conducted in 2012 at project demonstration sites.

Experimental design

The experiment was laid out in randomized complete block design with four replicates. Plot size was 200 m^2 (25x8 m).

Treatment

1. Control – Conventional tillage (CT)

2. Minimum tillage with cultivator (MTC)
3. Minimum tillage with chiseling (MTCh)
4. No-till (NT)

Observations

- Germination
- Number of grains per spike
- Number of grains per m2
- Thousand kernel weight - TKW
- Plant height
- Days to Heading
- Days to flowering
- Days to maturity
- Grain Yield

Time frame for research activities

Activities	2011			2012												2013											
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Winter wheat planting	x												x												x		
Irrigation						x	x											x	x								
Fertilization		x				x	x							x				x	x							x	
Data collection and			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x										
Reporting												x									x						
Report Writing												x									x						
First draft report																					**x**						
Finalized report																						**x**					

Expected outputs

Best tillage method will be assessed and will be recommended to be adopted in South Kazakhstan province and introduced to the farms of the country. Economic impact of the conventional and no-till will be assessed. A research paper will be prepared for submission to International peer reviewed journal.

3.2.3. Raised-bed planting and land levelling technology adjusted and applied and lower and more efficient water utilization for the crop rotations introduced, as compared to traditional cropping systems

Location: Sayram district, South-Kazakhstan Province

Collaborating scientists: Prof. Dossymbek Siddik, Drs. Ajar Karabalayeva, Rahim Medeubayev

Scientists:

Farmers: Dr. A.Babakhodjaev, Mr.Sattarkhonov Musakhon and Mr. G.Yusufjanov

3.2.3.1.Effect of different irrigation rates on productivity of winter wheat in irrigated conditions of South Kazakhstan.

Introduction

In some articles that are published in foreign countries have given some recommendations for using progressive technology with water saving furrow irrigation technology or raised bed technology. Bed planting systems have been used in cultivation for centuries. Raised bed cultivation has traditionally been associated with water management issues either by providing opportunities to reduce the impact of excess water in rainfed conditions or to more efficiently deliver irrigation water in high production irrigated systems (Sayre, 2003; Cutforth and Selles, 1992).

Study objective

To study the effect of improved irrigation technologies on winter wheat yield in the irrigated conditions of South Kazakhstan province through conservation agriculture technologies.

Methods and materials

Treatment

1. Float irrigation (1200 m^3)
2. Furrow irrigation (600 m^3)
3. Float irrigation (1600 m^3)
4. Furrow irrigation (800 m^3)
5. Float irrigation (1800 m^3)
6. Furrow irrigation (900 m^3)

Experimental design

This experiment will be conducted at the demo sites of the three project farmers. Randomized Complete Block Design will be used in the experiment. Replications – 4; plot size - 1 hectare for each treatment and number of farmers – 3. Standard agronomic practices and fertilizer doses will be applied for the crops. Analysis of variance (ANOVA) will be used to determine treatments' effect. Soil samples will be collected at 0-6 and 6-12 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting.

Observations

- Germination
- Tillering
- Plant height
- Soil moisture
- Yield
- Cost benefit analysis

Time frame activities

Activities	2011									2012										
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Seeding	x												x								
Vegetation irrigation		x	x		x									x	x		x				
Fertilization	x	x											x	x							
Harvesting						x												x			
Data collection and analyzing							x												x		
Reporting									x											x	x
Report Writing																				x	

First draft report																			**x**
Finalized report																			**x**

Expected outputs
The best irrigate rate and improved water management technology will be identified and will be recommended. The water management technology can be introduced to the farms of the country. On the base of obtained results a poster on water use efficiency will be produced in three languages Kazakh, Russian and English.

3.2.4. Economic analysis

Location: Sayram district, South-Kazakhstan province

Collaborating scientists: Drs. Natalya Gritsenko and Dossymbek Siddiq

Scientists:

Farmers: Dr. A.Babakhodjaev, Mr.Sattarkhonov Musakhon and Mr. G.Yusufjanov

3.2.4.1. A comparison study input costs under conservation agriculture and conventional technologies in South Kazakhstan

Introduction
An important component of the project is to estimate the financial benefits of the new technologies at the farmer-level. A comparison of input costs under CA and traditional technologies will be undertaken in the selected project demonstration sites. Farmers in the region are now becoming increasingly aware of CA as a new, promising technology.

Study objective
The specific objectives of the study are:

- To collect data on selected project sites
- To monitor growing conditions of crops on selected farms (demonstration and control plots)
- To analyze production costs of introduced CA technology

Methodology
The study area includes three integrated research sites situated in irrigated Ter-ter and Barda districts. Data will be collected from three project and three control villages representing different crop production systems. Households or farmers will be selected randomly across the villages. The selection of control area and villages would be critical to meet the precondition of selection of these at a larger distance with identical farm features of project locations. The sample will include 40 participating farmers from 3 project villages and 40 from control villages.

Time frame for activities (June-December 2011)

Activities	**2011**							**2012**											
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Informal survey				**x**															
Questionnaire designing				**x**															
Pre-testing				**x**															

Finalization of questionnaire				**x**														
Data Collection					**x**													
Data editing and entry						**x**												
Analysis						**x**												
Prepare an article										**x**								
Report Writing									**x**	**x**								
First draft report											**x**	**x**						
Finalized report															**x**			

Expected outputs
Farmers' perceptions and preference will be monitored. Economic impact of the traditional and conservation agriculture technologies will be assessed. A research paper will be prepared and will be submitted for local journal.

3.3. FIELD ACTIVITIES IN UZBEKISTAN

3.3.1. Improved crop production and management through accelerated adoption of conservation agricultural practices

Location: Kasbi district

Collaborating scientists: Drs. Zokhidjon Ziyadullayev, Ravshan Boyirov, Abdumalik Namozov and Yormamat Kholiyarov

Scientists:

Farmers: Azamat Ismatov, Sayli Meyliev and Sobir Kholov

3.3.1.1. *Effect of seeding rate on productivity of bed planted maize in the irrigated conditions of Kashkadarya*

Introduction
Maize (*Zea mays*) is a second important cereal crop after winter wheat in the irrigated conditions of Uzbekistan and is a dual propose crop. Corn yield potential per plant has not increased over the past 50 years, but the amount of yield per acre has increased. A significant portion of the observed yield increase per year is directly correlated with increased plant populations (Lori Abendroth and Roger Elmore, 2007). In Uzbekistan, there are a lot investigations were done by different researchers on corn cultivation in the conventional tillage system and but there is no any research was done on bed planting or resource saving technologies in agriculture. For the first time effect of seeding rate on productivity of bed planted maize will be studied in this experiment in irrigated conditions of Kashkadarya province.

Study objective
To study effect of different seeding rates on productivity of bed planted maize

Methods and materials
Maize hybrid Uzbekistan-601 will be planted in spring as a main crop at different planting rates.

Treatments

Seven different seeding rates of maize will be evaluated to determine grain and biomass yield. The seeding rates are as follows:

1. Bed planted maize – 40,000
2. Bed planted maize – 50,000
3. Bed planted maize – 60,000
4. Bed planted maize – 70,000
5. Bed planted maize – 80,000
6. Bed planted maize – 90,000
7. Bed planted maize – 100,000

Experimental design

The experiment will be conducted at irrigated site in a farm. Plot size is 100 m^2 (3,6x28 m). Four replications and the experiment will use a Randomized Complete Block Design (RCDB). Total area is 2800 m^2.

Observations

- Soil analysis before planting and after harvesting
- Seed germination
- Plant density ‘
- Ears per plant
- Grains per ear
- Days to flowering
- Days to maturity
- Grain Yield
- Biomass yield
- Cost benefit analysis

Time frame activities

Activities	2011							2012												2013							
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Seeding		x											x										x				
Irrigation			x	x										x	x									x	x		
Fertilization			x	x										x	x									x	x		
Harvesting					x												x										
Data collection and analyzing						x											x	x									
Reporting																									x		
Report Writing																										x	
First draft report																										**x**	
Finalized report																										**x**	

Expected outputs

The farmers will be trained in improved agronomic practices of corn production. The best seeding rate will be identified and will be recommended to be adopted in Kashkadarya province and

introduced to the farms of the country. A research paper will be prepared for submission to local journal.

3.3.1.2. Effect of rhizobial inoculation on productivity of bed planted soybean in soils of the Kashkadarya province of Uzbekistan.

Introduction

Central Asia is the origin region of Soy bean (*Glycine max (L) Merrill*). The crop is the oldest cultivated crop not only in Uzbekistan but one of the world's oldest cultivated crops, has been given recent prominence because of its broad utility and versatility for both human and animal nutrition, soil fertility, industrial usefulness, and geographical adaptability. In spite above mentioned characters and its ability to grow well with no added N fertilizer, soybean cultivation in Uzbekistan has not been substantial or the crop is not widely grown in Uzbekistan. Because cotton and winter wheat are strategic crops in the country.

Study objective

To study effect of Rhizobium with combination Potassium and Phosphorus on productivity bed planted soybean in irrigated conditions of Kashkadarya province

Methods and materials

Soybean variety Uzbek-6 will be planted as main crop in spring on beds. A demo site at Azamat farm will be selected to improve the productivity of soil in Kasbi district.

Treatment

1. Control
2. K 60
3. P 120
4. K60+P120
5. Rhizobium
6. Rhizobium + K60
7. Rhizobium + P120
8. Rhizobium + K60+P120

Experimental design

The experiment will be conducted at irrigated site in a farm. Plot size is 100 m^2 (3,6x28 m). Four replications and the experiment will use a Randomized Complete Block Design (RCDB). Total area is 2800 m^2.

Observations

- Soil analysis before planting and after harvest
- Seed germination
- Plant density ‘
- Pods per plant
- Grain per pod
- Days to flowering
- Days to maturity
- Grains per m2
- Grain Yield
- Biomass yield

- Cost benefit analysis

Activities	2011									2012											2013							
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Soil sampling	x											x												x					
Seeding	x												x												x				
Irrigation		x	x		x									x	x		x									x	x		
Fertilization	x	x											x	x											x	x			
Harvesting						x												x											
Data collection and analyzing							x												x										
Preparation of article																												x	
Reporting																												x	x
Report Writing																												x	
First draft report																													**x**
Finalized report																													**x**

Expected outputs
The farmers will be trained in improved agronomic practices of soy bean production. The best treatment will be identified and will be recommended to be adopted in Kashkadarya province and introduced to the farms of the country. An article will be prepared for regional journal and also a poster will be published.

3.3.2. Crop rotations diversified with crops suitable for conservation agriculture

Location: Kasbi district

Collaborating scientists: Drs. Zokhidjon Ziyadullayev, Ravshan Boyirov, Abdumalik Namozov and Yormamat Kholiyarov

Scientists:

Farmers: Azamat Ismatov, Sayli Meyliev and Sobir Kholov

3.3.2.1. Effect of tillage on productivity of winter wheat in irrigated conditions of Kashkadarya province

Introduction
No-tillage, including direct seeding practices that leave plant material of the previous crop on the soil surface, assists to control soil erosion and conserve our soil resource indefinitely as the residue mulch protects the soil surface from high winds and rainfall and prevents loosening and carrying away of soil elements. Thus, plant nutrients and soil organic matter remain in the field. Soil changes its structure in No-till system: macro pores, established in no-till system, facilitates water infiltration and aeration of the soil as well as root penetration into deeper zones; soil organic matter contents increases near the surface, gradually declining as depth increases; and soil macro- and micro- fauna

and flora are re-established. Under reduced tillage and direct seeding systems soil biota can build and maintain soil pore networks.

Study objective
The objective of this experiment is to see effect of different tillage on productivity of winter wheat growth and development in Kashkadarya province.

Methods and materials
The experiment will be repeated in 2012. Newly released winter wheat variety will be planted by using no-till planter at the seeding rate 200 kg ha -1 in Azamat Ismatov's farm in Karshi district.

Experimental design
The experiment was laid out in randomized complete block design. Plot size was 200 m^2 (25x8 m).

Treatment
1. Control - Conventional tillage (CT)
2. Minumum tillage with cultivator (MTC)
3. Minimum tillage with chiseling (MTCh)
4. No-till (NT)

Observations
- Germination
- Number of grains per spike
- Number of grains per m2
- Thousand kernel weight - TKW
- Plant height
- Days to heading
- Days to flowering
- Days to maturity
- Grain Yield

Time frame for research activities

Activities	2011									2012											2013							
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Soil sampling	x											x												x					
Seeding	x												x												x				
Irrigation		x	x		x									x	x		x									x	x		
Fertilization	x	x											x	x											x	x			
Harvesting						x												x											
Data collection and analyzing							x												x										
Preparation of article																												x	
Reporting																												x	x
Report Writing																												x	
First draft report																													**x**

Finalized report																													**x**

Expected outputs
The best tillage method will be assessed and will be recommended to be adopted in Southern part of Uzbekistan and introduced to the farms of the country. Economic impact of the conventional and no-till practice will be assessed. Results will be presented during the field days and formal training courses. A research paper will be prepared for submission to international journal.

3.3.2.2. *The effects of short-term cereal crop rotation on productivity of crops under no-till practices in the irrigated conditions of Kashkadarya*

Introduction
Crop rotation is an integral part of the crop production system. The greatest benefit to a good crop rotation is increased yields and soil fertility. A well-planned crop rotation will help in insect and disease control and will aid in maintaining or improving soil structure and organic matter levels. Using a variety of crops can reduce weed pressures, spread the workload, protect against soil erosion and reduce risk. Legume crops in the rotation have become more valuable with the increased cost of nitrogen. Research and experience have proved that a good crop rotation will provide more consistent yields, build soil structure and increase profit potential. Crop rotations for the selected farms were developed taking into account farmers' interest and also marketability of the selected agricultural crops of the project throughout the project countries.

Study objective
The objective of the experiment is to explore the possibilities for short-term increases in cereal-legume production through implementation of no-till practice.

Methods and materials

Treatment
Three 3-year crop rotations were included in the study. All fields in all rotations are represented each year.

The three crop rotations are:

1. CrWwKbRSb: Corn-Winter wheat-kidney bean-rape-soybean
2. SbWwCFp: Soy bean-Winter wheat-Corn-Field pea
3. CtWwBWw: Corn-Winter wheat-bersim-winter wheat

Experimental design
Experimental design is a randomized complete block with four replicates. Main plots are composed of the crop rotation treatments and measure approximately 20 × 7.2 m.

Observations

- Soil sampling
- Seed germination
- Plant density ‘
- Pods per plant
- Grain per pod
- Days to flowering

- Days to maturity
- Grains per m2
- Grain Yield
- Biomass yield
- Cost benefit analysis

Time frame activities

Activities	2011							2012												2013											
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Maize planting		x								x												x									
Soy bean planting	x										x												x								
Winter wheat planting																	x												x		
Kidney bean		x												x												x					
Field pea																		x												x	
Irrigation and fertilization		x	x								x		x		x		x	x	x				x			x			x	x	x
Data collection										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
Reporting																			x											x	
Report Writing																			x											x	
First draft report																														**x**	
Finalized report																															**x**

Expected outputs

Short-term crop rotation will be indentified and will be recommended to the farmers of Kashkadarya province through field days and field training courses. Advantages and disadvantages of the short-term crop rotations will be discussed during the field days and formal training courses. A research paper will be prepared for submission to international peer reviewed journal.

3.3.3. Raised-bed planting and land levelling technology adjusted and applied and lower and more efficient water utilization for the crop rotations introduced, as compared to traditional cropping systems

Location: Kasbi district

Collaborating scientists: Drs. Zokhidjon Ziyadullayev, Ravshan Boyirov, Abdumalik Namozov and Yormamat Kholiyarov

Scientists:

Farmers: Azamat Ismatov, Sayli Meyliev and Sobir Kholov

3.3.3.1. Effect of different irrigation rate on productivity of winter wheat in Kashkadarya province.

Introduction

The Kashkadarya province heavily depends on river water for mainly cotton cultivation and winter wheat the dominant crops. Water shortage is a big problem in Kashkadarya region. There are water shortages in some areas because of mismanagement in the form of excessive use of water for irrigation and leaching of salts from the soil profile. The water demand from current farming practices cannot be sustained and 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.

Study objective

To study the effect of irrigation rate on winter wheat yield in the irrigated conditions of Kashkadarya province through conservation agriculture technologies.

Methods and materials

Treatment

1. Float irrigation (1200 m^3)
2. Furrow irrigation (600 m^3)
3. Float irrigation (1500 m^3)
4. Furrow irrigation (750 m^3)
5. Float irrigation (1800 m^3)
6. Furrow irrigation (900 m^3)

Experimental design

This experiment will be conducted at the demo sites of the three project farmers. Randomized Complete Block Design will be used in the experiment. Replications – 4; plot size - 1 hectare for each treatment and number of farmers – 3. Standard agronomic practices and fertilizer doses will be applied for the crops. Analysis of variance (ANOVA) will be used to determine treatments' effect. Soil samples will be collected at 0-6 and 6-12 cm depth for moisture content, and for soil nutrient analysis at the time of sowing and harvesting.

Observations

- Germination
- Tillering
- Plant height
- Soil moisture
- Yield
- Cost benefit analysis

Time frame activities

Activities	2011									2012											2013							
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Soil moisture							x												x										
Seeding							x												x										
Irrigation							x												x										
Fertilization							x												x										
Harvesting			x												x												x		

Data collection and analyzing						x										x										
Preparation of article																									x	
Reporting																									x	x
Report Writing																									x	
First draft report																										**x**
Finalized report																										**x**

Expected outputs
The best irrigate rate and improved water management technology will be identified and will be recommended. The water management technology can be introduced to the farms of the country. A poster will be published.

3.3.4. Economic analysis

Location: Kasbi district, Kashkadarya province

Collaborating scientists: Drs. Zokhidjon Ziyadullaev and Abdumalik Namozov

Scientists:

Farmers: Azamat Ismatov, Sayli Meyliev and Sobir Kholov

3.3.4.1. A comparison study input costs under conservation agriculture and conventional technologies in South Uzbekistan

Introduction

Study objective
The specific objectives of the study are:

- To collect data on selected project sites
- To monitor growing conditions of crops on selected farms (demonstration and control plots)
- To analyze production costs of introduced CA technology

Methodology
The study area includes three integrated research sites situated in Kasbi and Karshi districts. Data will be collected from three project and three control villages representing different crop production systems. Households or farmers will be selected randomly across the villages. The selection of control area and villages would be critical to meet the precondition of selection of these at a larger distance with identical farm features of project locations. The sample will include 40 participating farmers from 3 project villages and 40 from control villages.

Time frame for activities

Activities	**2011**							**2012**										
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Informal survey				**x**															

Questionnaire designing				**x**														
Pre-testing				**x**														
Finalization of questionnaire				**x**														
Data Collection					**x**													
Data editing and entry						**x**												
Analysis						**x**												
Report Writing							**x**	**x**										
First draft report									**x**	**x**								
Finalized report												**x**						

Expected outputs
Farmers' perceptions and preference will be monitored. Economic impact of the traditional and conservation agriculture technologies will be assessed. A research paper will be prepared for submission to local journal and also a poster will be published.

4. REGIONAL ACTIVITIES

4.1.Inception workshop

A two day Inception Workshop will be organized in Tashkent, Uzbekistan. The following objectives will set: a) Discuss the detailed national and regional work plans of the project; b) Obtain valuable inputs and suggestions from the distinguished participants regarding for the conservation agriculture in the project countries; and c) Proposals and options for the none expendable equipment. In the Inception Workshop experts from FAO, ICARDA and National project coordinators and consultants from Azerbaijan, Kazakhstan and Uzbekistan will be participated and experts from international organizations will be invited for participation.

4.2.Closing workshop

Before project termination, a workshop will be organized to take stock of project achievements measured against project expected outputs and outcomes. Main stakeholders will discuss both the main benefits and the possible drawbacks of the new technologies tested at farm-level. The results and conclusions of this project analysis will provide the basis for the preparation and drafting of an outline programme (i.e. main features) of follow-up interventions to be submitted to interested donors.

5. ANNEXES

5.1. Selection of project demonstration sites for the project, Azerbaijan

	Name of villages and farmers	Area, no less than 30 ha		Knowledge of farmers about conservation agriculture,	Interest of farmers, P/N	Machinery supply, yes/no	Irrigation infrastructure status, good/fair	Reasonable proximity to Tarter town and readily accessible by road		Access to market, Yes/no	Private ownership of the land, yes/no	Structure of sown area		Positive signs	Negative signs
		Area, ha	Yes/no	Yes/no				Distance, km	Reasonable, Yes/no			Rotation	Suitable, yes/no		
	Varda														
1	Ibragimov Ahmad	35	Yes	yes	Positive	no	good	2 km	yes	yes	yes	Cereal production	yes	8	1
2	Agalarov Vidodi	15	no	yes	Negative	no	good	10 km	yes	yes	yes	Cereal production	yes	6	3
3	Aliev Suzayot	5.5	no	no	Positive	no	good	12 km	yes	yes	yes	Cereal production	yes	6	3
	Ter-ter														
1	Djumshudov Ehtibor	30	yes	yes	Positive	no	good	14 km	yes	yes	yes	Alfalfa	yes	8	1
2	Abbasov Mahammad	13	no	no	Negative	no	good	16 km	yes	no	yes	Cereal production	yes	5	4
3	Ordjov Veysal	4	no	yes	Negative	no	good	12 km	yes	no	yes	Vegetable	no	6	3
	Experimental station														
1	Babaev Mehmon	50	Yes	yes	Positive	yes	good	11 km	yes	yes	no	Cereal production	yes	8	1
2	Mamedov Mahammad	4	no	no	Negative	no	good	15 km	yes	no	yes	Cereal production	yes	4	5
3	Khasanov Rasim	2	no	yes	Positive	no	fair	12 km	yes	yes	yes	Vegetable	no	5	4
4	Khusenov Khatom	22	no	yes	Negative	no	good	18 km	yes	no	yes	Cereal production	yes	5	4
5	Bakhshaliev Mohir	3	no	yes	Negative	no	good	12 km	yes	no	yes	Cereal production	yes	5	4

5.2.Selection of project demonstration sites for the project, Kazakhstan

		Area, no less than 5 ha		Interest of farmers, P/N	Knowledge of farmers about CA, Yes/no	Structure of sown area		Machinery supply, yes/no	Typical farm	Irrigation infrastructure status, good/fair	Reasonable proximity to Chimkent city and readily accessible by road		Access to market, Yes/no	Private ownership of the land, yes/no	Positive signs	Negative signs
		Area, ha	Yes/no			Rotation	Suitable, yes/no				Distance, km	Reasonable, Yes/no				
1	Abduraimov Bahrom	2	no	yes	no	vegetable	no	no	yes	good	15	yes	yes	no	5	5
2	Babakhodjaev Avazkhan	12	yes	yes	yes	vegetable	yes	no	yes	good	15	yes	yes	yes	9	1
3	Ashurmetov Gayratjon	7	yes	yes	no	cereal	no	no	no	fair	15	yes	yes	no	5	5
4	Eraliev Atakhon	3	no	no	no	cereal	no	no	no	fair	15	yes	yes	no	2	8
5	Eshmetov Hakimshik	4	no	no	yes	cereal	no	no	no	good	15	yes	yes	yes	5	5
6	Jannatkhojaev Shodmonkho'ja	2	no	no	no	vegetable	no	no	no	good	15	yes	yes	no	3	7
7	Kholmurodov Qabuljon	1	no	yes	no	cereal	no	no	yes	fair	15	yes	yes	yes	5	5
8	Mirkhaldarov Mirkomil	2	no	no	no	cereal	no	no	yes	fair	15	yes	yes	no	3	7
9	Niyazaliev Mahammat	3	no	no	no	cereal	no	no	yes	good	15	yes	yes	no	4	6
10	Sattarkhonov Musakhon	5	yes	yes	yes	cereal	yes	no	yes	fair	15	yes	yes	yes	8	2
11	Sharakhmetov Shoabbas	2	no	yes	yes	vegetable	no	no	no	fair	15	yes	yes	no	4	6
12	Shodimetov Sultaniyoz	3	no	no	no	vegetable	no	no	no	fair	15	yes	yes	no	2	8
13	Yusufjonov Gafurjon	5	yes	yes	yes	vegetable	yes	no	yes	good	15	yes	yes	yes	9	1
14	Yusupov Ikrom	4	no	no	no	vegetable	no	no	no	good	15	yes	yes	no	2	7

5.3. Selection of project demonstration sites for the project, Uzbekistan

		Area, no less than 70 ha		Interest of farmers, P/N	Knowledge of farmers about CA, yes/no	Structure of sown area		Machinery supply, yes/no	Typical farm	Irrigation infrastructure status, good/fair	Reasonable proximity to Karshi city and readily accessible by road		Access to market, Yes/no	Private ownership of the land, yes/no	Positive signs	Negative signs
		Area, ha	Yes/no			Rotation	Suitable, yes/no				Distance, km	Reasonable, Yes/no				
1	Hamroev Buri	105	yes	yes	no	cereal and cotton	yes	mtz	no	good	25	yes	yes	yes	8	2
2	Xoliyorov To'ra	103	yes	no	no	cereal and cotton	yes	mtz and ttz	no	fair	24	yes	yes	yes	6	1
3	Bozorov Umidjon	80	yes	yes	no	cereal and cotton	no	T-28	no	fair	24	yes	yes	yes	6	4
4	Khudaynazarov Qilich	90	yes	yes	yes	cereal and cotton	no	no	no	fair	24	yes	yes	no	6	4
5	Amirqulov Bahrom	75	yes	no	no	cereal and cotton	no	TTZ-80	no	fair	23	yes	yes	yes	5	5
6	Sayviev Ulugbek	70	yes	no	no	cereal and cotton	no	Mtz	no	fair	15	yes	yes	no	4	6
7	Meyliev Sayli	107	yes	yes	yes	cereal and cotton	yes	TTZ-80	yes	fair	23	yes	yes	yes	9	1
8	Qoyliboev Abror	110	yes	no	no	cereal and cotton	no	MTZ, T-28	yes	good	25	yes	yes	no	5	5
9	Haqberdiev Nizomjon	91	yes	yes	no	cereal and cotton	no	Mtz	yes	good	15	yes	yes	no	6	4
10	Azimov Dilshod	115	yes	yes	no	cereal and cotton	no	TTZ-80, combine	yes	fair	70	no	yes	yes	5	5
11	Abdullaev Otamurod	80	yes	yes	yes	cereal and cotton	yes	Mtz-80, TTZ, combine	yes	good	10	yes	yes	no	9	1
12	Ismatova Farangiz	75	yes	yes	yes	cereal and cotton	yes	Mtz-80	yes	good	25	yes	yes	yes	10	0
13	Kholov Sobir	70	yes	yes	yes	cereal and cotton	yes	Mtz-80	yes	good	25	yes	yes	yes	10	0