



**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED, ROME**

## **REPORT**

**MISSION OF THE MINISTRY OF AGRICULTURE AND FAO PROJECT  
"SUPPORT TO STRENGTHENING NATIONAL FOOD SECURITY INFORMATION  
SYSTEM IN TAJIKISTAN GCP/TAJ/007/EC» ON CROP AND FOOD SECURITY  
ASSESSMENT IN TAJIKISTAN, CONDUCTED WITH FINANCIAL SUPPORT  
FROM EUROPEAN UNION**

**Dushanbe, 2014**

This report is the result of joint efforts of the Ministry of Agriculture of the Republic of Tajikistan and FAO project "Support to strengthening national food security information system in Tajikistan GCP/TAJ/007/EC» on crop evaluation for food security in Tajikistan, conducted with financial support from the European Union.

A total of 56 districts of three regions and DRS were covered by the study. On the basis of field observations, surveys of different types of farms, interviews with senior officials of the department of agriculture of districts' Hukumats, data obtained from the Statistical Agency under the President of the Republic of Tajikistan, the Ministry of Trade and Economic Development, the National Bank and other sources there have been made the appropriate analyzes and conclusions about food security in the country.

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**ABBREVIATIONS:**

ADB	Asian Development bank
ASMRRT	Agency for State Material Reserves of the Republic of Tajikistan
Cattle	Cattle
CFSA	Crop and food security assessment
CFSAM	Crop and Food Security Assessment Mission
CIS	Commonwealth of Independent States
CJSC	Closed Joint Stock Company
CPI	Consumer price index
DA	District administration
DF	Dehkan Farm
DM	Dry Matter
GAP	Gross agricultural products
GBAO	Gorno - Badakhshan Autonomous Oblast
GDP	Gross Domestic Product
GIEWS	Global Information Early Warning System
Ha	Hectare
HDI	Human Development Index
Hydromet	State Administration for Hydrometeorology of the Republic Tajikistan
IFI	International Financial Organization
IMF	International Monetary Fund
IO	International organization
IPC	Integrated Phase Classification
LLC	Limited Liability Company
MEDT	Ministry of Economic Development and Trade of the Republic Tajikistan
MEIRT	Ministry of Energy and Industry of the Republic Tajikistan
MoART	Ministry of Agriculture of the Republic of Tajikistan
NADF	National Association of Dehkan Farms
NB	National Bank of the Republic of Tajikistan
NGO	Non-Governmental Organization
OJSC	Open Joint Stock Company
SA	Statistical Agency under President of the Republic of Tajikistan
SAT	Seed Association of Tajikistan
SC	Small cattle
SCI	State Committee on Investments of the Republic of Tajikistan
TAAS	Tajik Academy of Agricultural Sciences
TAFF	Tajik Agricultural Finance Framework
TAU	Tajik Agrarian University named after Sh. Shotemur
UNDP	United Nations Development Program
USSR	Union of Soviet Socialist Republics
VAT	Veteran Association of Tajikistan
WB	World Bank
WFP	World Food Program
WUA	Water users associations

## Highlights

- According to the assessment, the total grain production is expected to reach a high level and will be more than 1.2 million tons. It is expected that 789,560 tones of wheat grain will be produced, i.e. 13% more than last year and 5% less than the average of the previous four years.
- In 2013/14 (from July to June) there will need to import 962,000 tons of wheat grain for a total population of 8.208 million, and this is for 13% more than in the previous year. This need will be covered on a commercial basis.
- The relatively low yield of wheat grain was due to the following factors:
  - Heavy rainfall in autumn did not allow for planting winter crops, which in most regions was postponed till spring;
  - Inappropriate implementation of agro-technical works;
  - Lack of mineral and organic fertilizers;
  - Use of low quality seeds;
  - Late supply of irrigation water;
- In 2012/2013 barley production is estimated at 132,736 tons, which is for 30% more than last year.
- Production of maize and rice is estimated respectively at 106,581 and 71,206 tons. According to the forecast, as second crops, there will be decrease of 39% in production and increase of 14% in rice production comparing with the same period of 2011/12.
- There is a significant increase in potato production, which is estimated to be 986,219 tons, which is 0.5% less than last year's production.
- Areas planned for cotton cultivation in 2013, decreased for 4% comparing to 2012 and reached the level of 191 thousand Ha, which is associated with another decline in prices for raw cotton in 2012. This fact may decrease country's export potential for cotton fiber and as a consequence reduce purchasing power and food imports.
- In the first nine months of 2013, there was 1.8% increase in food prices comparing with those in December 2012 and that cause 2.8% inflation rate in the consumer sector. Meanwhile, food prices, particularly for rice increased by 12.3%, for milk by 7%, for sugar by 2.1 %, for oil by 4.3%, and for beef by 1% comparing with the prices in December 2012. Also, there was a downward trend in prices for wheat grain and flour, which prices decreased by 10.1%. In August and September 2013, the price for wheat grain and wheat flour of the 1<sup>st</sup> grade did not change.
- The average daily calorie intake was 2198 kcal per capita in 2012 comparing to 2213 kcal per capita in 2011, thus slightly higher than the rate recommended by the World Health Organization (WHO) (2100 kcal per day). In January-June 2013, the average daily calorie intake per household member

was 2181 kcal per capita against 2164 kcal per capita in January-June 2012. In January-June 2013 the consumption of bread and bread products exceeded approved medical norm by 17.6% in all regions of Tajikistan and was on averaged 76.2 kg per household member. Bread and bread products covered 530 kcal (or ¼) of daily consumed energy.

- Most of the urban population is among those who live in conditions of food insecurity due to high food prices and worsening conditions of tariff rates and food prices.
- In general, the food security situation is stabilizing, but, unfortunately, due to high prices for food, the issues related to access to food for vulnerable populations remains unresolved.
- With record levels of remittances, the situation in rural areas could be much better. According to the International Monetary Fund, government sources, and the World Bank, remittances may reach 4.1 billion U.S. dollars.
- According to the results of analytical review of IPC, in general, the food security situation was analyzed in 13 areas for sources of income as of September - December 2012. About 870,000 people in 12 areas were classified in phase 3 - crisis. 2,381,754 people were found to be in phase - stress state of income, and 2,055,402 people were found to be in Phase 1 - the minimum income. The following areas are recommended to consider as a priority for food aid, based on a combination of calorie intake, dietary diversity, and also because of the decline in wheat production: Zone 1 (East Pamir livestock), Zone 4 (Jirgatal), Zone 6 (Southern Khatlon - cotton, vegetables and wheat grain), zone 7 (Khatlon - rainfed wheat grain and livestock), Zone 9 (Mastchohi Kuhi and Aini), Zone 12 (Asht).

## 1. OVERVIEW

During the period from June 5 to July 31, 2013 the specialists of MoA with the assistance of experts from FAO project "Support to strengthening national food security information system in Tajikistan GCP/TAJ/007/EC» funded by the European Union organized a mission on assessment of cereals production and food security in all regions and RRS. The objective was to assess the forecasting of cereals production in 2013. During the mission, interviews with key informant - representatives of district administration (DA), NGOs, farmers were conducted. Besides that, crop assessment was conducted on the selected land plots. During the mission a series of meetings were conducted with the districts' administrations and heads of departments of agriculture. During the meetings, there have been discussed issues related to harvests, pest control, supply with required resources, finance and credits, conditions of grasslands, pastures and livestock sector. Meetings provided primary information on the factors affected the volume of agricultural production since the beginning of the season, i.e. from the last autumn (September 2012).

Food security is a priority issue for Tajikistan, because the country has to import basic foodstuffs, including wheat flour and wheat grain, oil, seeds, sugar, fruits, vegetables, meat, and dairy products. In 2012 the volume of import was 757.7 thousand tons for wheat grain, 360 thousand tons for wheat flour (wheat flour yield rate from wheat grain is 71%) 66.4 thousand tons for oil, and 119.4 thousand tons for sugar. Imports of basic foodstuffs made up from 50 to 100 percent of the volume of total supply. For example, 55% of all amount of wheat grain for domestic consumption (including wheat flour), 80% of oil, and 100% of sugar are imported. Domestic production of wheat grain and its amount depends on the weather conditions in any given year.

The main export goods are cotton, fruits and vegetables (in 2012, the export amounted to \$224<sup>1</sup> and \$40<sup>2</sup> million respectively). This export earnings are barely enough to cover only 85% of the expenditures related to import of wheat grain and flour (in 2012 import of wheat grain and flour amounted to US \$312.6 million).

Despite the fact that food production share of household spending exceeded 60%, the quality of nutrition according to the recommended daily intake of micro and macro nutrients is relatively low. The main sources of calories are potato and cereals. Despite the significant positive results achieved in recent years, the poverty rate is 38.3 %.

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<sup>1</sup> MEDT

<sup>2</sup> SA/Food Security and poverty №4 – 2012

Area of Tajikistan is 142,000 sq.km. with a population of more than 8 million people and the presence of about 1 million households (Crop evaluation report, FAO, 2011). 93% of the country is mountainous area, and with regard to the country's population, agricultural area is not enough. Except areas under permanent crops, there is about 0.11 ha of arable land per capita, which is low in absolute terms and comparing to other CIS countries. Agricultural land covers 860,000 ha of arable land with average fertility, of which 100,000 ha cultivated with permanent crops, while 3.8 million hectares are pastures for unimproved grazing. As of 2012, cotton and wheat grain are grown on 58.5% of arable land (including non-irrigated). Potatoes, rice, and maize crops occupied respectively 4.9%, 1.5%, and 1.62% of all arable land.

Comparing with cropland, pasture resources are relatively more and is about 0.56 hectares per capita. 90% of pastures are in remote areas and are used for seasonal grazing. Intensive pressure on arable land leads to land degradation, erosion and salinity. Due to overgrazing, pasture lands also seriously degraded. 85 % of arable land depends on the irrigation system, however, over the past two decades, the conditions of the irrigation system has deteriorated (the depreciation of pumping and drainage system is respectively 50% and 65%), and about 45% of the land served by pumps (TAFF, 2011). However, due to favorable climatic conditions a large amount of different agricultural products are produced in the country.

In 2013, grain production exceeded that of the previous five years and significantly exceeded last year's level, which was the result of increased productivity without expanding cultivation area.

In general, heavy autumn rainfall in mountainous regions did not allow for winter sowing of cereals in large areas, so large areas of grain were sown in the spring. In the period from March to July there have been spring rains in all lowland areas. Due to unprecedented high level of precipitations, in many districts grain areas did not need irrigation.

Timely measures to control the spread of crop pests ensured pests absence and therefore this year there was no need in implementation of the pests control activities. Situation with supply of fertilizers and pesticides improved: fertilizers and pesticides have become more affordable (though their price was a bit high). Accordingly, this year use of fertilizers for grain crop improved.

The average yield of grain in the country was 28.6 centners/hectare while last year it was 25.3 centners/ha. According to our estimates, in 2013 the total cereal production in the country should reach 1,160,126 tons, which is 219 tons more than in the previous year.

Expected yields of cereals, rounded to the nearest thousand tons are as follows:

- The volume of wheat grain production was 789,560 tons, which is 2.8 percent less than the production estimates made in 2011/12
- Forecasted barley production is 132,736 tons, which is 29.7 percent more than the crop production calculated in 2011/12.
- Projected production of raw rice is 71,204 tons, from both the main and the second cropping season / crops, which is 13.6 percent less comparing with the last year's calculations.
- Projected corn production is 106,581 tons, the total harvest of the main and the second seasons, which is 39 percent less than the crop production pre-calculated in 2011-2012.
- Potato production decreased in 0.5 percent and was considered as satisfactory; this year's harvest is expected to be in the amount of 986,219 tonnes from an area of 42,043 hectares. 99 percent of potato have been produced during the main cropping season.

Although a detailed study was not included in the scope of the mission, it was estimated that the production of pulses noticeably decreased (by 38.7%) and reached 34,772 tones, including re- planting crops. According to the estimates, production of oilseeds also decreased by 21.3 percent and reached the level of 21,036 tons from the main and second cropping seasons.

It was noticed that although the cultivation area under cotton remained the same, which changes the trend towards decreasing the cultivation area for this crop taken place in 2010 and 2011, there was increase in production of raw cotton comparing to the last year, and respectively there have been produced 392,812 tons, which is about 6.0 percent less, and that will contribute to the local economy development.

Based on the assessment , it is assumed that in 2012/13 (July / June), the population will be nearly 8.06 million, and wheat consumption will be 181 kg/person/year. Based on the grain balance, CFSAM predicts wheat grain deficit in the amount of 707,000 tons, accounting for 34 percent of the national requirement . Balance of rice, as expected, is estimated to be enough for consumption of 11.3 kg of polished rice (14.6 kg row rice) per capita per year, although high quality rice can be imported as a luxury product. It is expected that the whole barley harvest will be used as animal feed.

The deficit of wheat grain will be covered by commercial import.

## **2. SOCIO-ECONOMIC CONTEXT**

### **2.1. Macroeconomic situation**

Tajikistan is a country located in Central Asia. It is characterized as landlocked, low - income, and food-deficit country. It shares borders with Uzbekistan (on the east and west), Kyrgyzstan (in the north), China (in the east), and Afghanistan (in the south). Tajikistan's has population of about 8.06 million people, there are about one million households. For the past 20 years, Tajikistan has existed as an independent republic. According to the rough estimates, about 70 percent of the population live in rural areas. Most communities are concentrated in the irrigated valleys associated with agricultural systems, which ensure the existence of the population, and the surplus are sold.

Immediately after receiving independence, the country experienced a brutal civil war (1992-1997 years ) resulted in serious damage and casualties over large areas. Peace and stability were restored in 1999. In 1991, after moving to a market economy, Tajikistan experienced high levels of migration. At the initial stage of emigration it was speeded up by war and conflicts followed independence. Recently, economic factors have become incentives for migration. Remittances by migrant workers have become one of the factors of the rapid economic growth in Tajikistan: in the period 2007-2012 the average economic growth stood at 8.2 per cent per year. According to the estimate, in 2012 the volume of remittances from migrant workers reached 2.9 billion U.S. dollars , which accounted for 45.4 percent of GDP and is expected to rise during 2013 to 47 percent of GDP. It is the largest external source for budget financing. In addition, remittances from migrant workers are an important source of household income and play a significant role in poverty reduction. Tajikistan's economy depends on exports of aluminum and cotton fiber. It is expected that the global economic crisis will slow economic growth in Tajikistan: during the period 2009-2011 it was within 2-2.5 percent. This is due, primarily, to the expected 28 percent decrease in remittances from Tajik labor migrants working in Russia, as well as the decline in exports of cotton and other commodities.

Over the last 3 years, in Tajikistan the short-term and mid-term macroeconomic prospects fluctuate and remain very unstable in the comparative GDP growth, high inflation rate, and rising insecurity (lack of) energy and water resources. Growth of GDP, which rose to 7.4% or 842.2 U.S. dollars per capita in 2012 and which is expected to continue to grow should be a turning point. Short time sequence analysis of macroeconomic indicators is presented in Table 1.

Table 1. Key Economic Indicators , 2006-2013 years , Tajikistan \*

Economic indicators	2006	2007	2008	2009	2010	2011	2012	2013 9 month
GDP per capita (US \$)	404.8	515.5	704.9	666.6	745.0	842,2	948	715,8
GDP growth (percent per year)	7,0	7,8	7,9	3,4	6,5	7,4	7,5	7,4
CPI (percent per year)	11,9	21,5	20,4	6,5	6,4	12,5	6,3	3,6

Unemployment rate (in percent)	2,3	2,6	2,7	2,7	2,2	2,5	2,6	2,5
Remittances by migrant workers (in percent of GDP)	28	30	47	32		23,5	47	
Agriculture production (in percent of GDP)	23,5	23,6	23	22			23,2	20,8
Budget deficit/surplus (in percent of GDP)	0,61	-1,2	-0,5%	-0,3	-2,3	-1,0		
Export growth (in percent per year)	54,0	4,9	-4	-28,3	18,2	5,2	8,1	-9,2
Import growth (in percent per year)	25,7	27,6	28,5	-21,5	3,4	20,7	17,8	9,1
Trade balance (in percent of GDP)	-35,1	-15,2	-9,3	-9,7	-2,01	-2,6		
Trade credit (in percent of GDP)	-2,5	-15,2	-9,3	-9,7				
External debt (in percent of GDP)	31,0	30,2	26,7	35,8	34,4	32,50		

\* The figures shown in the table are obtained from various sources, including the SA, MEDT, NB, WB, WFP, ADB, UNDP and IMF.

Fluctuations in the active balance of foreign trade are partly the reason of inland location of Tajikistan (landlocked) and transit disputes during the period from 2009 to 2013 with Uzbekistan, which compounded the impact of the global financial crisis in Tajikistan. Disputes relating to rail road services, more restricted imports than exports thereby reduced the deficit of active balance of foreign trade. It is expected that resolution of these disputes will undoubtedly lead to an increase in international trade, which necessarily increase the trade deficit, but will increase GDP in the service sector. Contribution to GDP by sector in 2012 was: in the services sector - 41.6 percent, industry - 14.4 percent, and agriculture - 23.3 percent. Electricity was exported for 21.3 million U.S. dollars and cotton for 223.9 million U.S. dollars.

## 2.2. Population and employment

According to the SA's methodological explanations and our estimates, the population of Tajikistan in 2013 will be 8.06 million, with population growth of 2.1 percent. Of these, from 2.5 to 3.2 percent of official (i.e. registered) unemployed. Unregistered unemployed, according to the data is about 60 percent of the active population, including about 33 percent of the labor force working abroad and 27 percent of working unofficially. These people make a significant contribution to household food security through: a) remittances (in 2012, above 40 % of GDP), in 2013 remittances may have been 4.19 billion U.S. dollars, and by b) working in sub-sectors of natural farming associated with adjoined plots. Such areas (household land plots and presidential land plots) are respectively possessed by about 770,000 and 375,000

families. Household land plots helped the rural population to survive in heavy early 90s, with more than 1,000 percent of hyperinflation and the following half a decade of discord. These and subsequently allocated to about 375 thousand families presidential land plots in 2005/7, also give the opportunity to establish the supply chain, based on the above-mentioned production activities.

With regard to quality of life and well-being, despite strong, positive changes in the economy until 2008, after the crisis in 2009 and the economic recovery in 2012, Tajikistan with Kyrgyzstan have been ranked 125<sup>3</sup> out of 187 countries included in the number of countries with medium human development and still stands below Turkmenistan (102) and Uzbekistan (114), but higher than Pakistan (146) and Afghanistan (175) in the list of the UN human Development Index (HDI), which shows little progress since 2000.

### **2.3. Agricultural sector**<sup>4</sup>

Agriculture is one of the largest sectors of the economy. The agricultural sector employs about 67 percent of the economically active population, its production gives 23.2 percent of GDP. In 2012, agricultural production in Tajikistan provided about 28 percent of revenue from official exports. Tajikistan is a mountainous country, and even taking into account the importance of agriculture for its economy, the share of land suitable for plowing is small, it accounts for only 7 percent of the territory. The remaining 93 percent of the territory is covered by the stretching from east to west and from north to south ridges, which form mountain ranges of the Tien Shan and Pamir. Half of the country's area is located at an altitude of over 3,000 meters. The lowest area is located at an altitude of 300 meters above sea level (Fergana Valley), the highest point in the country is Ismail Somoni Peak (7495 m), which is part of the Range of the Academy of Sciences (Pamir). Over 8,000 square kilometers of land, mostly in the Pamir, covered with huge glaciers. Glacial water feeds the many rivers flowing through the territory of Tajikistan and to the west, in Uzbekistan.

Arable agricultural lands are limited primarily to river valleys, where 68 percent of the cultivated land usually dependent on irrigation to produce appropriate harvest, with the number of irrigations from one or two to eight - ten, depending on the crop (priority is given to cotton) and the lifting efficiency of the pump - system. In the country, there are four main, well-defined system of valleys:

- Fergana Valley in the north of the country, along the Syr-Darya river in the south- western part of the valley, which extends from Uzbekistan to Tajikistan;
- Extensive lowland of Khatlon region in the south - west, stretching from Kulob in the east to the border with Uzbekistan in the west;

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<sup>3</sup> Human Development Report 2013

<sup>4</sup> The present section was developed based on the document "Investigation of the regional market of the Central Asian region" prepared by U.I.Robinson as per WFP request in June-August 2008.

- Hissar valley between Dushanbe and Tursunzoda to the north of Khatlon region;
- Narrow band of Zarafshan Valley, stretching from the east to the west between the Fergana valley and Hissar.

Agricultural significance of the three regions of the country: Sughd, Khatlon, GBAO, and RRS is proportional to the four river basins and their tributaries and watersheds in their respective regions. The main agricultural areas of Tajikistan are located in the southwest of Khatlon region, in the north of Sughd region, in Hissar and Rasht areas, in the western and southern parts of the RRS . In Table 2, there are proportions of agricultural land, cultivation area, number of livestock, average GAP in the regions.

Mountainous GBAO part is the largest according to the territory, but has the smallest population and the lowest level of agricultural activity. Khatlon region is the largest with regard to population (2.6 million) and the largest agricultural area in Tajikistan, which has up to 48.6 percent of GAP. 50 percent of the agricultural area occupied by cotton, 40 percent are cultivated with grain and 40 percent of the area is pastures for cattle. Livestock in the area make up 40 percent of the total number of cattle and small ruminants in the country (according to the Mission estimates). Significant contributions to agricultural production are made by Sughd region – 29.7 and RRS - 20.4 percent, while the contribution of GBAO is only 2.4 percent (Table 2) . In general, the area under cereals are almost equal in Sughd and RRS.

Table 2. The relative contribution of the four regions to a total agricultural production in Tajikistan.

Region	Sughd, %	Khatlon, %	RRS, %	GBAO, %	Tajikistan, %
Agriculture production	29,7	47,5	20,4	2,4	100
Agricultural lands	20,8	38,3	24,2	16,6	99,9
Cultivation area	31,1	50,1	17,3	1,4	99,9
Cattle	27,4	40,6	26,6	5,4	100
Sheep and goats	27,5	40,1	25,3	7,1	100

Source: SA/Statistical digest, Agriculture in the RT, 2013

Fruit crops, potatoes, vegetables, and melons, evenly distributed between the three main agricultural areas. Orchards and vineyards are cultivated mainly in Sughd and Khatlon regions, in Sughd region there are more than 50 percent of the gardens, and in Khatlon there are more than 50 percent of vineyards. Despite the privatization of the agricultural sector and trade liberalization, the structure of production in the agricultural sector described above still reflect the interstate dependence created during the Soviet Union. Cotton grown before under a compulsory quota, remains

the main cash crop. In 2007, quotas may have been weakened and farmers were given more flexibility. Nevertheless, the supply for cotton remains associated with the work of cotton processing factories and seemingly stands as a separate supply chain in the country. According to the official statistics, the area under cotton has been reduced from 280,000 ha to 200,000 ha. Despite the reduction in quotas, the debt, burdened with repeated loans taken in subsequent years by hopeless debtors obliged farmers to continue to cultivate large areas with cotton; cotton growing with further obtaining a loan as a part of the contract for cotton growing becomes more attractive opportunity for impoverished farmers without the means for larger expenses, without getting credits, for cultivation of the larger areas with alternative crops. So, long-term debt on cotton at the household level, not only restrict the ability to farm, but do not give farmers to seek more profitable alternative markets. In addition to direct competition for land during the spring and early summer, cotton growing prevents additional crops from growing in the middle of summer. Winter wheat growing allows the same piece of land to be cultivated with maize, potato, or a variety of other vegetable crops for consumption and sale after wheat harvesting in June, while after cotton harvesting, it is too late for the cultivation of any other crops, thus directly affecting both food security and income generated from the sale of surplus.

### **2.3.1. Farms' structure**

During privatization of the state assets after the collapse of the Soviet Union, new forms of management relating to land reform and changes in the structure of the agricultural sector developed. Agriculture structure is currently based on three categories of farms: a) Enterprises – emerged as a result of privatization of specialized state farms, b) Dehqan farms - cooperatives and private farms emerged as a result of the fact that the members of the collective farms received the right for and access to the land of collective farms as groups or on individual basis, and (c) family plots - smallholdings and Presidential lands. Enterprises are large-scale units, the former state farms, which moved to the companies during the privatization process. Private dehqan farms are divided into individual/family farms (75,988 small farms) and cooperative farms (1,169 farms), which are managed by former managers on behalf of employees with land share certificates (Table 3). They are much more privatized with the right for joint land use, which is given to the owners of private land for the period of 50 years, and which can be bought and sold. Enterprises and farms is a registered and taxes paying business. Smallholdings/kitchen-gardens are an important asset of households and may have been a source of income for most families for decades. Most families in rural areas and small towns have small plots (0.08-0.3 ha), usually adjoined to the houses. A certain part of the production from these private land plots is supplied to local markets, from which dealers involved in trade networks, supply production to cities and export to other CIS countries. According to a series of presidential decrees, starting from 1997, area for crop production in such farms has been increased by 75,000 hectares. According

to these decrees, presidential land plots were allocated, which gave access to the land for a larger number of rural population.

Table 3. Farms' structure in Tajikistan as of January 1, 2013

Farms categories	Number	Area of farmland, Ha	Average size of the farm, Ha	Area, %
Sate farms	350	604.9	1728.3	16.58
Collective farms	1169	110	94.1	3.02
Private Dehqan farms	75988	2589.4	34.1	70.99
Smallholdings/kitchengar dens	740400	268.2	0.4	7.35
Presidential land plots	375000	75	0.2	2.06
<b>Bcero</b>	<b>1192907</b>	<b>3647.5</b>	<b>X</b>	<b>100</b>

Sources: SA/Statistical digest, 2013; State Committee on Land Management and Geodesy of the Republic of Tajikistan; World Bank, 2006; WI Robinson, Mission data, 2008; Z. Lerman and D. Sedek (2009); The Economic Effects of Land Reform EC / FAO Food Security Program ( Z.Lerman and D.Sedek (2009) ); The Economic Consequences of Land Reform in Tajikistan / Food Security Program EC / FAO).

### 2.3.2. Precipitations and timelines for farm operations

The country has significant resources of surface, which are sufficient for irrigation agriculture. The main source of water for agriculture are the glaciers, but about 55% of the area where cereals are sown before winter, the harvest depends on precipitations during the season. In the best years, cultivation area for cereals and oilseeds is considerably expanded on the rainfed lands of foothills. Rains start in September and continue till May, that creates optimal conditions for the autumn and spring sowing and for plant growth during the spring months. In snowy years, snowmelt also provides a significant amount of moisture needed for plant growth on non-irrigated lands. Absence of precipitations from June to October explains the strong dependence of the spring crops of the main cropping season and cereals of the second cropping season from the artificial, at least, supplemental irrigation.

The first (main) season of agricultural works involves seeding crops in the fall (it's mainly wheat grain, barley, and pulses) and in the spring (wheat grain, barley, maize, and cotton). The second (small) season for agricultural works involves the seeding of cereals (maize, sorghum, rice), pulses (soybean, beans), as well as vegetables and potatoes after harvesting of winter and spring cereals in June-July.

Given that about two-thirds of the crop is grown on irrigated land, the water management issues become increasingly important. The current system is an

adaptation of the system existed during the Soviet Union: the primary water supply is managed by the relevant departments of the Ministry, which are responsible for supplying of water to the land that previously belonged to state and collective farms. In some areas, the responsibility for distribution of irrigation water was given to WUA, which are supported by international organizations. However, many WUAs cannot work effectively as they face opposition from the local administration.

Table 4 presents data on the size of cultivation area and volume of production of the main food crops for 2012 by date of sowing.

TABLE 4 . Size of cultivation areas (excluding land under cotton and irrigated land under fodder crops) and volume of production in 2012<sup>5</sup>

Crop	Area, Ha			Production, tons
	Winter crops	Spring crops	Total	
Wheat grain	226209	76847	303056	812588
Barley	20368	51891	72259	102359
Maize	13752	-	13752	174857
Rice (paddy)	13090	-	13090	82378
Total Cereals	246681	176085	422766	1207214
Potato	41785	-	41785	991044
Vegetables	49007	-	49007	1342358

### 2.3.3. Structure of agricultural crops

Since the Soviet Union time cotton was the main cash crop of the country as a whole and individual households. In different years cotton-fiber export cotton made up from 75 to 90% of the total agricultural exports. Cotton is grown on irrigated land and its cultivation requires a certain amount of productive resources. The centralized system for cotton-fiber purchasing is based on that each district has a mandatory quota for cotton cultivation. After 1997, state system for procurement of other crops and commodities stopped functioning, but the production of cotton-fiber remained under the state control. Under this, in 2007 a system of mandatory quotas allocated for cotton cultivation areas become less rigid and farmers became much flexible with regard to making decisions about what to cultivate on their lands. As a result, in the last two years cotton cultivation area significantly decreased. The destruction of the Soviet system led to a break state-supported supply chain, production fell by half. Persistent errors in the management of the cotton industry at all levels taken place in the post-Soviet period, led to huge debts in each link in the chain of added value, starting from farms and ginneries to the cotton-fiber wholesale organizations at the end. Despite the easing of the quota system, the continuously growing debts (defaulters annually continued receiving new loans) forced farmers to keep large

<sup>5</sup> SA/Statistical digest, Agriculture in the RT, 2013

areas under cotton. Production resources needed for cotton growing are provided under the contracts for the supply of cotton-fiber. At the same time, impoverished farmers do not have the funds to purchase the resources necessary for the cultivation of other crops.

In 2008, after a landmark court case in 2006, the process of writing off debts for cotton started. In April 2010, the IMF informed that the cancellation of long-term debt for cotton amounted to \$500 million was completed and reforms have been initiated to match prices of agricultural producers with the world prices. In anticipation of this event, before the planting season in 2009, there have been published the Resolution of the President, encouraging farmers to use low-yielding area under cotton, as well as areas with high market potential for growing and further crops diversifying, which effectively changed the settled policy to grow cotton as much as possible. In 2013, there was the downward trend in the cotton cultivation area to the level of 191,000 hectares. Theoretically, increasing the share of cotton production in combination with writing-off cotton debts opens up opportunities for the production and sales of a wider range of cash crops, as well as increased production of major crops. In practice, the implementation of these features depends on proper and timely functioning of the irrigation system; and exporting of increased number of products depends on the ability of the Tajik traders to cope with bureaucracy around goods' export.

Wheat grain is the main cereals and food crop. In the past two years, cultivation areas for wheat grain on irrigated land, previously cultivated with cotton, markedly expanded in both collective and private farms. The water is supplied to the field not more than one or two times per season. Share of land cultivated with wheat in home gardens is also increasing, and on this type of land wheat is expected to partially replace barley. Wheat production covers no more than half the country's needs in this crop. The rest part of wheat grain is imported, mainly from Kazakhstan.

Approximate breakdown of annual food crops is presented in Table 5, by the type of land on which they are grown. According to official statistics on domestic production, besides cotton, 86-94% of all field crops are grown in Dehqan farms and in smallholdings, where smallholdings supply 54-59% of potato and maize, and proportion of wheat grain produced in these two types of farms are respectively 52 and 36%. All vegetables and fruits (90-94%) like potato and maize are grown mainly in Dehqan farms and smallholdings, highlighting the high level of importance of the informal agricultural sector.

**TABLE 5 . Agricultural production by farms' categories, 2012 , Tajikistan**

Crop/Type of farms	Wheat %	Maize, %	Rice %	Potato, %	Vegetables, %	Fruits, %	Cotton, %
Smallholding	36.5	58.8	33.8	54.1	60.7	65.3	0.0

Dehqan	52.4	35.2	52.4	39.1	33.1	25.3	79.9
State	11.1	6.0	13.8	6.8	6.2	9.4	20.1
<b>Total</b>	<b>100</b>						

Source: SA/Statistical digest, Agriculture in the RT, 2013

### 2.3.4. Productive resources in agriculture

#### **Seeds**

For cultivation of most cereals the seeds received after collecting of the previous year harvest are used. Farmers produce seeds by their own or buy them in seeds farms located in the same area. In small farms seeds are rarely treated with fungicides. At the same time, considering the individual cases, the Mission noted that such treatment was a part of the pre-cultivation preparation in surveyed collective Dehqan farms and cooperatives.

According to FAO Crop and Food Security Assessment Mission in 2005, only 10% of the area under wheat were cultivated with using certified seeds. The use of low quality seeds lead to reducing genetic potential of the crop, low germination, emerging plant diseases such as covered, and increasing weeds. Seed certification is limited to about 13 percent of the annual seeds requirements (wheat only). Farmers can receive support from the government in the form of humanitarian aid through non-governmental organizations. This amount, which is at least 85,000 tons, represents only a small proportion of the country's annual need in seeds. In 2008, FAO provided 1,100 tons of improved seeds for wheat sowing on 5,500 hectares of land, which, if they had been planted in 2008/ 9 together with 1,100 tons of fertilizer, according to the scheme, would have had potential to provide improved seeds for wheat cultivation on 137,500 hectares in 2009/10, which then had to be extended to a larger number of farmers to use during the sowing campaign under observation (2010/11) and ( 2011/12) by an exchange between farmers.

#### ***Fertilizers, chemicals and machinery***

Since receiving independence, the use of productive resources in agriculture has declined sharply. Fertilizers, chemicals, machinery, and fuel are mostly imported at world prices. Fertilizers are mostly imported from Russia and Kazakhstan, which provide a large proportion of all supplies. A part of the fertilizer comes illegally from neighboring republics. Over the past decade, the use of fertilizers has increased, although it is still low, and it seemed to be one of the main factors that limited productivity. The most widely used fertilizer is ammonium nitrate, which according to the available data contains on average 34.5% of nitrogen.

Fertilizers are used mainly in the cotton fields. In addition, fertilizers are regularly applied to the wheat land. If the main phosphorus fertilization has become a rarity, and potash fertilizers are not used at all, application of nitrogen fertilizers remained a

part of the standard agricultural practices. Soil fertility in smallholdings is annually replenished by applying manure (where crop production and livestock are combined into a single system of agriculture), while large private and collective Dekhkan farms, as well as state farms do not have such an opportunity.

Due to limited access to chemicals, use of pesticides and herbicides are not widespread and because of this plants are susceptible to pests. Pesticides to combat non-migratory pests are available on the market. Such pesticides are usually used to protect cash crops, primarily cotton, and to protect orchards, vegetable, and fruit plantations. Migratory pests remain a problem for the country. Following the model established during the Soviet Union, thousands of hectares of arid steppes and semi-desert grassland in areas bordering with Afghanistan, where, according to world international recognition, some species of meadow locust, namely *Calliptamus italicus* (Italian locusts) and *Doclostaurus maroccanus* (Moroccan locust) reproduced are annually exposed to a wide range of pesticides. Such treatment aims to combat locust larvae before the insects will be able to fly and become a real threat to the plants on the neighboring arable lands.

Most of the agricultural machinery and irrigation equipment, including pumps and pipes, is in a dilapidated condition. Machinery is worn out, and its age is rarely less than 20 years. Operated tractors, mostly those inherited with the collapse of the Soviet Union. Their technical maintenance in large farms is limited to disassembling of some machines for spare parts to be used for repairing other machines. In addition, some spare parts are purchased in Russia. As a result, the available Soviet-style agricultural machines with preparation of seedbed in several passes are poorly implemented, and to compensate for the effects of the out of date agricultural methods seeding rate is increased.

### **3. CROP PRODUCTION DURING THE SEASON 2012-2013**

#### **3.1. Assessment methodology**

Methodological approach used during this year assessment is described in Appendix 2.

#### **3.2. Factors that determined the size of the cultivation areas and yield for cereals in 2013**

##### **3.2.1. Temperature and precipitation during the season 2012-2013**

Mission members collected and analyzed data on temperature and precipitation according to the State Agency for Hydrometeorology of the Republic of Tajikistan (Hydromet). In tables 6 and 7 there have been shown the data on average monthly temperature and precipitation in three districts of Sughd, DRS, GBAO, and six districts in Khatlon (three districts in Kulob zone of Khatlon and three districts in

Kurgan-Tube zone of Khatlon). This data clearly show that precipitations contribute to the growth of winter and spring crops DRS, as well as that usual absence of precipitations in all areas of the country from June to November, indicate a high level of dependency of crops sown in late spring and in the second season on supplemental irrigation and good water management. In years when it is snowing a lot, melt water also provides a significant amount of moisture that supports growth on the rain-fed lands. In general, the Republic has enough resources of surface water to support production of major crops on the area of about 700 thousand hectares, where irrigation systems are functioning, although there are problems with supplying electricity to the pumping systems.

Despite the need for improved maintenance and efficiency of using, it is assumed that in the summer the current irrigation system can support cultivation of the second crops on 100,000 hectares of land.

Observations made during CFSA mission in 2010-2013 showed that main part of this area is planted with maize (for both grain and fodder), pulses (mung bean and soybean), and rice cultivation area is increasing.

According to the results of the qualitative assessment and information provided by groups of farmers and key informants interviewed in selected areas / zones about precipitation taken place during the season 2012-2013 season, a conclusion can be made that in terms of quantity and quality precipitations can be characterized as "normal". Precipitation created conditions for expansion of cultivation area, particularly in the rain-fed lands that are irregularly used for crop cultivation, and in some regions have reduced the need for irrigation of cereals cultivated on irrigated land.

Table 6. Average monthly temperature in regions of the Republic of Tajikistan for 2012 and for 9 months of 2013.

Regions	Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Gissar	2012	0,2	-0,2	7,4	17,3	19,5	24,6	27,5	26,5	20,8	15,0	9.1	3.0
	2013	2.1	6.5	11.9	14.8	20.1	26.1	27.5	26.5	22.5	15,0	N/D	N/D
Khatlon	2012	2.8	3.9	9.8	19.8	22.1	27.3	29.1	27.8	22.2	16.9	10.7	3.9
	2013	5.1	5.3	12.5	17.5	23.5	28.9	29.4	27.8	23.9	16,8	N/D	N/D
Khujand	2012	-0.7	-4.9	6.9	19.3	23.3	27.4	28.6	28.4	22.1	14.5	6.4	-1.1
	2013	0.8	4.6	10.9	15.7	22.1	26.5	28.5	27.0	23.5	15,6	N/D	N/D
Khorog	2012	-9,1	-7,2	-0,8	12,0	14.0	18,5	22,1	22,0	18,8	10.7	4.1	-2.5
	2013	-9.2	-3.8	5.7	11.7	15.5	19.7	23.6	23.1	19.0	11,8	N/D	N/D

N/D – no data

**Table 7.** Average monthly precipitations in regions of the Republic of Tajikistan for 2012 and 2013

Regions	Years	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Gissar	2012	67,9	104,6	102,5	131,7	59,2	45,6	0,3	0	0	0	68.5	51.4
	2013	45.4	117.7	110.8	146.5	32.5	5.8	2.5	5.2	0	10,2	n/d	n/d
Khatlon	2012	46,5	27,1	78.9	42,4	56,0	13,0	0	0	0	0	36.0	41.2
	2013	23.6	87.5	41.0	42.3	4.0	0	0		0	3,6	n/d	n/d
Khudjand	2012	9,6	15,3	18,2	19,7	5.1	0	0	0	0	6.4	27.0	13
	2013	10.5	37.0	15.6	30.6	14.1	10.0	0	3.0	1.0	2,7	n/d	n/d
Khorog	2012	37,5	39,6	69,8	8,4	29,2	0,9	0,8	0,5	0	5.7	10.8	22.0
	2013	25.0	17.0	42.8	8.4	24.7	n/d	n/d	0.6	0	0	n/d	n/d

n/d—no data

From the data obtained by the Mission (table 8), spring, underground, and river water is used for irrigation of crops in Sughd region. Availability of these irrigation sources: much better from 15 to 50%, good - 20%; according to the time: available throughout a year from 15 to 20%, 20-80% in the summer, mainly pump irrigation - 65%, which is served by the state -80%. Irrigation with river water supplied by pumps prevails In Kurgan-Tube zone - 85%, which is much better available than in 2012 (50 % of respondents). In this zone, 45% of pump systems are in the private sector and only 15% are state-supervised. In Kulyab zone water collected in tanks is also used for irrigation - 20% and spring and river water is 70% more used for irrigation. About 10% of irrigation sources are in private sector. In GBAO, spring water is mainly used for irrigation, availability of which is 75% better throughout the year comparing to 2012, and 35% of water is used for free. In DRS, river and spring water is mainly used for irrigation, which is well availability in 75% and 60% respectively. Spring water is used in 50% throughout a year, 35% of irrigation is happened by using passing water, which is free in 35%. River water is used by gravity in 15%, in 25% is supplied by pumps which are reliable in 15%, and in 15% it is paid, while in 35% use of irrigation water is free of charge.

Table 8. Qualitative assessment of the use of water for irrigation during the season 2012-2013 (by regions)\* in % from the total number of farms

Source of water	Indicators	Assessment rating	Sughd	Kurgan-Tube zone	Kulyab zone	GBAO	DRS
Tank	Availability of irrigation water	Much better			20		
		Good					10
	Time of access to irrigation	Throughout a year			10		
	Belonging	Free of charge			10		
Stocks	Availability of irrigation water	Much better			15		
		Good					10
	Time of access to irrigation	Throughout a year			15		
		During winter					10
Spring	Availability of irrigation water	Much better	20		70	85	10
		Good	20		30		75
	Time of access to irrigation	Throughout a year	20		35	85	50
		During winter	15		20		
		During summer	20		30		

	Irrigation method	By hand			10	15	
		Reliable	30			30	10
		Pump	10				15
		Passing water	10			35	35
	Belonging	Private			10		
		Collective			10		
		State	20			35	
		Paid	35		10	35	
		Free of charge	10		45	15	35
Underground	Availability of irrigation water	Bad	10				
		A bit better	15	10			
		Good	20				25
	Time of access to irrigation	Throughout a year	15				15
		During winter	10				
		During summer	30				
	Irrigation method	Pump	45				15
	Belonging	Private	10				
		Collective	50				
		State	10				
Paid		15					
Free of charge		10					
River	Availability of irrigation water	Bad	20				
		A bit better	50	50	70		15
		Good	20	10	30	85	60
	Time of access to irrigation	Throughout a year	15	40	45	85	50
		During winter	10		10		
		During summer			30		10
	Irrigation method	By hand				15	
		Reliable				15	15
		Pump	65	85			25
		Passing water	30	30		35	
		Gravity water	20	80	20	15	15
	Belonging	Private		45	10		
		Collective		25	10		
		State	80	15	10	70	
		Paid		30	10	15	15
Free of charge		10		45	15	35	

\*According to the results of interviews conducted with 280 households

### 3.2.2. Seeds supply

During 2013, out 318,394 hectares of the total cultivation area for wheat grain planned by MoA, 258,628 hectares were planned for cultivation of winter wheat and 59,766 hectares for spring wheat. The volume of planned requirements in seeds was about 52 thousand tons for winter sowing and 12 thousand tons for sowing of spring wheat. In-country seeds production provided 90% of total needs in winter varieties of seeds and 95% of total needs in the seeds of spring varieties. 10% of the winter seeds and 5% of the spring seeds requirement were therefore not covered by in-country production.

Every year, the government allocate funds for direct seeds purchasing from Russia (Krasnodar region) to provide farms with high-quality seed material. Although chemical seed treatment is rarely conducted in small and medium-sized farms, having analyzed the problem, the FAO -CFSAM in 2012 noted that the seed treatment had to be a part of the pre-cultivation preparatory process in the collective Dehqan farms and selected cooperatives. Larger farms still use drills, inherited from the state farms / collective farms. Seeding rate of wheat and barley in practice largely correspond to the North Germany (Schleswig- Holstein) agronomic system: high density of winter wheat after tillering ensures availability of about 600 ears on one square meter by the time of harvesting. This year, Seeding rate in Khatlon (Kulob and Kurgan-Tube) was 220-230 kg / ha, in RRS and GBAO - 180-200kg/ga. Almost the same was the seeding rate on the plains of Sughd region, while in the mountain valleys, according to the interviewed farmers, from 250 to 300 kg of seeds have been used for a hectare. Such high seeding rate was used to compensate the damage caused by winter and drown the weeds in the spring.

Cotton sometimes was re-planted twice as heavy rains caused temporary field flooding, and heavy drops of rain having fallen created spray that covered the vulnerable seedlings with dense layer of salt mud. The rains continued, and where seeds were replanted, precipitation contributed to the growth and development of the newly germinated plants. In most areas, rains also contributed to the growth of the initially sown crops, that once again proved the unique and vital role of precipitations for crops development in the current year.

### 3.2.3. Application of fertilizers

During the season covered by this report (2012-2013) use of fertilizers decreased. Increase in prices (from 100 to 150 %) and restrictions on the export of fertilizers from neighboring states were the main reasons for this reduction. As may have been expected, in the majority of cases fertilizers were used for cotton, with modes of use of fertilizers adopted by former agricultural system of state farms / collective farms. The same application rate is supported by current enterprises and private Dehqan farms. This is mainly phosphorous and two split applications of nitrogen fertilizer,

which together account for about 600 or more kg. of fertilizers per hectare. Wheat grain, corn, and rice are other field crops, for which more than 300 kg/ha of fertilizers are regularly used. Although phosphate fertilizers are now used rarely, potassium fertilizers are not used at all, and plants are fed with nitrogen fertilizers during the period of growth and development.

It was noted that in the households smallholdings and at the level of presidential land plots a small amount of nitrogen fertilizer is used for wheat crop. However, on such land, soil fertility was maintained by using organic fertilizer (manure) for wheat, potato, and other vegetables. Farmers apply from 8 to 10 tons of organic fertilizers for potato and other vegetable crops grown on small land plots, including smallholdings and small Dehqan farms, besides that, to maintain fertility, farmers also cultivate alfalfa on their land as the main rotary crop.

It was noted that during this period the use of fertilizers was influenced by three factors: a) global rise in prices, and b) decreasing of supplies through Uzbekistan, and in the last years c) production of nitrogen fertilizers was stopped in the country due to the reason that Uzbekistan did not supply gas for the local nitrogen fertilizers plant.

In the absence of data on imports of fertilizers, information on the fertilizers application has been obtained by extrapolation of data collected by the Mission working groups during analysis of specific cases and interviews with key informants, including employees of the Procurement Department of the Ministry of Agriculture and districts departments of agriculture. It is unlikely that this year there have been applied a lot of phosphorus or potassium fertilizers, if any, applied. While phosphate fertilizers were available in the form of superphosphate, double superphosphate, and monoammonium phosphate. It is known that all districts have been provided with nitrogen fertilizers in the form of ammonium nitrate, ammonium carbonate, and ammonium sulfate, and the prices for these fertilizers were slightly higher comparing to the previous year. In the districts located closer to the border with Uzbekistan, prices for fertilizer are much lower than in the rest part of the country. The highest prices for fertilizer were reported in GBAO, and in this region the lowest level of fertilizers application were reported. In any case, it is expected that in 2013 the use of fertilizers will not exceed the level of 2012. Table 9 presents data on the prices for fertilizers and their application for wheat crop by region / zone.

Table 9. Application of fertilizers during the season 2012-2013 (according to the Mission estimates)

	Soghd			DRS			Khatlon-Kulyab			Khatlon-Kurgan-Tube			GBO		
	Application	Application rate kg/ha	Price for 50 kg (TJS)	Application	Application rate kg/ha	Price for 50 kg (TJS)	Application	Application rate kg/ha	Price for 50 kg (TJS)	Application	Application rate kg/ha	Price for 50 kg (TJS)	Application	Application rate kg/ha	Price for 50 kg (TJS)
Nitrogen	Yes	100- 210	120- 170	Yes	100- 190	160- 200	Yes	80- 217	150- 200	Yes	100- 250	140- 165	In some areas	50- 200	200- 225
Phosphate	In some areas	50- 100	70- 145	Yes	60- 150	110- 160	In some areas	50- 80	150- 165	Yes	40- 100	120- 140			
Potassium	No			No	-	-	No	-	-	No	-	-	No		
<b>Total, tons</b>	<b>73362</b>			<b>80478</b>			<b>93475</b>			<b>46874</b>			<b>680</b>		

According to the mission's estimates, in the cotton fields, there have been applied about 400 kg/ha nitrogen and 180 kg/ha of phosphate fertilizers, that, if calculate for a country as a whole amounted to 110 thousand tons of fertilizers (about 34,4 thousand tonnes of phosphates and 76,5 thousand tonnes of nitrogen). Thus, according to the Mission, for the main crops (potato, vegetables, cereals), there have been used 295 thousand tons of fertilizers. The calculation doesn't include fertilizers used for other crops (oil seeds and pulses), as well as fertilizers used for the second crops (maize and rice).

### 3.2.4. Pests and plants' diseases

Besides careful use of cotton pesticide cocktails, i.e. field use of fungicides and insecticides at the farm level, the use of pesticides are commonly limited for orchards, areas of vegetable crops in both public and private sectors.

During the mission, the following pests and diseases were most frequently mentioned by farmers: Italian (*Calliptamus italicus*) and Moroccan (*Dociostaurus maroccanus*) locusts foe all crops, yellow rust (*Puccinia striiformis* West.), and smut (*Tilletia caries* (DC.) Tul.) for wheat; corn borer (*Ostrinia nubilalis*), Colorado potato beetle (*Leptinotarsa decemlineata*), and bollworm (*Helicoverpa armigera* Hubn) for maize; onion fly (*Delia antique* Mg.), Downy (*Peronospora destructor* Casp.), and thrips (*Thrips tabaci*) for onion; powdery mildew (*Erysiphe cichoracearum* and *Sphaerotheca fuliginea*) and Downy (*Pseudoperonospora cubensis* Rostowz.) for melons; Colorado potato beetle (*Leptinotarsa decemlineata*), winter cutworm (*Agrotis* sp. *Segetum*), wireworms (*Conoderus* sp.), and blackleg (*Erwinia carotovora*) for potato; aphid (*Aphis gossypii*, *Aphis craccivora* Islands *Acyrosiphon gossypii*), spider mites (*Tetranychus turkestanii* Ug. et Nik.), gummosis (*Xanthomonas campestris* pv *malyacearum* (Sm)), cotton (*Helicoverpa armigera* and Hubn) and winter cutworm (*Agrotis segetum* X.Schiff.) for cotton; green moth aphid (*Aphis pomi* Deg.), red mite (*Metatetranychus ulmi* Koch.), codling moth (*Carpocapsa* (*Laspeyresia*) *pomonella* L.), and the apple moth (*Hyponomeuta malinella* L.) for fruit crops.

As it was mentioned I part 2.3.4, government interventions in pest control is limited to locust control activities. This year, throughout the country, except GBAO region (in which only 1,480 ha in Darvoz district have been treated) a locust breeding area of a total 105,754 hectares of pastures (Khatlon - 56355 hectares, DRS - 11,900 hectares, and Sughd – 36,019 ) was treated with pesticides. At the level of individual farms, in addition to a rigorous pesticides treatment of cotton plantations, private procurement of pesticides from commercial networks taken place this year. Pesticides were used to protect potatoes plantations from Colorado beetle, to combat winter moth, aphids, and Turkestanic Yellowtail in the gardens. Despite the fact that the season 2012-2013 had a greater amount of moisture, the cases of outbreaks of crop pests above normally expected level was not mentioned.

Weed control is carried out almost entirely by hand. Before application of fertilizers, the cotton fields are necessarily exposed to soil loosening (by hand or machine). Having studied 56 districts, the Mission noted that the weeds were completely absent in cotton fields. The situation was not so in fields where other crops were grown. Wheat and other cereals crops are usually once exposed to manual weeding during the process fertilizers application or right before the application or weeding is not conducted at all. During the Mission, the wheat plantations clogged with persistent weed-wild oats (*Avena fatua L.*) have been observed. Soil can sometimes be exposed to manual loosening. In fields where maize is grown for grain, weeding is done manually. Manual weeding is also done in potatoes and other vegetables plantations, which proves the importance of these crops for households and availability of appropriate manpower within families.

The use of pesticides was observed only in three areas of DRS, where rice is grown and where labor cost is high.

### **3.2.5. Use of agricultural machinery**

Small farms lease agricultural machinery from larger farms. It was observed that the rental price is determined by demand and varies considerably between regions and between districts within one region (see Table 10). In the places where through leasing companies and international organizations new tractors became available, their high efficiency has reduced the rental price. However, the cost of field works with using agricultural machinery is still high and in some districts more than TJS 2,000 are spent for 1 hectare, and average rental cost was higher comparing with the previous year. The cost of manual labor, especially for weeding widely varies and depends on the region, ranging from TJS 100 to 300 per day. The price for manual or combine harvesting / threshing in all areas was found to be almost the same, which was in kind, 100 kg of grain per one ton of collected or threshed crop.

Table 10. A summary table of the opinions of the key informants with regard to using agricultural machinery and live power during the season 2012-2013 (by area)\*

Region		Land preparation, type of power used			Availability, timelines			Average spending, Somoni/Ha			Remarks
Region	Total # of districts covered by the study	Tractor	Animals	Manual	Timely	Queues	With delay	Up to 1000	1000-1500	More than 1500	
Soghd	14/14	14 districts 100%	2 districts 10-15%	12 districts 85-90%	Timely	Yes	No	6 districts	6 districts	2 districts	Mainly private tractors (all the districts) and tractor lease (12 districts)
DRS	12/13	7 districts 55-60%	5 districts 40-45%	All- 100%	Timely	Yes	Yes	1 districts	7 districts	4 districts	In the spring, access was hampered by rains
Khatlon-Kulyab	11/11	8 districts 70-75%	5 districts 45-50%	9 districts 80-85%	Timely	Yes	No	8 districts	3 districts	No	Mainly private tractors (9 districts) and tractor lease (5 districts)
Khatlon-Kurgan-Tube	13/13	10 districts 75-80%	No	No data	Timely	Yes	No	1 districts	7 districts	5 districts	Tractor rent payment became chipper because of the leasing company
GBAO	6/7	3 districts 50%	3 districts 50%	3 districts 50%	Timely	Yes	No	4 districts	1 district	1 district	In 3 districts on 30% of the cultivation area, bulls are used

\*According to the results of interviews conducted with 280 households.

### 3.2.6. Lending

During interviews with farmers, including representatives of cooperatives, collective and private Dehkan farms, it was found that almost always interest rates on seasonal loans provided to farmers exceeded 20% and often 30%. An additional payment equal to 10%, taken as collateral for the loan was frequently mentioned. Small farmers generally avoid taking loans from banks, only bigger dehkan farms (who own more than 5 ha of land) take loans from the banks.

Often, these loans are not available for the farmers because of the high interest rates. Unpaid debts is an obstacle to obtaining seasonal loans. According to the respondents, corruption is widespread in credit institutions. In addition, it is necessary to take into account the risk associated with the lack of insurance coverage of borrowers costs, while lenders require significant guarantees.

During the Mission, out of 280 respondents, 30% mentioned that they had gotten loans from banks. The banks have been mentioned with following frequency: Agroinvestbank-in 26 cases, Sbergatelnii Bank-15 cases, Tadjikvneshekonombank-9 cases, Imon International-8 cases, Eskhata-5 cases, Arvand, Humo and Partners, Oriyonbank-2 cases per each bank, Finka and Sohikbank- case per each bank. Out of MFO, there have been mentioned: Micro 21-in two cases; CJSC Dehkon, LLC Firdavs –B, OJSC Pahtai Nav-in 1 case per each organization. Respondents also noted that received financial support from shareholders and used their own funds.

Among additional sources of funds, there have been mentioned in kind loans provided by investors interested in cotton growing (the similar loans may exist for wheat cultivation), and also funds brought by returning labor migrants (or remittances from migrant workers) invested in the smallholdings and small private Dehqan farms.

### **3.3. Cultivation areas for cereals during season 2012-2013**

The cultivation area for cereals has increased recently at the expenses of reducing cultivation areas for cotton and other crops.

In Table 11 the data on the area under cereals crops and cotton during the seasons 2011-2012 and 2012-2013 (by zone) is presented.

The total area planned in 2012-2013 season for cereals cultivation as a main crop decreased by 0,7% comparing with the previous season (2,839 hectares). A reduction in cultivated areas of 4.4% and 4.8% was observed in Sughd and GBAO respectively, representing 5,496 ha and 354 ha, while in Khatlon and DRS regions cultivate areas slightly increased by 0.9% and 1.3% (1,988 and 1.016 ha):

- The total cultivation area for wheat is 303,677 Ha or 2.4% less than in 2011/2012 year;
- The total cultivation area of barley is 72,855 Ha, or 2,1% more than in 2011/2012;
- Maize cultivation area was 13,914 ha in 2012/2013, increased by 8.9% than in 2011/2012;
- Rice cultivation area was 13,177 ha in 2012/2013, decreased by 0.3% than in 2011/2012;

Areas covered with other crops during the main season:

- Cultivation area for pulses decreased by 8.2%;
- Potato cultivation area increased by 13.7%, in the main season, ready for harvesting up to 41,738 Ha;
- Oilseed crops cultivation area reduced by 3.7%, ready for harvesting 23,540 Ha;
- The cotton cultivation area reduced by 4% and was 191.333 hectares.

As for the areas cultivated with rice and maize, the preliminary findings suggest that during the main crop season there will be 0.3% decrease in the cultivation area for rice and 8.9% increase in the cultivation area for maize. Both results reflect the late spring and the uncertainty with regard to regular supply of irrigation water before May 1. Data collected by the mission about the second crops, showed a significant decrease up to 68% in cultivation area for rice and up to 45% for maize, including the zone data on late sown rice and maize, as well as summer cultivation of crops after wheat harvesting. The data on rice and maize cultivation during the second season and projected contribution of these crops to domestic production is given in Section 3.5.

Table 11: Cultivated areas under agriculture crops in the RT

Crops	2012/2013 '000 ha	2011/2012 '000 ha	Average (last 5 seasons) '000 ha	% change (2013/12 compared to previous year)	% change (2013/12 compared to average)
Wheat	303.7	311.2	329.6	-2.4	-7.9
Barley	72.9	71.3	67.3	2.1	8.3
Oat	2.4	2.1	2.8	16.9	-13.0
Maize	13.9	12.8	13.6	8.9	2.1
Rice	13.2	13.2	13.2	-0.3	-0.3
Cereals, total	424.3	427.2	442.3	-0.7	-4.1
Pulses	17.8	16.4	14.9	8.2	18.9
Oilseeds	29.0	30.1	28.8	-3.7	0.8
Potato	41.7	36.7	33.7	13.7	23.7

Cotton	191.3	199.3	194.4	-4.0	-1.6
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Source: SA/Cultivation area under agricultural crops in the RT, 2013 (29 c/x)

### **3.4. Evaluation of crop production – the main season 2012/13.**

In 2013, wheat production during the main season exceeded the production of the previous five years and significantly exceeded last year's level, which was the result of increased yield for cereals crops in both, major agricultural areas of the country and in the sub- regions with a minor crop sector.

In general, a high level of the autumn's precipitations in mountain regions did not allow to timely cultivate winter cereals crops on a large areas, and therefore large areas were cultivated with cereals crops after the thaw in spring. Spring rains have taken place during the period from March to July throughout the valley. A high level of spring precipitation allowed normal growth and development of crops in all areas surveyed by the working groups. Farmers took advantage of the favorable weather conditions. Cereals were sown even in mountain area of some districts of the country, which gave a good harvest.

On the basis of yield data for the last 6 years we can find the equation of the trend (equation of linear regression) and inserting the values of  $x$  and  $y$  calculate the probable yield (t / ha) in 2013 (Table 12 and 13).

Table 12. Calculation of the probable yield of the crops in 2013.

Crop	Year							Equation of the trend
	2007	2008	2009	2010	2011	2012	2013	
Wheat	2.1	2.1	2.5	2.4	2.3	2.5	2.6	$y=0.8257x+20.16$
Barley	1.5	1.5	1.9	1.8	1.6	1.7	1.8	$y=0.4314x+15.04$
Maize	4.0	3.8	3.8	4.1	4.2	4.4	4.4	$y=0.9886x+37.073$
Oats	1.1	0.9	1.3	1.3	0.9	1.1	1.0	$y=-0.12x+11.253$
Rice	3.1	3.2	3.1	3.4	3.5	3.8	3.9	$y=1.4629x+28.413$
Pulses	1.1	1.2	1.2	1.3	1.3	1.3	1.4	$y=0.4914x+10.68$
Potato	21.8	22.7	22.3	23.0	22.8	23.3	23.5	$y=2.4229x+218.12$
Oilseed	0.9	1.0	0.7	1.0	0.8	0.9	0.8	$y=-0.1229x+9.18$
Cotton	1.7	1.6	1.8	1.9	2.1	2.1	2.3	$y=1.1429x+14.533$

Table 13: The total cultivation area and forecasted production of the crops during the main season in 2012/13

Crop	Area, Ha	Yield, t/ha	Total production, x000 m.t
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Wheat	303677	2.6	790
Barley	73742	1.8	133
Maize	13914	4.4	61.2
Oats	2475	1.0	2.5
Rice	13177	3.9	51.4
Pulses	16716	1.4	23.4
Potato	41738	23.5	981
Oilseeds	24689	0.8	20
Cotton	191333	2.3	440

### **3.5. Evaluation of crop production – the second season 2012/13.**

Cereals crops cultivated during the second cropping season were not previously included in the reports of the CFSAMs and were not reflected in SA data. This year, from the area assessed by the Mission, there will be collected harvest and made forecasts for cereals crops, pulses, oilseeds, and potato production in order to determine a baseline for future food security program. On the basis of data collected by the Mission team, the Table 14 shows the cultivation areas, yield, and gross yield forecast for the crops to be cultivated during the second cropping season.

Table 14. Cultivation area and forecast of the gross yield for the crops cultivated during the second cultivation season (2013)

<b>Crop</b>	<b>Area, Ha</b>	<b>Yield, t/ha</b>	<b>Total production, x000 m.t</b>
Maize	13745	3.3	45.4
Rice	6774	2.9	19.8
Pulses	10829	1.1	11.4
Oilseed	2142	0.6	1.3
Potato	305	17.6	5.4

\* Yield of the second crops was calculated by comparing the yields of these crops when cultivated as the main and the second crops. In 2012, the average yield of crops cultivated during the second season was 75% of the yield of the same crop cultivated in the main season. Consequently, the expected yield of the crops cultivated in the second cultivation season in 2013 was adopted at the level of 75% (based on the comparison of productivity in 2012) from the yield of crops sown in 2013.

### **3.6. Data on expected and projected yield of the main and second crops.**

Cultivation area and forecast of the gross production for crops cultivated in the main and second season are shown in Table 15. As can be seen from the table, the gross wheat production for 2013 was 789,560 tons, barley - 132,736 tons, rice – 71,204 tons, pulseses – 34,772 tons, potatoes - 986,219 tons, and oilseeds – 21,036 tons.

Table 15. Cultivation area and forecast of the gross production for crops cultivated in the main and second season in 2013.

<b>Crop</b>	<b>Area, Ha</b>	<b>Yield, t/ha</b>	<b>Total production, x000 m/t</b>
Wheat	303677	2.6	790
Barley	73742	1.8	133
Maize	27659	3.9	107
Rice	19951	3.6	71
Oats	2475	1.0	2.5
Pulses	27545	1.3	35
Oilseeds	26831	0.8	21
Potato	42043	23.5	986
Cotton	191333	2.3	440

### **3.7. Other crops**

At this moment, the Mission did not finish an assessment of productivity of other crops in the current year. According to preliminary estimates, it seems that this year the cultivation areas for potato and pulses are increased, and cultivation area for sunflowers was greatly expanded.

### **3.8. Animal husbandry**

After privatization of the collectively owned livestock, most of the livestock (88% of cattle, 76% of sheep and goats, 100% of horses) were owned by different Dehkan farms. Average number of livestock in one farm is not big and therefore the problem with livestock management is not observed. By 01.10.2013 only a small proportion of livestock was collectively owned (1.5% of cattle, 6.3% of sheep and goats) and 34.9% of poultry.

From year to year there is a tendency of reduction of the proportion of number of livestock of collective farms in total number of livestock. This year, as in previous years, the interview conducted by the Mission showed that livestock production system used for all sheep and goats, and for a large part of cattle included transhumance to intermediate and high-altitude pastures. Moving usually begins in April – May and ends in September or October. Key informants explained that for those who breed cattle for slaughter (meat) usually buy gobies born in the spring (sold from mountain pastures at a discount), which are fed with the grain left from the winter (domestic forage), or sold as fed steers. Some small farms regularly increase number of cattle to 2-3 lactating cows in order to get an extra heifers to sell them in the spring after calving as pregnant cows mated to a calf.

The breeding (multiply) of sheep and goats takes place during seasonal pasturing.:

- Lambing takes place in the spring;
- All the livestock is distilled to the mountains: herds of the households and collective farms can be distilled by family members or can be gathered to the groups and distilled by village shepherds and farm workers;
- At the end of summer or in the autumn, lambs are weaned from ewes and sold for slaughtering or for fattening;
- About 50% bright are left to replenish sheep herds and to replace sheep with dental defects (age 4-5 years), these bright replenish breeding stock ;
- Extra bright are sold for slaughtering, fattening or as breeding stock;
- Sheep with dental defects and other culled livestock are fattened for sale or for own consumption.

The size of breeding herd is determined by capabilities of the farms during the winter. Fodder prepared by the farms is used during the winter, including low-quality wheat, corn, and barley grains, by-products, namely straw, roughage, bran. Basis of the diet of animals is rough herbage of lowland pastures and meadow hay and alfalfa prepared by farms.

Table 16 presents data on livestock population by regions and by years. Mission collected full data for DRS, Sughd, Khatlon, and GBAO that allowed comparing the number of cattle, sheep, and goats from 2006 to 2013. The table shows that from 2007 the number of cattle, sheep, and goats were slightly but steadily increasing. In the country, as a whole, comparing to 2012, as of 01/10/2013 the number of cattle increased by 13,109 units, cows by 21,359, sheep and goats by 182,583, and poultry by 247,593 units. It should be noted that in 2013 the area of forage crops decreased by 3.6 % comparing with 2013.

Table 16. Number of livestock (cattle, cows, sheep and goats, horses) and poultry in Tajikistan

	2006	2007	2008	2009	2010	2011	2012	2013 (01/10)	Difference, 2013-2012
<b>Cattle (thousand pcs)</b>									
Tajikistan	1422.6	1702.5	1799.5	1830.0	1896.9	2010.8	2043.7	2056.8	13.1
DRS	367.0	412.1	450.6	466.6	487.7	507.2	523.3	546.9	23.6
Soghd	388.5	498.3	503.7	505.4	510.7	555.9	560.9	564.3	3.4
Khatlon	573.5	695.6	743.7	756.4	794.9	842.8	853.3	835.4	-17.9
GBAO	93.6	96.5	101.6	101.6	103.6	105.0	106.3	110.3	4.0
<b>Cows (thousand pcs)</b>									
Tajikistan	756.6	864.3	932.9	951.5	984.9	1033.2	1049.2	1070.5	21.4
DRS	198.0	219.0	241.3	251.1	262.2	271.2	276.9	291.3	14.4
Soghd	211.0	259.5	268.2	268.1	275.4	298.4	301.9	307.0	5.1
Khatlon	314.6	350.5	386.3	394.7	409.1	424.9	431.0	432.9	1.9
GBAO	33.1	35.3	37.1	37.6	38.2	38.7	39.251	39.235	-0.016

<b>Sheep and goats (thousand pcs)</b>									
Tajikistan	3165.1	3798.4	4146.8	4200.2	4394.2	4602.8	4732.5	4915.1	182.6
DRS	669.7	839.6	971.9	992.6	1061.6	1112.4	1165.3	1244.6	79.2
Soghd	980.9	1181.5	1193.4	1181.8	1192.0	1265.6	1304.6	1351.4	46.8
Khatlon	1247.5	1498.6	1676.3	1720.6	1827.4	1905.9	1943.2	1969.3	26.1
GBAO	267.1	278.6	305.1	305.1	313.1	318.9	319.4	349.8	30.5
<b>Horses (thousand pcs)</b>									
Tajikistan	76.1	78.5	77.1	75.8	76.4	76.5	76.7	78.4	1.7
DRS	17.1	16.4	14.6	12.7	12.6	12.8	12.5	12.7	0.2
Soghd	8.0	8.0	8.0	8.0	7.8	7.7	7.8	8.2	0.4
Khatlon	50.3	53.5	53.9	54.8	55.7	55.7	56.1	57.1	1.0
GBAO	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.0
<b>Poultry (thousand pcs)</b>									
Tajikistan	2579.8	3280.4	3682.9	3938.5	4402.7	4655.9	4851.1	5098.7	247.6
DRS	797.6	1098.8	1276.5	1424.8	1755.7	1843.5	1832.0	1935.4	103.4
Soghd	688.7	812.6	953.5	1008.2	1079.7	1176.5	1336.0	1414.8	78.7
Khatlon	989.7	1262.9	1334.7	1387.3	1445.0	1510.0	1556.8	1601.6	44.9
GBAO	103.9	106.1	118.2	118.2	122.3	125.9	126.3	146.9	20.6
<b>Fodder crops (excluding pastures with rough herbage/ thousand Ha)</b>									
Tajikistan	131.4	130.3	108.2	122.6	87.7	86.0	94.1	90.6	-3.4
DRS	28.7	27.9	23.5	23.6	18.5	17.9	20.7	19.7	-1.0
Soghd	56.2	56.9	46.7	55.1	36.7	37.9	42.8	43.1	0.3
Khatlon	43.8	42.7	35.6	41.5	30.5	28.0	29.1	25.8	-3.3
GBAO	2.6	2.9	2.4	2.4	2.1	2.3	2.1	2.0	-0.2

Source: SA/Statistical digest, Agriculture in the RT, 2013

Information collected by this year Mission in 56 districts where Mission's teams asked questions related to livestock, suggest the following:

- Harsh winter and critical situation with the stock of fodder in the late spring, were factors which gave impetus to the early transhumance of livestock to nearby pastures located around villages in March in Sughd, Khatlon, and GBAO regions.
- Due to early winter, mountain pastures remained under snow, and this fact did not allow animals to stay longer and therefore winter fodder stock was spent earlier.
- Due to widespread use of vaccines, no outbreak of infectious disease was observed.
- It is noted that the productivity of livestock during the year varies widely within regions and between regions, as it was expected because of the hundreds of different management regimes.
- Situation Analysis of offspring calves per 100 cows in 2012 in agricultural enterprises and Dehqan farms showed range within 67 heads in GBAO; 66 heads in DRS; 62 heads in Khatlon, and 54 heads in Sughd.

- Sheep and goat offspring for 100 heads in agricultural enterprises and Dehqan farms in 2012 was respectively 97 heads in Khatlon, 86 in Sughd, 82 in DRS, and 80 in GBAO.

Based on the condition of pastures and more than enough hay harvested in 2013, there should be enough fodder for the winter period. This conclusion was made based on the results of the approximate estimation made using the following criteria:

- In order to feed 2.97 millions of livestock over the period of 100 winter days (three months), it is required 2.12 million tons of fodder if calculated as dry matter (DM);
- More than 108 thousand hectares of irrigated land cultivated with alfalfa, smallholdings and pastures will allow to produce at least 340 thousand tons of fodder if calculated as dry matter (DM);
- Stubble and straw from more than 427 thousand hectares cultivated with cereals will add to the above mentioned amount not less than 790 thousand tons of fodder if calculated as dry matter (DM);
- In addition, concentrated fodder needed to improve the diet of animals kept for fattening, brooding animals, dairy herds, are about 760 thousand tons, including 156 thousand tons of low-quality wheat, 133 thousand tons of barley, bran, and cotton cake;
- Grazing of animals on lowland pastures with rough herbage will also provide a certain amount of fodder; this amount should be calculated;
- In addition, the local breeds, as any cattle bred in the mountains, have the ability to quickly gain condition in the summer to live on their own stocks in the winter.

The estimated probably available additional winter fodder (dry weight) is about 1.42 million tons of dry weight, plus an unknown amount of fodder products received from cotton seeds processing. Roughage from the nearby pastures will provide presently unknown amount of fodder by the spring. However, it seems that a) maize, or equivalent to it high-quality fodder will have to be imported for poultry and exotic dairy breeds, and b) the breeding stock will have to be vaccinated before sending to the pastures. In order to satisfy the fodder productivity, it is necessary to change the trend of each year increasing the number of livestock (which may become possible because of receiving remittances) at the household level.

Prices are stable or increasing, and traders expect the prices to remain stable until September, when the regular annual sales will start, and when livestock return from the summer pastures and prices for livestock usually fell, although it does not affect the retail price for meat. The price per bale of hay press was 6-12 TJS and that can foster a further increase in September / October in the breeding of cattle and small cattle kept for fattening, slaughtering, or further sales.

## 4. CEREALS AVAILABILITY

### 4.1. Cereals balance 2013/14 (July - June)

National Cereal Balance, included in Table 17, was prepared based on the data from the 2013 joint FAO/MOA Crop Evaluation Assessment, official data from the Statistical Agency, data from FAO- GIEWS on the national cereals balance of the country and information from the Ministry of Agriculture. The used parameters are listed below:

- The population of Tajikistan in 2013 was estimated to be nearly 8.208 million people by SA (“TAJSTAT: Food Security and Poverty No 3 – 2013”) with annual increase rate of 1.025 percent.
- **Stocks:** A draw-down in stocks of 115 000 tonnes of wheat is assumed in the balance following two consecutive years of high levels of imports, coupled with relatively good harvests.
- **Domestic production** includes the Mission’s estimate of cereal production during the 2013 main cropping season plus the Mission’s forecast of the cereal production in the second season.
- **Human consumption:** wheat is the main cereal consumed as food in the country. Available official information on the production and import of wheat grain and wheat flour in recent years suggests that wheat consumption has increased. Based on the cereals balances by FAO – CFSAM in Tajikistan, annual wheat consumption per capita (all wheat products) is estimated to be 181 kg / person / year (10.73 kg for 1 pers / Month X 12 months / or 0.71 kg in flour terms ). Rice consumption was also adjusted according to the consumer basket and increasing domestic rice production to 8.5 kg / person per year of milled rice. Given the low amount of maize and barley, the total apparent consumption of cereals is estimated to be 192kg / person per year (including rice in milled terms).
- **The use of fodder** (animals and poultry): it is expected that 25% of wheat, plus most of the barley and maize will be used as fodder for livestock.
- The need for **seed material** was calculated taking into account the following seeding rates: wheat 200-220 kg/ha, barley - 150-180 kg/ha, rice - 180-200 kg/ha, maize - 25-30 kg/ha. The average cultivation areas for the last five years have been taken to make calculations.
- The following **losses rate** during harvesting, transportation, and storage of grain were used; wheat at 15 percent; barley at 6 percent; maize at 9 percent and rice at 4 percent. To identify the real losses rate under various conditions it is necessary to conduct the appropriate technical study.

Table 17. Tajikistan –Cereal balance in 2013-2014 marketing year (July/June), in thousand tons.

	Wheat grain	Rice (milled)	Maize	Barley	Total
<b>Availability in country</b>	<b>905</b>	<b>47</b>	<b>107</b>	<b>1133</b>	<b>1192</b>
Drawn-down stock	115	0	0	0	115
Domestic production**	790	47	107	133	1077
<b>Domestic Utilization</b>	<b>1867</b>	<b>74</b>	<b>107</b>	<b>138</b>	<b>2186</b>
Food use**	1486	70	10	10	1576
Feed use**	198	-	84	107	389
Other uses**	183		13	21	221
<b>Imports**</b>	<b>962</b>	<b>27</b>	<b>0</b>	<b>5</b>	<b>994</b>

\*\*CFSAM estimates

Balance sheet shows that the total cereal deficit is close to 1 million tons, out of which 962 thousand tons are wheat grain or wheat make products.

Import requirements for wheat grain for 2013/14 marketing year are approximately 13% lower than the actual wheat imports in the previous year. It is expected that food aid will be approximately 15 thousand tons under the ongoing / proposed programs of the World Food Program, and thus commercial import of wheat required for the balance will be 947 thousand tons.

Taking into account the harvest from the second season, the potato harvest is estimated to be 986,219 tons, while the production of pulses, according to the assessment, taking into account harvest from the second season will reach up to 34,772 tons. It is unlikely that any additional compensating imports of cereals will be needed.

#### **4.2. Cereals marketing**

Tajikistan agriculture alone can supply the population with potato production, the most part of the required amount of fruits and vegetables, but not more than 25 percent of the wheat products. Further, 75-80 percent of dairy products, meat, eggs , vegetable oil and 100 percent of sugar needed imported each year.

Access to international markets is limited due to the country being landlocked. All goods imported from Russia (sugar, wheat products) and from the west (frozen meat, dairy products) whether they are shipped by road or by rail, must come to the country through Uzbekistan. Wheat and wheat products from Kazakhstan can only

be shipped by railway, and thus must also come through Uzbekistan. Alternative road route from Kyrgyzstan can be used for the transportation of goods from China and this trade has increased. Goods from Iran (vegetable oil ) can now be shipped through the newly built road bridge from Afghanistan or through the traditional route Turkmenistan - Uzbekistan. Limited access to other countries makes the country highly dependent on Uzbekistan with regard to import, and Uzbek taxes on imports and exports, and accordingly shipment terms changes in the interest of Uzbek market and consumers. Besides that, Uzbek policy on transit of goods continuously changing. In order to improve the situation, in late August - early September 2011, the Government of Tajikistan has begun to use the first railway direct line from Khujand to Russia.

The structure of agriculture which consist of associations of small production enterprises, the lack of processing factories, bad road conditions with the road routes going through mountains and impassable for many months of the year, and the railway that runs only through Uzbekistan means that production of the local processing enterprises have a tendency to be used only within the country; the exports level is low; and the surplus of fruit and vegetables are often wasted. However, seasonal local markets are reached with the products, including maize, vegetables and fruits from smallholdings and small Dehqan farms. During the season, fruits and vegetables are sold directly by small producers in quantities ranging from hundred grams to the volumes required for loading car trunk / pickup truck at about 700 kg. Traders of the second stage sell large amounts of the production in the smaller markets within the cities (shops on the corner of streets) and in remote villages, depending on the location of the main market.

Supply of the locally produced wheat grain and flour corresponds to the above described model. Wheat grain from families smallholdings is consumed locally as flour after milling in locally available facilities. Such facilities are small "Chines" and stone electricity operating mills which milling capacity is not more than 2-3 tons per day. Most of the wheat from the 76,000 small farmers, that make up 52 percent of domestic wheat production in 2012, will likely be divided among the members and workers of the farms or will be used as in kind payment or as a share of the production, as well as will grinded at the village level with the balance to be sold in local market. Mission suggests that, although the local wheat is not purchased by large mills, but most of the medium and small size milling plants to produce wheat flour can mix some locally produced wheat purchased in local markets from workers who convert in cash their in kind payment, or from farmers who sell surplus of the higher quality produced wheat with imported wheat. Such patterns of distribution and use can be expected from the state farms which production makes up 13 percent of the total wheat production. Mission estimates suggest that after subtracting 200,000 tons (25 percent) to be used as fodder for animal and 67 000 tons to be used as seed and using the same calculation of wheat consumption (181kg/person/year) it is likely that this year only 25 percent of the total population will be supplied with wheat

flour through such local deals. This means that the remaining 75 percent of the population buy bread or wheat flour in provincial towns and cities from bakers, in shops and markets which are supplied with wheat flour by seven large and ten medium-size plants which produce wheat flour from imported wheat or supplied with wheat flour distributed by larger wholesalers.

### **4.3. Prices, variability, and terms of trade**

The nature of the geographical location of Tajikistan increase population vulnerability to the global price increase on all important food staff that need to be imported. Moreover, the country depends on import as nearly 50 percent of the main product (wheat / wheat flour), most part of vegetable oil and 100 percent of fuel should be imported and therefore increasing prices for these products are constantly recorded since 2002. The assessment results show that the households economy are under the same pressure as it was observed during the crisis in 2008, due to:

- a. Increased prices that reflect global prices increase;
- b. Increased export tariffs;
- c. Increased transit tariffs through Uzbekistan;
- d. Increased tariff on imported fuel;
- e. Increased cost of international transportations, and
- f. Increased cost of in-country transportations.

At the same time, the urban population in particular suffers from increased prices for the locally produced food stuff such as meat (lamb and beef, the prices of which increased almost 2.5 times from March 2007 to August 2012), fruits, vegetables and milk.

Previous studies have shown that the imported goods are purchased by retailers mainly in Dushanbe. Thus, to date the market prices throughout the country were quite conventional. Increase in prices in the remote places are usually associated with the transportation cost. In this regard, the price increase for key food stuff in Dushanbe may reflect changes at the national level.

### **Food prices**

Tajikistan is a country dependent on import and global price increase for wheat put in a difficult situation the majority of the population which already spend the main part of their income on food.

In the markets of Tajikistan, in the beginning of September, the real price for wheat flour remained the same as it had been in August, but in comparison with the beginning of the year the price decreased by 11%.

According to the seasonal factor, prices for some food stuff reduce in October and November, however the retail prices for wheat flour in October and November remained at an extremely high level.

The high prices for wheat flour will have impact on the household purchasing power and food security in the country, especially at the level of the most vulnerable households.

In order to ensure food security, in such cases, everything should be done to avoid short-term increase in prices resulting in negative long-term consequences for vulnerable populations.

Sharp fluctuations in food prices lead to unpredictability in the market and food security related serious risks. Besides that, price fluctuations constrain investment required for the development of agriculture, which is in sharp need for government support, but a timely entry into WTO with present state of agriculture and the economy, as a whole, may lead to improvement of the situation and first of all to supporting and development of agricultural. According to WTO rules, Tajikistan, as a developing country, can expect state support to agriculture in the amount not more than 10% of this industry production. Consequently, WTO rules will influence the state policy on the development of agriculture. These are production and processing of fruits, primarily apricots and grape. It is for this position, Tajikistan membership in WTO is particularly attractive.

Over the last months we have observed a decline in prices for potato that is explained by increase in gross yield of potatoes in all categories of farms and which reached 757.7 thousand tons (by September 2013), which is 13.5 % more than in previous year. At the same time, the yield of vegetables was 1027.9 thousand tons, which is 8% less than in 2012.

Throughout the country, for the mentioned period, all the categories of farms produced production for more than 11,256.9 million Somoni (by October 2013). According to SA data, during this period, this indicator increased by 9.3 % comparing with the same period in 2012.

In some districts, including Mastchoi Kuhi, the potato yield per hectare was on averaged more than 200 centners. In all categories of farms, potato was cultivated on the area of 44.3 thousand hectares, and population share makes up about 50% of all the area cultivated with potato.

In the country, in 2013, comparing with 2012, the potato cultivation area increased by about 2.5 thousand hectares. Such varieties of potatoes as "Picasso", "Cardinal" and "Santa" are mainly produced in the country.

According to the current estimates, in all categories of farms taking into account the population, there will be produced more than 980 thousand tons of potato. Potato production increasing will noticeably reduce imports of this product from other countries, particularly from Pakistan.

## **Recommendations for discussion:**

### **1. Increase production of cereals and pulses:**

- a) Intensive use of cultivation areas of cereals and leguminous crops by introducing new technologies, using appropriate application rate for organic-mineral fertilizers, integrated crop protection measures;
- b) Widespread implementation of the practice of planting second crops in the system of year-round using of irrigated land;
- c) Increase yields by planting high quality seeds of the 1st-2nd reproductions, cleaned from weeds with mandatory treatment before sowing;
- d) Diversification of agriculture (selection of high- profitable, priority crop varieties and livestock breeds for growing in a particular region);
- e) Use of energy and water saving technologies.

### **2. Increase production of animal husbandry:**

- a) Selection of priority for growing in a particular region highly productive breeds of livestock and poultry, strengthening veterinary services, diseases control and prevention, advanced animal fattening technologies, development of science based diets for animals, etc;
- b) Increasing production of fodder crops to meet the needs of farm animals in forage, creating an adequate supply of forage;
- c) Improving pasture conditions (access, restoration, watering, pasture rotation and regulation of load on pasture).

### **3. Monitoring and evaluation of the situation:**

- a) Availability, food stocks and their accessibility (physical and financial) on the spot, especially in remote mountainous areas (stability of reserves);
- b) Conduct regular researches on food security of the population. This will allow to trace the dynamics of the level of food security in the areas.

## Appendix 1. Cereals production in season 2012-2013 by regions/zones

### Sughd

Sughd region occupies the northern part of the country. Its territory includes:

- a. Northern Tajikistan, covering the south-western part of the Fergana Valley of Syrdarya river. The eastern part of the valley is on the territory of Uzbekistan. The Valley is bordered by two stretching from east to west mountain ranges – Kuramin in the north and Turkestan in the south. Rich soil and natural conditions of the valley are highly suitable for growing cotton and Mediterranean crops - grapes, apricots, peaches.
- b. Zeravshan valley, crossing the southern part of Sughd region from east to west along the river Zarafshan. In the north, the Valley is bordered by Turkestan Range, in the south by Zeravshan. Sughd region occupies a leading position in the production of rice, tobacco, and fruits. All Tajikistan's tobacco is grown in Zarafshan Valley. Main sectors of agricultural production in order of importance are: in the north of the region – cotton, cereals growing, animal husbandry, horticulture; Zeravshan Valley - tobacco farming, cereals growing, animal husbandry, horticulture.

Agriculture is one of the largest industries of Sughd region. The agricultural sector employs about 70 percent of the economically active population.

Arable farming is mainly concentrated in the river valleys, where about 50 percent of land usually require irrigation.

Households in Sughd region mainly grow vegetables including tomato, cucumber, eggplant, and potato for their own consumption and for sale. In 2013, over 40% of land was cultivated with wheat and barley as fodder crop occupied 35% of the total area cultivated with cereals and pulses.

This year, the main cropping season started with timely and large amount of autumn precipitations. Rains continued until June and July, and did not have any negative consequences.

Data on cereals and pulses production are shown in Table 18.

**Table 18. Cereal production in the Sughd region for the period 2013**

	Total cereals			Out of them wheat		
	Cultivation raea, Ha	Yield, t/ha	Gross yield, tons	Cultivation raea, Ha	Yield, t/ha	Gross yield, tons
<b>Sughd</b>	<b>106182</b>	<b>1.91</b>	<b>202731</b>	<b>50095</b>	<b>2.19</b>	<b>109642</b>
Aini	2725	2.58	7029	853	2.69	2295
Asht	1130	3.66	4132	1130	3.79	4289
B. Gafurov	4535	2.06	9336	3599	1.97	7100
Ghonchi	30347	1.01	30595	9799	0.98	9629
J. Rasulov	5345	2.33	12441	2955	2.62	7737
Zafarobod	4230	2.25	9513	3131	2.58	8064
Istaravshan	21892	1.51	32989	8101	1.39	11237
Isfara	2115	4.26	9009	1450	4.43	6426
Mastchoi Kuhi	426	4.1	1747	269	5.03	1352
Konibodom	1857	3.09	5743	886	3.44	3052
Mastchoh	1795	1.77	3185	1111	1.72	1911
Panjakent	12938	2.52	32593	5569	3.01	16740
Spitamen	3151	2.84	8933	1803	3.06	5518
Sahrison	13696	2.59	35488	9438	2.57	24292

Source: Mission data

**DRS**

DRS (Districts of Republican Subordination), these are 13 districts, some of which used to be a part of the Karategin area. These districts stretch as long strip from east to west between Hissar and Zaravshan ranges in the north, Vakhsh and Darvoz ranges in the south and western branches of Pamir (Academy of Sciences range) in the east. Mountain ranges form a natural barrier between the baser Khatlon in the south and Zarafshan and Ferghana Valleys in the north, in Sughd region. The natural landscape of Central Tajikistan is diverse - from semi-desert with appropriate vegetation to alpine meadows and mountain pastures. From the west (Hissar) to the east (Hissar- Alay Range in the eastern Rasht) altitude increases rapidly. Crops are grown mainly in Hissar valley stretching from Dushanbe to the the border with Uzbekistan (Tursunzode). Most DRS's agricultural production including crops and livestock, is produced in the east of Hissar valley in the places surrounding Dushanbe. Flax, grape, and vegetables are mainly grown in Hissar. Rice and cotton are also produced, although in much smaller amounts than in Khatlon and Sughd. In Rasht agriculture is limited to the long narrow valley of Surkhob river flowing from the

east to the west. In the southwest, already in the Khatlon region, Surkhob flows into the Vakhsh river. Potato is the only crop grown by households in significant amounts in Rasht for both, own consumption and for sale. The main agricultural sectors in Gissar valley are cotton growing, animal husbandry, and horticulture; while they are animal husbandry, cereals and potato production, and horticulture in the Rasht zone. In 2013, wheat occupied 83% of the total area cultivated with cereals and pulses (Table 119).

Table 19. Cereals production in DRS during the period 2013

	Total cereals			Out of them wheat		
	Cultivation area, Ha	Yield, t/ha	Gross yield, tons	Cultivation area, Ha	Yield, t/ha	Gross yield, tons
<b>DRS</b>	<b>82215</b>	<b>3.04</b>	<b>249941</b>	<b>70484</b>	<b>3.22</b>	<b>223157</b>
Tursunzoda	14794	3.75	55499	12939	3.69	47807
Shahrinav	7756	3.00	23245	6450	3.22	20785
Hissor	11129	3.25	36140	9467	3.43	32444
Rudaki	19121	3.22	61662	16218	3.55	57506
Vahdat	9344	3.19	29797	8386	3.33	27900
Varzob	2922	1.14	3343	2471	1.17	2896
Faizobod	4218	2.23	9392	3641	2.16	7860
Rogun	1821	1.97	3586	1976	2.28	4505
Nurobod	2165	2.23	4819	1145	2.21	2531
Rasht	2472	2.18	5385	1661	3.03	5028
Tojikobod	2390	2.41	5749	2224	2.20	4882
Jirgatol	2286	2.73	6246	2286	2.53	5776
Tavildara	1797	2.83	5078	1620	2.00	3238

Source: Mission data

## Khatlon

Khatlon region occupies the south -western part of Tajikistan, from Hissar ridge in the south to Pamir in the west. Broad river valleys of the region (rivers Nizhnii Kofarnihon, Vakhsh, Kyzylsu) are divided by ridges radiating in southwest direction from the mountain range located in the north. Cotton, grapes, and flax are mainly grown in Khatlon. This region is leading with regard to livestock production (milk and meat). The western part of Khatlon - Qurghonteppa has the warmest climate in the country. Cotton and other subtropical crops are cultivated on large irrigated areas in the valleys of Nizhnii Kofarnihon and Vakhsh rivers in the western Khatlon. East part

of the region (Kulob) is mostly mountainous terrain. Relatively small area of the valleys are located along Yakhsu and Kyzylsu rivers near the city of Kulob. Here, the main direction of farming is cotton growing. Main sectors of agricultural production, in order of their importance, are: cotton, cereals growing, animal husbandry, and horticulture. This structure is typical of both Kurgan-Tube and Kulyab zones of Khatlon region.

The main cereal and food crop is wheat. In the past two years, wheat cultivation area on irrigated land previously cultivated with cotton noticeably increased in both collective and private Dehqan farms. The water is supplied to the field not more than once or twice per season. Wheat cultivation increases in families smallholdings, in which, this crop is expected to partially replace barley. Wheat production covers not more than half of the country's needs in this product. The gap is covered by importing wheat grain mainly from Kazakhstan. In 2013, wheat occupied 88%, pulses 3%, and barley 1.4% of the total area cultivated with cereals and pulses (Table 20).

Table 20. Cereal production in Khatlon region for the period 2013

	Total cereals			Out of them wheat		
	Cultivation area, Ha	Yield, t/ha	Gross yield, tons	Cultivation area, Ha	Yield, t/ha	Gross yield, tons
<b>Khatlon</b>	<b>209592</b>	<b>3.30</b>	<b>691148</b>	<b>192255</b>	<b>3.32</b>	<b>638970</b>
Bokhtar	3117	5.09	15874	3022	5.11	15433
Khuroson	9281	3.23	29963	7884	3.05	24047
Vahsh	7291	4.55	33176	6738	4.50	30338
Jilikul	4812	3.17	15249	3896	4.13	16095
Kubodiyon	4475	4.37	19567	4063	4.58	18621
J. Rumi	6034	3.50	21102	5753	3.69	21236
A. Jomi	5831	3.95	23035	4973	3.79	18845
Kumsangir	4224	4.74	20034	4181	4.78	19975
Panj	8739	3.95	34491	7768	3.76	29193
Shahrituz	4734	5.07	24021	4664	5.09	23755
Yovn	11221	3.65	40919	10677	2.96	31573
N. Khusrav	2964	4.72	13994	2607	4.90	12785
Sarband	641	4.73	3034	622	4.71	2930
Kulob	4490	3.63	16291	4417	3.63	16022
Muminobod	11078	2.34	25913	10293	2.34	24099
Vose	19933	3.26	64904	18646	3.25	60523

Hamadoni	7743	4.47	34626	7271	4.67	33941
Farkhor	13532	3.48	47101	12618	3.63	45827
Temurmalik	15960	2.24	35749	13494	2.19	29567
Dangara	34781	3.17	110216	31915	3.21	102536
Khovaling	6776	2.17	14695	6193	2.28	14143
Shurobod	16068	2.15	34626	15121	2.36	35613
Baljuvon	5031	2.11	10624	4645	2.15	10005
Norak	836	2.33	1944	795	2.35	1870

Source: Mission data

### **Gornii-Badakhshan (GBAO)**

GBAO is located in the Pamir Mountains, occupying half of the country territory on the east. The main factors limiting the development of agriculture in the region are the lack of suitable land and high altitudes. If in Western Pamir there are narrow river valleys allowing to engage in farming at altitudes of 3700-4200 meters, the climate of the Eastern Pamir is much drier and colder throughout Tajikistan. This high-altitude cold desert, without a single tree and any vegetation. During the short summer season it is suitable only for animals grazing on the pastures with rough herbage.

In 1997, after conducting land reform, in the structure of agricultural production in the country, the following farms' categories were available in GBAO: collective farms, collective and private Dehqan farms emerged because of land reform. In districts, collective Dehqan farms is divided among land shareholders.

In the districts, most of the households gained access to small plots of land (0.05 ha), usually right next to the house. Homestead land, orchards, and kitchen gardens are households' "fixed assets" and they play an important role in ensuring food security, serve as a source of income and food: a part of the production grown on the homestead land is sold at local markets.

Wheat is the main cereal and food crop. Wheat occupies 66%, pulses 21%, and barley 13% of the total area cultivated with cereals and pulses. This year, in the region, potato other vegetable crops cultivation area increased at expenses of decreasing cultivation area for cereals (Table 21).

Population grow cereals mainly on presidential land plots, and potato, vegetables, and legumes are cultivated on the homestead land plots. Wheat production covers not more than a half of the needs of the valley in bread.

This year, after autumn precipitations, in the spring there were long rainfalls, that, accompanied by low temperatures, delayed the animal transhumance to the high mountains pastures. As for grass, it was growing well and the rains, which continued until July did have any adverse effects.

Table 21. Cereals production in GBAO for the period 2013

	Total cereals			Out of them wheat		
	Cultivation area, Ha	Yield, t/ha	Gross yield, tons	Cultivation area, Ha	Yield, t/ha	Gross yield, tons
<b>GBAO</b>	<b>7218</b>	<b>2.30</b>	<b>16636</b>	<b>4604</b>	<b>2.42</b>	<b>11153</b>
Darvoz	1686	2.22	3749	1447	2.09	3025
Vanj	681	3.47	2367	444	3.87	1719
Rushon	703	2.37	1669	442	2.78	1229
Roshqala	1026	2.20	2259	562	2.23	1255
Ishkoshim	2055	2.32	4786	1440	2.44	3517
Shugnon	1067	1.69	1807	269	1.52	408

Source: Mission data

## Appendix 2. Assessment methodology

This year, the international Crop and Food Security assessment mission worked in Tajikistan in mid-July. Timelines of the mission work coincided with the last weeks of work on a joint assessment at the national level conducted by the FAO and MoA working groups. The following have been involved in conducting assessment at the national level:

- Four working groups with two people in each. Having started in early June, during 44 days these groups assessed five agricultural zones in four areas: Sughd, DRS, Khatlon – Kulob (zone), Khatlon - Kurgan-Tube (zone), and GBAO.
- Assessment was conducted in a total of 56 of the 58 districts. The assessment included:
  - Collecting information about areas planted with all crops during the main cropping season (winter and spring crops) in state farms / cooperatives, collective Dehqan farms, private Dehqan farms, on homestead and presidential land plots. Source for this information were departments of agriculture at districts level.
  - Data from eleven unvisited districts, where agricultural production is limited, was obtained by telephone;
  - survey of 280 farms of all the above mentioned categories located on the territory of 171 administrative-territorial formation of districts subordination (Jamoat);
  - During farms survey, to ensure quality of crop assessment of all cultures, there have been used questionnaire developed in Tajikistan intended for assessment of the new varieties of cereals crops;
  - For cereals assessment, there have been used 18 separate indicators developed in order to test seeds; and this allowed to make estimations for production of the main cereals during the main cropping season.
- To calculate production for selected districts, the data on cultivated areas provided by the districts' departments of agriculture were supported with average yield data collected by the Mission for the ready-to harvest crops (cereals) based on that the total yield data was calculated for each district. Except some rare cases, independent assessment of other crops, in addition to wheat, was not conducted as the Mission worked during the period during which it was too early to reliably estimate the yield of potato and most vegetables, not to mention the yield of maize, rice, oilseeds, and cotton. Data on the areas cultivated with all the crops during the main cropping season

was obtained at the district level. With regard to the relevance and validity of the calculated data, there should be mentioned the following:

- Data was obtained at the district level before correction/verification;
- Data collection mechanism corresponds to the common and as it was mentioned a multi-stage approach:
  - The registered enterprises on quarterly basis fill in certain forms, where, among other things, the indicate cultivation area. This data is submitted to the District Department of Agriculture. Large enterprises, cooperatives, collective Dehqan farms and private Dehqan farms are obliged to follow such a system. MoA, in calculation cultivation area, usually operates this data. To estimate the harvest this data is supported by the estimated data on productivity received from farms through the local departments of agriculture.<sup>6</sup> As this information is used for tax purposes, the farms are inclined to underestimate productivity indicators;<sup>7</sup>
  - Data on the area of homestead and presidential land plots was obtained from: a) representatives of the SCS at district level; b) which, in turn, receive the data from the administrative-territorial entities of districts subordination (Jamoats); c) which, in turn, receive information from the representatives of villages, whose duties include the registration of all cultivated land in every village. It is clear that there is possibility of errors and incorrect interpretation of the data. Under this, there are factors that limit errors to some extent: a) the number of households in each village is confirmed by documents; b) area of land plots is not big; c) land distribution is documented, and , if necessary, information can be verified using multiple sources; d) homestead and presidential land plots, as well as production received from these categories of land are not charged any taxes, so in this case there is no apparent reason to underestimate information on cultivated area and received harvest.
- National consultant on food security analysis conducted monitoring of the work of the Mission members:

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<sup>6</sup> In the Mission calculations, the productivity estimates (yield per hectare) will be replaced by the figures obtained by the Mission through calculations of cereals yield for each district based on random sampling.

<sup>7</sup> All working groups have confirmed that farmers questioned the accuracy of measurements made in their fields.

- During the trip, in 6 districts, there was conducted sample crop evaluation, key informants, including representatives of districts departments of agriculture, regional administrations, NGOs, farmers, traders, combine operators and threshers were interviewed. Random crop evaluation was conducted on individual land plots in accordance with the provisions of the Technical notes included in the latest edition of the FAO / WFP Guidelines for the CFSAMs work.
- For comparison purposes, the data on cultivated areas and agricultural production by years was obtained from the State Committee on Statistics.

Upon returning to Dushanbe, all FAO and the Ministry of Agriculture working teams, who participated in the assessment at the national level responded in details to the questions about the districts and regions they had visited. The questions were asked for each area separately. The interview format was in accordance with the recommendations of the Technical notes included in the latest edition of the FAO / WFP Guidelines for the CFSAMs work. All estimates have been carefully verified, yield calculations were corrected taking into consideration the type of seeds, sowing timelines, timelines for fertilizers application and amount of applied fertilizers, spread of seasonal pests and diseases, such crops productivity in neighboring areas, historical data, after which the data was compared with that of other independent assessments conducted in the same locations. The results of the discussions were formalized, and the information obtained by the working groups was in details, that allow to conduct a quantitative analysis of the factors influencing the cultivation area and yield.