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THE PERSPECTIVE OF AGRICULTURAL DEVELOPMENT IN IRAQ

Abdulmuttaleb Abbas SALIH, Hussein Ali Hussein AL-QAESI

University of Dhi-Qar, District Almustfawiyah, Nasiriyah, 64001, Iraq, Phone: +009647809249646, Emails: hussein_782003@yahoo.com, abd_mtlb@yahoo.com

Corresponding author: abd_mtlb@yahoo.com

Abstract

Agriculture is still an important sector since it provides an opportunity for Iraq to improve the country's economy. The perspective of agricultural development is therefore a very important aspect since it can shape the future of the agricultural sector. The present research is situated in the field of agriculture, focusing on evaluating the current perspectives on agricultural development in Iraq, by comparing the past and present ones, and finally looking for indicators of what path it might actually take, based on government policies, actual status, current directions in research and other indicators. This study will be divided into an introductory section, research methods, results and discussion in which data will be interpreted, and it will end with conclusions and recommendations.

Key words**:** *agricultural development, Iraq, perspectives*

INTRODUCTION

The status of agriculture in Iraq has been different in the past, despite the fact that Iraq has been a net food exporter, thanks to its abundance of water and land, with a relatively small population.

After World War II and independence, oil revenues were invested for a massive modernization of the agro-industrial complex in Iraq, with capital intensive initiatives and the introduction of modern inputs and the expansion of irrigation.[14]

Nowadays, Iraq's agricultural sector represents a small, but vital component of Iraq's economy, due to Iraq's involvement in military conflicts, particularly the 1980-88 Iran-Iraq War and the 1991 Gulf War, and by varying degrees of government efforts to promote and/or control agricultural production.

Many factors, such as population growth, massive urbanization, warfare and domestic turmoil have determined an ever increasing recourse to food imports and many producers were almost obliged to abandon input intensive production systems and they had to retrieve traditional methods and to rely on local inputs.

Extension of agriculture is a very important matter at the time in Iraq.

Also, according to many Iraqi experts there is a growing awareness about the pollution problems caused by the misuse of chemicals, while the cost of many imported inputs makes them unaffordable for most small farmers [3], so the development of programs and workshops for farmers, regarding use of technology, pesticides and benefits of organic agriculture would be a good method of ensuring the issues that pollutions might cause.

Regarding the direction that agriculture should take in Iraq, Iran, Saudi Arabia and other neighboring countries, there are strong forces pushing for intensive farming, based on all possible inputs [16],[17], but on the other hand there are also those who suggest various forms of low external inputs agriculture and organic agriculture, at least for some areas of the country and for some products and markets.[9].

Current perspectives of agriculture in Iraq

The Iraqi Ministry of Agriculture has formulated a Strategic Plan to address the limitations of agriculture in Iraq and endorsed a strategy for FAO assistance to the Iraqi efforts along with various key ministries. In order to expedite the rehabilitation of the agriculture sector, the Government of Iraq is increasing its investment in agriculture and is seeking technical assistance and support from

FAO and all other international organizations. As a result, many projects for agricultural extension have developed. Some programs are The Iraq Salinity Project, the ACIAR program, and the IAER program.

On the private sector, USAID has invested in programs designed to stabilize communities, foster economic and agricultural growth and build the capacity of national, local, and provincial governments to respond to the needs of the Iraqi people. Currently, USAID assists private Iraqi agricultural businesses in improving their productivity by introducing to them the latest technologies in agribusiness, including soil and water management. The goal is to increase productivity, lower production and marketing costs, increase the profitability of agricultural enterprises, and generate rural employment with technical assistance and business development training. USAID is helping the private sector increase agricultural revenues.[16]

MATERIALS AND METHODS

The questions that this study is aiming to answer are:

1. What is the current status of agriculture in Iraq and in the neighboring countries?
2. How did agriculture evolve in Iraq?
3.What are the current perspectives on agriculture in Iraq and how do the state policies affect and shape the current perspectives on agriculture?

This study involves the use of theory and statistical data. The theory may or may not be made explicit in the design of the research, although it will usually be made explicit in presentation of the findings and conclusions. In the paper the fallowing indicators have been used: arithmetic mean, coefficient of variation, average annual growth rate, ecologic indicators and statistical indicators.

The formulas used for to calculate these indicators, are:

$For\ the\ arithmetic\ mean = \bar{x} = \frac{\sum xi}{n}$, where $\bar{x}$ = the arithmetical mean, xi= the average production values for a number of years (i); n= number of years taken into account.

RESULTS AND DISCUSSIONS

The current status of agriculture in Iraq and in the neighboring countries

The direction in which the Iraqi agriculture is going represents an important matter, since it can revive and contribute to national wellbeing, by taking also into account the growing competition for water and the challenges due to climate change, or use pesticides and chemicals in order to increase the production. This section will present the results regarding the current status of agriculture in Iraq and in its neighboring countries, as well as the current status and perspectives of agriculture in Iraq. Iraq was once one of the breadbaskets of the Middle East, and in fact today the yield gaps, understood as the differences between actual or observed yields and simulated potential yields in a given area, remain very significant [11].

Table 1.The evolution of agricultural land in Iraq during 1990-2014

Category	MU	1990	2000	2005	2010	2014
Country area	1,000 ha	43,832	43,832	43,832	43,524	43,505
	%	*100.0*	*100.0*	*100.0*	*99.3*	*99.3*
Agricultural area	1,000 ha	9,230	8,300	9,390	8,220	9,269
	%	*100.0*	*89.9*	*101.7*	*89.1*	*100.4*
Arable land	1,000 ha	5,000	4,100	5,200	4,000	5,034
	%	*100.0*	*82.0*	*104.0*	*80.0*	*100.7*
Permanent crops	1,000 ha	230	200	190	220	235
	%	*100.0*	*87.0*	*82.6*	*95.7*	*102.2*
Forest	1,000 ha	804	818	825	825	825
	%	*100.0*	*101.7*	*102.6*	*102.6*	*102.6*
Other land	1,000 ha	33,703	34,619	33,522	34,387	33,338
	%	*100.0*	*102.7*	*99.5*	*102.0*	*98.9*
Inland water	1,000 ha	95	95	95	92	73
	%	*100.0*	*100.0*	*100.0*	*96.8*	*76.8*

Source: FAOSTAT, http://faostat3.fao.org/download/E/EL/E [7].

Of the total area of Iraq (43.5 million ha), 22 percent, i.e. 9.2 million ha is cultivable land, suitable for agriculture. Agriculture is mostly practiced on small farming units. More than 80 percent of the farms have a total size of less than 10 ha and even these 10 ha are on average scattered over several different locations. The agricultural area has had many variations during the period 1990-2014, from 9,230 thousand ha to 8,220 thousand ha in 2010 and increased up to 9,269 thousand ha in 2014. The arable land had the same trend with a small value in 2010 and an increase until year 2014 at 5,034 thousand ha. The permanent crops occupy 235 thousand ha, with small variations over the years.

Table 2. Structure and use of land in Iraq during 1990-2014

Mode of use	**1990**		**2000**		**2010**		**2014**	
	mil ha	%	mil ha	%	mil ha	%	mil ha	%
Country area	43,832	100.0	43,832	100.0	43,524	100.0	43,505	100.0
Agricultural area	9,230	21.1	8,300	18.9	8,220	18.9	9,269	21.3
Arable land	5,000	11.4	4,100	9.4	4,000	9.2	5,034	11.6
Permanent crops	230	0.5	200	0.5	220	0.5	235	0.5
Forest	804	1.8	818	1.9	825	1.9	825	1.9
Inland water	95	0.2	95	0.2	92	0.2	73	0.2
Other land	33,703	76.9	34,619	79.0	34,387	79.0	33,338	76.6

Source:FAOSTAT, http://faostat3.fao.org/download/E/EL/E [7]

Regarding the structure of land from the table 2, the agricultural land had the highest share in 2014, i.e. 21.4%, almost the same with year 1990. In year 2010 it was a gap, most of the categories studied had a decrease, followed by an increase until year 2014. It is remarcable how the categories vary between the years, being unusual to have such differences, but having the political issues, the fluctuations are easy to explain.

The arable land had a share between 9.2% and 11.6% and the permanent crops are for the whole period at a 5% from the total land.

Table 3. Total area equipped for irrigation

Country	**MU**	**1961**	**1980**	**2000**	**2010**	**2014**
Iran	1,000 ha	4,700	4,948	7,870	9,273	9,600
	%	*100.0*	*105.3*	*167.4*	*197.3*	*204.3*
Iraq	1,000 ha	1,250	1,750	3,525	3,525	3,525
	%	*100.0*	*140.0*	*282.0*	*282.0*	*282.0*
Jordan	1,000 ha	31	37	76.9	96.4	105
	%	*100.0*	*119.4*	*248.1*	*311.0*	*338.7*
Syria	1,000 ha	558	539	1,211	1,341	1,310
	%	*100.0*	*96.6*	*217.0*	*240.3*	*234.8*
Turkey	1,000 ha	1,310	2,700	4,745	5,215	5,215
	%	*100.0*	*206.1*	*362.2*	*398.1*	*398.1*

Source: FAOSTAT, http://faostat3.fao.org/download/E/EL/E [7].

Regarding the area equipped for irrigation Iran has the biggest surface, and has increased its surface since 1961 with 4,900 thousand ha reaching at 9,600 thousand ha, meanwhile Iraq has an increase with 2,275 thousand ha. As a percentage Turkey has a very high increase, from 1,310 thousand ha to 4,745 thousand ha in year 2000 and reaches 5,215 thousand ha in 2014, overpassing Iraq.

The highest development of cereal production yield (kg per hectare) is registered during 1990-2014 in Turkey, with a mean of 2,420, followed by Iran with 1992.05 and Syria, with 15,00.82. Iraq and Jordan show relatively close means, respectively 1,190.09 and 1,370.36.

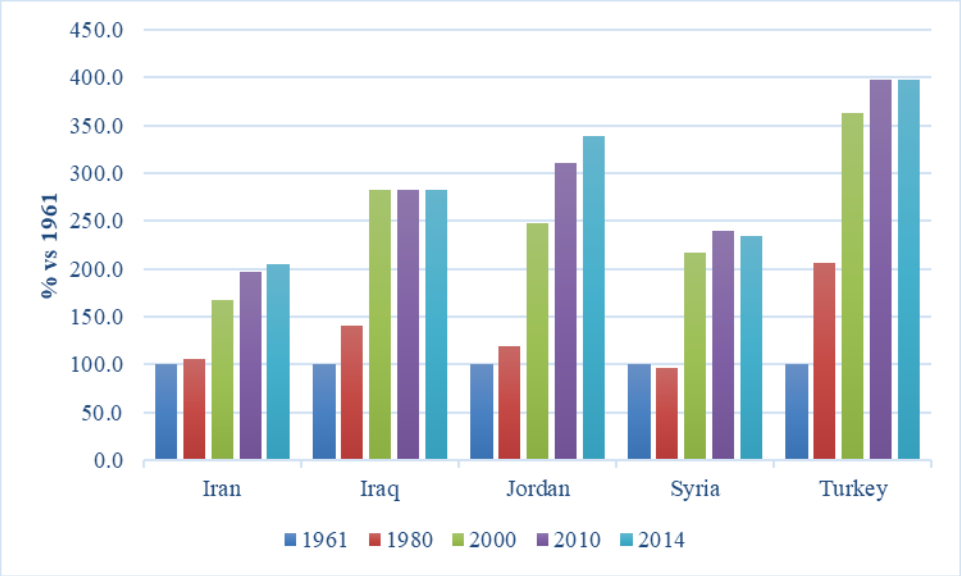

Fig. 1. The increase of the total area equipped for irrigation (1961=100%)
Source: World Development Indicators, http://data.worldbank.org/data-catalog/world-development-indicators[18]

Table 4. Evolution cereal production yield (kg per hectare) in Iraq and neighboring countries during 1990-2014

No	Country	Indicator	Period 1990-2014				Mean	StDev	Coefficient of variation	The annual growth rate
			1990	2000	2010	2014	mll ha	mll ha	%	%
1	Iran	kg/ha	1,445	1,833	2,358	1,963	1,992	315.6	15.84	1.28
		vs 1990(%)	100	126.8	163.1	135.8	x	x	x	x
2	Iraq	kg/ha	1,061	363	1,697	2,187	1,190	537.4	45.15	3.06
		vs 1990(%)	100	34.2	160	206.1	x	x	x	x
3	Jordan	kg/ha	1,220	1,726	1,963	1,455	1,370	452	33.0	0.74
		vs 1990(%)	100	141.5	160.9	119.3	x	x	x	x
4	Syria	kg/ha	750	1149	1232	1063	1501	391	26.05	1.47
		vs 1990(%)	100	153.1	164.3	141.8	x	x	x	x
5	Turkey	kg/ha	2,214	2,311	2,727	2,831	2,420	344	14.21	1.03
		vs 1990(%)	100	104.4	123.2	127.9	x	x	x	x

Source: World Development Indicators, http://data.worldbank.org/data-catalog/world-development-indicators[18]

In terms of cultivated areas, there are large variations between the years due to climatic and/or economic reasons. Certain studies certified that in the period 2000-2013 both population growth rates and those of agricultural production were lower but also that in Iraq the rhythms of agricultural production growth was smaller than the population growth rate.[8].

Current perspectives of agriculture in Iraq

The first important perspective in the development of agriculture is the extension which is a non-formal educational function that applies to any institution that disseminates information and advice with the intention of promoting knowledge, attitudes, skills and skills. Educational organizations are important elements in the institutional context for extension. The work of universities and training institutes in particular has a significant impact on extension organizations. The content of their curricula as well as the numbers and qualifications of their graduates are limiting or enabling factors in any country [1].

At the same time, extension is a political and organizational instrument utilized to facilitate development. Its purposes may differ, from technology transfer to problem-solving educational approaches and advancing

community involvement in the process of development.

Most ministries of agriculture have an extension unit that deals mainly with crops and other agricultural systems. During the 1970s and 80s, efforts were made to unify ministerial agricultural extension operations but with limited success.

Extension is multidisciplinary. It combines educational methodologies, communication and community techniques. When effectively provided extension is known to enhance social and economic development. Many studies have demonstrated the high economic returns of investments in agricultural dissemination, thus investment in agricultural research and extension is a good input of agricultural growth [2].The role of government is critical for the reconstruction of agricultural extension even if the extension services are provided by private contractors [12].

Extension of agriculture is an important matter of discussion in Iraq and its neighboring countries, since it has a major economic and sociologic impact. According to experts there is a growing awareness about the pollution problems caused by the misuse of chemicals, while the cost of many imported inputs makes them unaffordable for most small farmers [3].

In terms of agricultural education, which is an important factor of the extension of agriculture. At the moment, educational agriculture can be pursued at universities (the most common are Mosul and Baghdad Universities), continued in research centers and by continuous training for farmers through the programs and workshops offered for the purpose of extending agriculture.

The SBAR is the largest national agricultural research (NARS) institution: it represents 26% of the potential research years of the NARS. Its main mandate is agricultural research which mobilizes about 75% of the time of its professional staff. Other activities cover community services (soil analysis, seed production, etc.), extension and training[15]. Below, in table 5, the main agricultural educational topics identified as a critical need in 2013 are listed. In the Arabian world, at the level of year 2012, the internet users were 34 at 100 persons, a continuous increasing no. in the last decade [13], i.e. the channels for information are wide opening.

Table 5. Preferred Formats through which Iraqi farmers prefer to receive agricultural information

Format	Farmer preference (%)	Extension agent preference (%)
Personal face-to-face	64.2	74.9
Written brochures and bulletins	20.7	11.7
Internet	9.5	3.8
Video media	3.8	9.6
Written books	1.8	0.0

Source: FAOSTAT, http://faostat3.fao.org/download/E/EL/E [7].

The second perspective, and much related with the first is the development of organic agriculture. Organic agriculture is an important factor of extension of agriculture so its reality and future prospects require theoretical and applied research, a good administration that would reflect in society's involvement, trough targeted investments, agricultural education, and appropriate legislation.

Table 6. Agriculture areas certified as organic

Country	Iran	Iraq	Jordan	Syria	Turkey
Area	1,000 ha	1,000 ha	1,000 ha	1,000 ha	1,000 ha
2006					162
2007			1.03		135
2008	11.4		1.03	25.66	142
2009	8		1.03	35.4	250
2010	6				192
2011	14.4		2.6		326
2012	41.35				399

Source: FAOSTAT, http://faostat3.fao.org/download/E/EL/E [7].

"Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity.

It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional

conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system."[5].

The purpose of organic farming is to eliminate the use of fertilizers, pesticides, animal drugs and food additives, I order to improve soil, water and environmental quality.

The excess use of nitrogen fertilizers in agriculture can lead to nitrate accumulation into plants, and in this regard, workshops and programs are required in order to deliver information to farmers and inform them about the benefits of organic agriculture. Today, organic agriculture is studied in colleges of agriculture in the Kurdistan region and Iraq especially to graduate students.

The agricultural policies adopted by the Ministry of Agriculture have made the agricultural inputs seeds and fertilizers in particular, available to farmers, particularly for the strategic crops, such as wheat. In Iraq's case, there are many reasons to believe that the country's agricultural potential is great [4].

As a result, farmers rely heavily on the inputs provided by the government for wheat. Financial capacities of the most vulnerable farmers in particular, are limited, according to FAO, whose staff interviewed farmers who made it very clear that seeds and fertilizers were their priority needs for the coming cropping season with 92 and 96 percent of them requesting support for seeds and fertilizer as illustrated in the graph below.

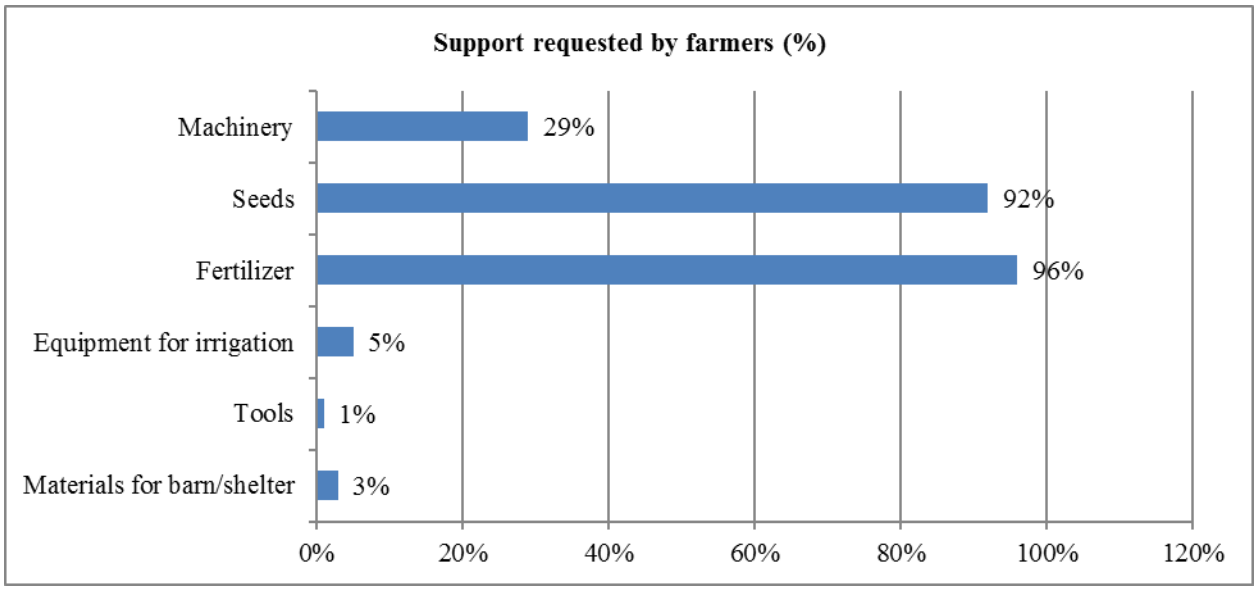

Fig 2. Support requested by farmers
Source: Rapid Assessment of Agricultural Livelihoods, FAO 2016.[7]

Agricultural growth would also lift growth in the food processing and service sectors. To support farmers and traders in this process, improving infrastructure and market information systems will be important for market access and to provide actors along the supply chain with useful information about prices and marketing opportunities.

It would also be good to implement measures to reduce the transaction costs related to international trade, including excessive documentation requirements, authorizations from multiple agencies, unclear or subjective criteria for the application of duties, and delays and uncertainties related to customs clearance.[10].

CONCLUSIONS

Iraq is trying to find solution to develop the agriculture and to overcome the issues it has been confronting in the last years. Of the total area of Iraq (43.7 million ha), 22 percent, i.e. 9.5 million ha is cultivable land, suitable for

agriculture, which represents a small part compared to the other countries.

From this study we find that Iraq, and also the countries that were taken into study have developed a solution to one of the most important problems - the irrigation area. As it could be seen, all the countries have increased the surfaces equipped for irrigation, doubling or tripling it.

Extension and counseling help farmers to make the best decision for the agriculture development. Extension organizations need to develop communication with fertilizer providers since excessive use of agrochemicals can harm human health and the environment, and programs such as integrated pest management are recommended.

The agricultural policies in Iraq indicate that many ministries, committees, and institutions are involved in drawing up the agricultural policies of the country. These include the Agriculture Committee in the parliament, Council of Ministers, Ministry of Agriculture, Ministry of Water Resources, Ministry of Environment, and some non-governmental organizations (NGOs), which are very good perspectives for the development of the agriculture.

A key factor is the agricultural education, which is an important factor of the extension of agriculture, and is an important help for the development of knowledge of farmers, it can be pursued at universities (the most common are Mosul and Baghdad Universities), continued in research centers and by continuous training for farmers through the programs and workshops offered for the purpose of extending agriculture.

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