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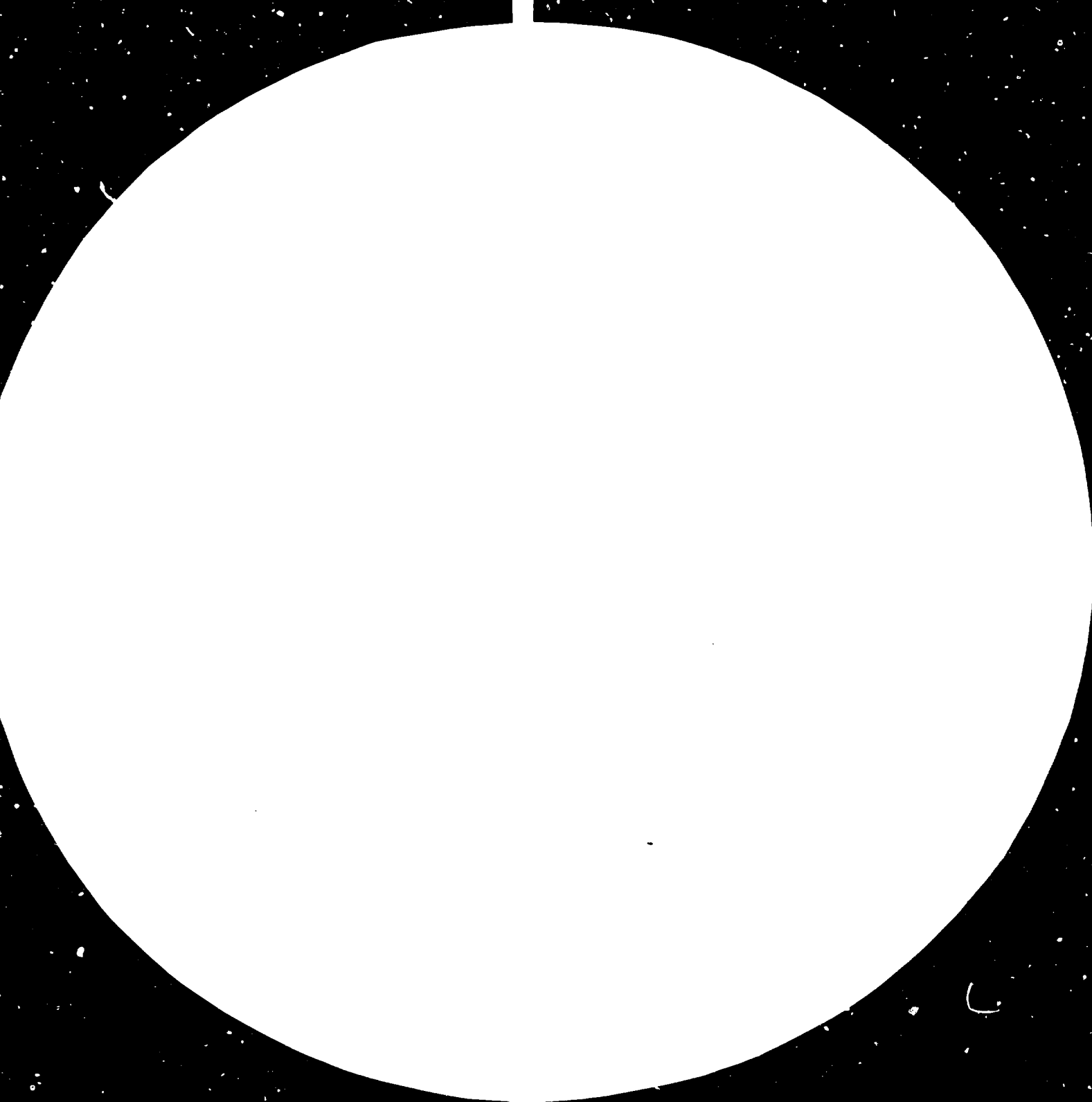
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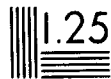
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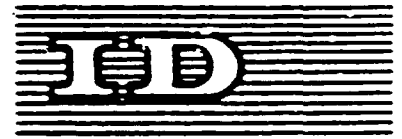


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THE DEVELOPMENT OF CHEMICAL FERTILIZERS PRODUCTION IN IRAQ

presented by the

Government of Iraq

M. A. S. ...

900000

## PREFACE

This document, the Development of Chemical Fertilizers Production in Iraq is one of 18 studies presented as supporting material to the Iraq country paper about the development of agro-industries and state of agricultural production and supplementary industries. We thought of presenting them to assist the reader in getting acquainted with the pioneering experiment in Iraq in the development of this field of our economic activities. This documentation reflects the great development achieved within the years that have already elapsed since the uprising of 17th July Revolution under the leadership of Arab Baath Socialist Party that aimed at achieving economic and social welfare for the people by rational use of the natural resources and elevating our country to the rank of advanced countries within a considerable period.

From the point of view of the Revolution leadership in Iraq, what has been achieved so far in the field of irrigation development, drainage, mechanization of agriculture, animal production, other agro-industries, and other infra-structural development in this field, are deliberate and effective steps towards reaching our aspiration.

In those studies we have tried to highlight the main development features, the negative sides as well as the positive results achieved so far with the objective of presenting our experience to brotherly and friendly countries in particular to those whose conditions and potentialities are similar to our country. This exchange of experience is not only a necessity but a duty imposed on us by our principles and the current international circumstance in which food weapon becomes one of the important weapons raised by imperialism in the face of developing countries. If those countries do not support each other and exchange national experience their task in achieving their food security will be, if not impossible, difficult to achieve.

We hope that our contribution together with that of other participating states and organizations will contribute to the success of this ministerial meeting on development of food industries in developing countries.

Preparatory Committee  
for the Round-Table Ministerial Meeting  
on Agro-Industry Development

THE DEVELOPMENT OF CHEMICAL  
FERTILIZERS PRODUCTION IN IRAQ

Introduction

Chemical fertilizers have been occupying a significant position in the world industrial production due to its direct and effective role in providing food for the world population on one hand, and for the technological development achieved in this industry and its production methods, on the other hand. This industry has a great commercial volume in the world markets. The total final products of different kinds of fertilizers (\*) in 1979-1980, was estimated at more than (350) million tons, i.e., it has the second position among the industrial world products, after iron and steel industry, if we exclude oil production.

During this century, fast development was achieved in the production and consumption of fertilizers, especially after World War II, in order to cover the league, which the world is actually suffering from, and to face the food demand of the increasing requirements of population growth. This growth has reached high rates and could be described as population explosion more than its being normal increases (according to the statistics and projections of UN specialized agencies).

World population in 1900 was about (1550) million; in 1960, it reached (2913) million; in 1970, (4020) million; and in 1980, about (4300) million (\*). It is expected to reach more than (6000) million by the year 2000.

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(\*) United Nations, The Future of World Population Sales No. 85 X 1112.

(\*) To Feed This World, by Wortman Cummings (1970), The John Hopkins University Press - Baltimore, U.S.A.

Food Climate and Man, by Margaret A. Biswas and Asit K. Biswas, 1979.

From the facts of the importance and critical food situation in the world and its effects on the developing countries in particular, the strategy of human and political stand view of Iraq reflected in its development plans, and due to the importance of chemical fertilizers role in food production, for all these reasons, we have given special attention to the preparation of this paper on the development of chemical fertilizers production in Iraq and its role in the economic development and its strategic importance for the Arab states and the world, especially to the developing countries which suffer from the problems of lack of food and limited ability to establish projects in this field.

In this paper, we tried to depend on realistic facts and actual agricultural situation, as well as the future projection of the political leadership for the medium and long term plan in fertilizers industry and the ambitions to realize the maximum agricultural production under the positive circumstances in Iraq.

#### World Population Growth and the Problem of Food Provision

Statistical data shows that the world population growth inclined sharply in its annual rates, especially in the developing countries, those suffer mostly from the lack of minimum food requirements, some of them suffer from aridity and famine.

Most developing countries do not have the financial requirements to enable them to reach the technological development level, in order to solve their suffering from the most crucial and important problem facing their people directly, which is to provide the minimum food level for their people.

The following table shows the world population distribution and population growth<sup>(\*)</sup>:

Table (1)  
Population in Millions

Region	1900	1960	1980	2000
North America	81	197	254	312
South America	63	206	349	592
Europe (including USSR)	423	629	792	941
Africa	120	239	333	517
Asia	857	1621	2471	3070
Australia	6	16	22	29
New Zealand				
<b>TOTAL</b>	<b>1550</b>	<b>2913</b>	<b>4220</b>	<b>6257</b>

This population growth and the high living and health standards must be accompanied with parallel increase in food production to cover the continuing increase in the food demand which is faced by a great number of nations, such as Latin America and some Asiatic and African countries.

Food supply today is considered to be one of the main problems in the world. It required fast action and effective movements, and inspite that goods in large capacities exist to reach suitable solutions, the problem of securing food supply is connected with many other important and critical factors, that are actually facing humanity, such as the population growth mode, economic conditions, having sufficient energy provision, raw materials, technological development, monetary inflation in some countries and the lack of capital in others, etc.

(\*) There are several population statistics, most of them agree on the above-mentioned figures.



All these factors have effective reflections on the problem of food supply, either positively or negatively, which requires a balanced formula in favor of increasing food production and supply in the quantities and qualities needed by the whole world.

In spite that such problem is widely being discussed in the world for an effective action, it does not seem possible to entrust any international body, which may have enough means and authorities to act automatically, to put effective measures to be followed in the direction of food production increase as well as to follow-up its progress. Therefore, we notice that treating such a problem at the international level has taken different modes, particularly those actions adopted through international organizations such as UNIDO, FAO, etc. aside from the initiatives taken by some of the countries, which are characterized by a liberal policy and human attitude. Consequently, the international organizations and scientists have studied such matters and put some proposals and formulas to tackle the problem of food supply in the world, some of which are enumerated hereunder:

- 1 - Developing aquaculture in rivers and seas.
- 2 - Searching for non-classical food sources such as the production of single-cell protein from petrol; it is also called industrial protein.
- 3 - To extract protein from tree leaves.
- 4 - To change mode of production of animal fodders from concentrated method to assorted field sources and leaving the grains which are used as fodder to be utilized by man.
- 5 - To use agricultural crops which gives high yields.
- 6 - To increase the cultivated area horizontally by decreasing crop rotation method and instead using fertilizer.
- 7 - To increase the productivity of the agricultural area by using fertilizer, developed methods in cultivation, irrigation, seeding, harvesting and using pesticides. Each of the first three methods

has its own importance and role as it has actually been used widely and proved its effect and participation in the food production increase, yet such factors offered limited participation compared with the efforts and research work spent to achieve such a little increase. For example, single cell protein has been industrially produced; fish have been reared directly in rivers, seas, and oceans, to promote development of aquaculture particularly by dosing urea to the sea directly, the results of which are still not fulfilling the expectation.

As for the horizontal expansion of the agricultural land, such factor is certainly very important and effective and it requires a great deal of time and investment particularly, for land reform, desalination and providing irrigation sources, which makes the return not economical and insignificant. Therefore, the world has been left without effective choice for the increase of food production except by increasing the productivity of the cultivated land by applying modern technology in agriculture, particularly the systematic and scientific use of fertilizer based on actual experience and research in determining the suitable kind of nutrient and the amount required for the particular crop which may give the best results.

Using the chemical fertilizer to promote agricultural production is considered to be one of the most effective and fastest method in this respect. Almost 50% of the world increase of agricultural production is attributed to this factor, and due to it, the chemical fertilizer industry has been given a particular attention in Iraq in accordance with the strategical policy of revolutionary government of Iraq, which considers this subject as important. Iraq today, is one of the biggest producer of chemical fertilizers among Arab and Gulf countries, as well as it occupies an important position among international fertilizer producers family. Iraq produces today about 50% of the total production of Japan from urea.

Chemical Fertilizer Utilization in Iraq

It has not been so long since Iraq has started the use and application of chemical fertilizer for commercial agriculture production, apart from its use for research and pilot experience. We could date back its first attempt to use fertilizer at the mid-sixties where the total import of Iraq from different types of fertilizer reached 6000 tons.

After 1966, the chemical fertilizer consumption in Iraq increased sharply especially in 1971, when the increase rose from 6000 to 77,000 tons.

Table (2)  
Iraq Import of Chemical Fertilizers

Fertilizer	1965	1966	1967	1968	1969	1970	1971	1972
Ammonium Sulfate	523	6560	14381	28740	43692	45773	36280	60300
Mixed Fertilizer	53	1492	10276	4293	6133	6301	10430	147750
Tri super Phosphate	-	-	146	2293	4041	4549	10000	12650
Urea	-	-	-	210	359	241	260	3500
<b>TOTAL</b>	<b>756</b>	<b>8052</b>	<b>24743</b>	<b>35796</b>	<b>54215</b>	<b>51931</b>	<b>10910</b>	<b>91200</b>

Such fast increase in fertilizer consumption in Iraq could be interpreted as a natural reflex to the economic return realized by the farmers through their individual experience for applying fertilizer rather than its direct connection with the control planning for agricultural and industrial development, which was not systematically

foreseen by the State at that period, while lately such use and application of fertilizer has been taken into consideration by the production plans for agriculture and its related activities, such as land reform, irrigation, mechanization and other modern techniques.

If we consider 1972 (which was the beginning of chemical fertilizer production in Iraq) as a base year for chemical fertilizer utilization, it can also be considered as a base year for the planned agricultural programs connected with the national development plan. The implementation rate in land reclamation was still low until the beginning of the five-year plan (1976-1980), on the contrary to the industrial progress in the country which was achieved in the industrialization processes, and it led to the foundation of many industries including fertilizer industry. Chemical fertilizers consumption rate continued to increase with close connections with the agricultural development plan. The quantities supplied to the agricultural sector in 1978 were about 250 thousand/ton, i.e. an increase rate of 300% compared to the quantities consumed in 1972 which was considered the base year.

During the implementation of the agricultural plan of 1979, an increase in the fertilized land was noticed. It reached 18.7% of the total cultivated land, while the total cultivated land in the previous year was more than that in 1979. The Ministry of Agriculture explained this fall by the interruption of the land reclamation process with the cultivation plans. The cultivated land in 1978 was about 11.6 million donoum, while in 1979, it decreased to 10.875 million donoum. The hectare is equal to about 4 donoum.

A Close View of the Agricultural Situation in Iraq

The total area of Iraq is estimated to be 176 million donoum and about 48 million of the total area could be considered arable land, i.e., amounting to about 27.4%, provided that the required condition for cultivation is made available, particularly:

- 1 - Availability of irrigation sources.
- 2 - Desalination measures has been taken.

According to the latest statistics, the actual cultivated land is about 22 million donoum, half of which is situated in the irrigated regions, the other half is in the rain irrigated regions. This cultivated land could be distributed to:

- 1 - 13.6 million donoum used for different economic crops.
- 2 - 8.4 million donoum covered by orchards, forests, and pastures.

As for the different field crops area, they are divided into:

- 1 - 9.5 million donoum mainly for wheat, and barley.
- 2 - 4.1 million donoum for other crops.

The reclaimed land accomplished after 1973-1974 is not included because it is only a relatively small area.

As for the reclamation projections for the period 1981-1986 prepared by the Ministry of Irrigation, it will be about 16.500.000 donoum during the five-year plan period, plus about half a million donoum of the land expected to be reclaimed directly by the State Agricultural Organization through the establishment such as Dujaila and Abu Ghuraib projects. The total cultivatable lands will amount to about 16 million donoum at the end of the 1981-1986 plan period; this area is a potential land for applying fertilizers at different levels according to the regions and the nature of their soil.

As for the response of this area to the fertilizer, it could be classified as follows:

1 - Irrigated Lands

- a. Good irrigated land - 2.192.556 donoum available at present and has excellent response to fertilizer.
- b. Fairly irrigated land - 3.076.081 donoum relatively respond to fertilizer.
- c. Not very suitable land - 14.775,068 donoum; this land needs reclamation, and does not respond to fertilization, or their response is not sufficient.

2 - Rain Irrigated Land in the North Region

- a. About 3.242.500 donoum of it does respond to fertilizers particularly those areas above the rain line 400 ml. (rain insured area).

As for the lands with slope and has not very deep-soil in the northern region, which is about 1.618.150 donoum, this do not respond to fertilization and its economic return is not encouraging. Therefore, it is recommended not to apply fertilizer before experimenting the response of the land so that we can demonstrate the effect of the fertilizer application and its return to the farmers, in order to realize the benefit of such operation.

This is the actual status of agricultural land in the country which will be used for the projections of the future fertilizer consumption and its development.

Table (3) gives indicative figures on crops produced and land cultivated, whether planned or actually executed, as well as the fertilized area.

Table (3) a

## Cultivated and Fertilized Lands in Iraq 1978

Crops	Decided Land for Cultivation Donoum		Decided Land for Fertilizing Donoum		Fertilizing Percentage %
	Planned	Implemented	Planned	Implemented	
<u>WINTER</u>					
Wheat	7.781.940	6.248.750	504.167	379713	6%
Barley	3.306.195	3.131.311	109.828	78.69	2.5%
Vegetables	107.956	100.704	39.389	32605	32%
Alexandrian Clover	91.791	96.481	14.440	15072	15%
	92.855	98.998	31.845	27.264	30%
Beans	87.609	38.921	4.594	3.291	3.3%
Covered Tomato	67.892	53.138	30.992	21.540	40%
Different Crops	38).765	182.899	118.88	51.156	
<b>TOTAL Winter</b>	<b>11.917.003</b>	<b>9.992.202</b>	<b>854.242</b>	<b>608.710</b>	<b>6.1%</b>

Table (3) b

Crops	Decided Land for Cultivation Donoum		Decided Land for Fertilizing Donoum		Fertilizing Percentage %
	Planned	Implemented	Planned	Implemented	
<u>SUMMER</u>					
Rice	447.248	350.629	291.895	171.817	49%
Cotton	150.749	119.246	96.905	59.951	61%
Corn	120.479	125.724	102.913	103.311	81%
Vegetables	449.408	474.174	201.146	170.719	36%
Uncovered Tomato	111.633	108.466	64.897	66.933	62%
Surghum	118.704	111.843	20.661	21.375	17.7%
Green Gram	76.195	55.946	10.761	5.989	10%
Different Crops	270.874	263.781	51.011	153.659	
TOTAL Summer	1.745.290	1.609.809	840.161	753.754	47%
T O T A L	13.362.293	11.602.011	1.694.408	1.362.462	12%



The total cultivated lands in 1978 was about 11.600.000 donoum while in 1979, it was about 10.875.000 donoum i.e., a decrease of about 700 thousand donoum, was realized due to the reclamation operations under construction, as we have mentioned before. But the lands planned for cultivation in 1980 will surpass these problems and the total area will reach to about 13.2 million donoum. The fertilized land has been increasing considerably during the years 1978-1980, supporting the principle of vertical increase of agriculture which is one of the fastest and most effective method to increase agricultural production.

Table (4)

Cultivated and Fertilized Lands 1978-1980

Year	Real Cultivated Land/Million Donoum	Real Fertilized Land/Million Donoum	Total Supplied Fertilizers/Ton	% Fertilized to Cultivated Land	Average Quantity of Fertilizers Kg/Donoum
1978	11.602.011	1.362.462	246.000	11.7%	180.6
1979	10.875.344	1.817.422	242.335	16.7%	133.3
1980	13.200.000	2.400.000	348.055	18.0%	145.0

These lands are cultivated according to the central plans and directives for all the agricultural sectors. In these plans, the agricultural cooperatives have the largest share of cultivated lands, which represents the farmers orientation towards organizing themselves in cooperatives in order to cooperate in cultivation, fertilizing, producing and marketing of the agricultural crop, etc. The private sector occupies the second position, collective farms in the third category and the last is the state farms, as shown in Table (5) where cultivated land is divided to both socialist and private sector as follows:

Table (5) a

Sector	Donoum		
	1978	1979	1980
<b>Socialist</b>			
- State farms)	300.000	370.000	468.000
- Collective farms)			
Cooperative Farms	8.300.000	7.446.000	8.700.000
Private Sector	3.000.000	3.060.000	4.100.000
<b>TOTAL</b>	<b>11.600.000</b>	<b>10.876.000</b>	<b>13.268.000</b>

Fertilization in these sectors is not clear or accurate, except for the total fertilized lands compared to the total cultivated lands.

But the 1980-1981 agricultural plan has considered this point, and estimated the fertilization rate in these sectors as follows:

Table (5) b

Sector	Suggested for Fertilization in the 1980 Plan/Donoum	Fertilized to Cultivated Land (%)
State Farms	264.000	92%
Collective Farms	97.000	41%
Agri. Cooperatives	1.900.000	21%
Private	215.000	5%

The total land planned for fertilization in 1980 is 2.4 million donoum from a total of 13.2 million donoum planned to be cultivated in the same year, i.e., 18% of the total area covering summer season which includes the cultivation of 900.000 donoum at a fertilization rate of 85%, i.e. 1.5 million donoum and winter season at a fertilization rate of 13%.

It is worth mentioning that the estimations of the private sector fertilization, which is 5%, is not accurate because most of them do not plan or declare their planning. These rates cannot be considered a correct indication for the fertilization in the private sector, especially since we have noted the demand of this sector for chemical fertilizers does not correspond to the statistical rate. According to the reports of the Fourth Annual Conference for Agriculture and the reports of the State Organization for Agricultural Equipments, it is noted that the supplied quantities of fertilizer to the private sector in 1978 were (126.881.250) tons of different fertilizers, which is divided as follows:

Ammonium Sulfate	64.636 tons
Urea	48.325 tons
Super Phosphate	3.587/250 tons
Mixed Fertilizers	10.341 tons
<hr/>	
TOTAL	126.881/250
<hr/>	

As for the quantities supplied for both the private and socialist sectors in the same year, they reached 246 thousand tons, i.e. what is used by the private sector is equal to that actually used by the socialist sector or a little more.

This fact means that the private sector uses fertilizer more than what was indicated in the 1980 plan, or that this sector consumes higher quantities of fertilizers for the crops which are more productive, without considering the general balance for agricultural production in the country or the consequences of using fertilizers without consideration of the soil nature, but more important for this sector is the profitability.

### The Strategy of Pioneer Agricultural Plan

The agricultural authorities have adopted lately the experimental plans for agriculture in the country as an important means to spread agricultural knowledge in general and to generalize the advanced agriculture principles which depend on modern technology in land preparation in particular, irrigation and appropriate seeding. These plans also help to rationalize the utilization of chemical fertilizers as an educational instrument in agricultural development, to exploit lands and increase production on one hand and to enlarge this experiment by itself as a method to attain economic production and high quality crops on the other hand.

Total area included in pilot plant projects in the summer season 1979 and winter season 1979/1980 was about 649.132 donoum, 520.106 donoum of it planted with wheat, 96.801 donoum with barley and 112.510 donoum with rice.

The importance of pilot plant agriculture emerges from the selection of strategic crops such as wheat, barley and rice, because the total area cultivated with these crops constitute about 82-85% of the total cultivatable lands and makes more than 90% of the winter crops. As for rice, in spite of its low cultivated area, it constitutes about 20-25% of the summer crops, so what will be achieved in pilot plant agriculture, will have distinguished importance in improving agricultural crops which constitute the major volume of agricultural production, especially cereals.

### Actual Consumption of Chemical Fertilizers in Iraq Compared with the Arab and World Consumption

Iraq actually consumes about 250 thousand tons/annum of different kinds of fertilizers, according to the fertilizing statistics for 1978/1979. This quantity expected to be about 350 thousand tons according to the summer fertilizing plan of 1980 and winter 1980/1981 mentioned in the annual agricultural plan proposed by the Ministry of Agriculture and Agrarian Reform for 1980.

The table below gives details about fertilizers used in 1978/1979 and proposed for 1980.

Table (6)

Year	Fertilizer/Ton				Total/ Ton
	Ammonium Sulfate	Urea	Tri Super Phosphate	Complex Fertilizers	
1978	100.841	106.977	22.499	15.683	246.000
1979	83.632	110.846	38.953	8.904	242.335
1980	94.985	123.954	76.939	49.145 + 3.032  Potash Fertilizers	348.055

On the total fertilized areas was about 1.36 million donoums in 1978, 1.82 million donoums in 1979, and it is hoped to reach 2.4 million donoums in 1980 according to the proposed plan. On the other hand, the actual cultivated lands planned for cultivation for the same years are 11.6, 10.88 and 13.2 million donoums respectively as were shown previously in Table (3).

If we consider the statistics of 1978 representing relatively a stable year, the real cultivated lands then would amount to 11.6 million donoum of the total lands decided for cultivation, i.e. that means an achievement ratio of 87% which is quite an encouraging rate. The fertilized lands were 1.4 million donoum of the totally planned area for fertilizing which was 1.7 million donoum, i.e. the fertilizing plan has reached an implementation rate of 82% which is also an encouraging and good ratio.

The total fertilization rate to the total cultivated land was 12% (the cultivated land was 11.6 million donoum, the fertilized land was 1.4 million). This rate is undoubtedly low compared to the available potentiality and the due attention given to the agricultural sector.

The low fertilization rate is concentrated especially in cereal crops, the lands cultivated, in the mentioned year, with wheat was about 6.25 million donoum while only 0.378 million donoum was fertilized, i.e. at a rate of 6%. As for the lands cultivated with barley it was 3.13 million donoum, only 0.078 million donoum of it was fertilized, i.e. at a percentage of 2.5%. On the contrary we note that the fertilizing rate in lands cultivated with vegetables, tomato, cotton and corn is adequate and the ratio reached between 32% - 80%.

50% of the lands cultivated with rice is fertilized but the total area allocated for rice is very small and did not exceed half a million donoum in the country. This might be due to the soil and large quantity of water.

If we compared the total fertilizers consumption in 1979 which was 250 thousand tons with the area included in the fertilizing operation which was 1.362 million donoum, the fertilizer rate per donoum would be about 183.5 kg. of nutritional components/donoum. So, we can consider that the average consumption of the donoum in the fertilized lands is 65 kg. of nutritional components, which means 260 kg/hectare<sup>(\*)</sup>.

If these quantities are widely used in the actual cultivated lands, this will place Iraq in an advanced position among the world countries in their utilization rates of chemical fertilizers as shown in Table (4).

(\*)

But if we take the average consumption of fertilizers (nutrient/hectare) to the total cultivated land in Iraq according to the year 1978, it will come to about 30.2 kg/nutritional component/hectare.

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(\*) 1 Hectare = 4 donoum

(\*) Total cultivated land in 1978 was about 11.6 million donoum, i.e. 2.9 million hectare. Total fertilizers consumed was 250 tons where 87.5 thousand tons of nutritional components, i.e. at the rate of 35%. The share of one hectare is 7.5 kg. of nutritional components.

This average of consumption puts Iraq among the countries of low consumption of chemical fertilizer according to the statistical tables prepared by the UNIDO, which classified, the consumption rates as follows:

More than 200 kg/hectare	Very high consumption.
100-200 kg/hectare	High consumption.
50-100 kg/hectare	medium consumption.
25-50 kg/hectare	Low consumption.
.5-25 kg/hectare	Very low consumption.

Below this average is considered very little. (These averages are calculated according to the total consumption of chemical fertilizers to the total cultivated land). Table (7) shows the average consumption of fertilizers in some selected countries according to 1969-1970 statistics. Iraq is added to the list according to its average consumption of fertilizers per hectare in 1978.

We have done some statistics on average consumption of chemical fertilizers in Iraq based upon consumption in 1978, and we noted that actual consumption per capita is about 7 kg. of nutritional components, while in the developed countries, this average reaches between 80-90 kg. and for example, the consumption of fertilizer in Democratic Republic of Germany, is 92.6 kg. per capita; Australia 87.7 kg.; and France 82.3 kg. per capita. See Table (8).

At this average of consumption per capita of fertilizers, Iraq is situated among the countries of low consumption.

Table (7) a

Average Consumption of Fertilizers in Some Countries  
Kg/Hectare. According to the 1969-1979 Statistics

Countries	Fertilizer Consumption (1000) Tons	Cultivated Land Million Hectare	Fertilized Consumption Kg/Hectare/ Nutritional Comp.	Notes
Holland	614	0.91	675	
Belgium	519	0.89	583	
Japan	2276.4	.68	400	
West Germany	3061	8.19	374	More than 200 kg/hectare is considered very high.
East Germany	1500.2	4.99	301	
Austria	0409.2	1.67	243	
France	4203.2	19.82	213	
Czechoslovakia	1130	5.35	212	
Poland	2440	15.49	158	
Sweden	473.1	3.04	156	High
Hungaria	698.6	5.61	125	100-200 kg/hectare.
Bulgaria	685	4.56	150	

.../



Table (7) b

Countries	Fertilizer Consumption (1000) Tons	Cultivated Land Million Hectare	Fertilized Consumption Kg/hectare/ Nutritional Comp.	Notes
Egypt	323	3.85	48	
USA	14.880.7	176.4	82	Medium
Ceylon	119.5	1.98	61	50-100 kg/hectare.
Romania	585	10.56	55	
URSS	8.033.0	224.3	36	
China	3.246.0	109.4	30	Low
malaysia	101.3	3.57	29	25-50 kg/hectare.
Australia	1.097.0	41.46	27	
Mexico	533.7	23.82	22	
Brazil	601.3	29.76	20	
Indonesia	227.3	12.70	18	Very low.
Canada	755.0	43.40	17	
India	17110.1	163.7	10	
Tunisia	38.6	4.51	8.6	

.../

Table (7) o

Countries	Fertilizer Consumption (1000) Tons	Cultivated Land Million Hectare	Fertilized Consumption Kg/Hectare/ Nutritional Comp.	Notes
Iran	87.0	11.59	7.5	
Syria	28.9	5.86	4.9	
Argentina	74.1	33.01	2.2	
Iraq	14.1	7.50	2	1-2.5
Afghanistan	15	7.84	1.9	Very little.
Tanzania	12.5	11.7	1.1	
Nigeria	13.5	21.8	.6	
Ethiopia	1.3	9.6	0.1	

Table (8)  
Consumption of Nutritional Components  
Per Capita

Countries	Kg/Capita	Notes
East Germany	92.6	
Australia	87.7	
France	82.3	5-80
? Poland	74.1	Very high.
USA	67.8	
Austria	55.3	
Poland	47.2	
Spain	37.2	25-50
URSS	33.1	High
UK	28.1	
Japan	22	
Switzerland	21.9	
Taiwan	19.1	10-25
Chile	15.2	Medium
Turkey	12.5	
Mexico	10.5	
Egypt	9.3	
Tunisia	7.6	5-10
Brazil	6.5	Low
Morocco	6.2	
Philippines	4.5	
Thailand	3.6	
India	3.1	
Iran	3.1	Very low
Pakistan	2.9	
Indonesia	1.9	
Angola	---	

The position of Iraq among the Arab countries in fertilizers consumption per hectare based on the cultivated land, comes after Egypt, Lebanon, Algeria, and is about the same consumption of Libya and Morocco and higher than the rates in other Arab countries.

As for its rank of consumption per capita, Iraq has not reached an advanced position among the Arab countries but is preceded by Libya, Egypt, Syria, Lebanon, Tunisia, Morocco and situated at about the same average with Algeria and higher than Jordan, Sudan and the other Arab countries as shown in Table (10).

As for the general average consumption of fertilizers in the Arab countries which is estimated to be 32.5 kg. nutritional components/hectare and 8.6 kg. nutritional components per capita, Iraq is within this average for both consumptions.

Table (9)  
Fertilizers Consumption in the Arab Countries  
Kg. Nutritional Components/Hectare 1978

Countries	Total Consumption Thousand Tons of Nut. Comp.	Cultivated Land/Million Hectare	Consumption Kg./Hectare
Egypt	533.00	3.0	177.7
Lebanon	31.00	.35	97.1
Algeria	157.300	3.9	40.3
Morocco	187.300	5.4	34.7
Libya	55.00	1.6	34.4
Iraq(*)	87.500	2.9	30.0
Tunisia	54.900	2.1	26.1
Syria	98.500	6.0	16.4
Saudi Arabia	91.900	0.9	11.0
Jordan	13.900	1.3	10.7
Sudan	70.400	8.0	8.8
Somal	3.8	1.0	3.8
N. Yemen	5.600	1.3	4.3
TOTAL	1295.600	39.65	

Average consumption/hectare 32.5 kg. nutritional components.

(\*) Arab Union for chemical fertilizers producers.

(\*) Figures according to the latest information of cultivated lands and fertilizers quantities used in 1978.

Table (10)

Arab Countries Consumption of Fertilizers  
Kg/Nutritional Components/Capita for 1978

Countries	Total Consumption Thousand Tons	Population Million	Average Personal Consumption Kg/Person
Libya	55.00	2.9	19.0
Egypt	533.00	40.0	13.3
Syria	98.500	8.0	12.3
Lebanon	34.000	3.1	11.0
Tunisia	54.900	5.4	10.2
Morocco	187.300	19.0	9.9
Algeria	157.300	18.4	8.2
Iraq (*)	87.500	12.5-13.0	6.7-7
Jordan	13.900	2.8	5.0
Sudan	70.400	17.0	3.7
N. Yemen	5.600	5.2	1.1
Saudi Arabia	9.900	9.6	1.0
Somal.	3.800	4.4	0.9
<b>TOTAL</b>	<b>1295.600</b>	<b>151.0</b>	

Average personal consumption = 8.6 kg. nutritional components.

(\*) Iraqi figures of consumption according to real facts of 1978.

According to the actual and real consumption of chemical fertilizers in Iraq and the actual and future agricultural situation compared to the world situation either in the developed or developing countries, and in the light of the potentiality in vertical and horizontal increase in agricultural production, the results obtained by the utilization of chemical fertilizers at the economic and experimental agricultural production level, its scientific research and field experiments and pilot agriculture, the following conclusions can be drawn:

- 1 - In spite the fact, that Iraq has recently started utilizing chemical fertilizers, its utilization has made a fast progress phase which is noticeable for the developing countries as compared with those having long or short experience in this field.

During the years 1978-1979, 90% of the proposed area for fertilization is fertilized for the summer crops and more than 70% for winter crops which is considered a successful and promising experience.

Fertilizers utilization has achieved ambitious and high economic return as compared with the advanced countries, especially the fertilization of Maxibac wheat and some other field crops particularly in the pilot agricultural plants.

- 2 - Creating fertilization awareness so that farmers would realize that fertilization is an essential process in the agricultural sector, otherwise the efforts without the proper utilization of fertilizers will not give the suitable revenue compared with the efforts and costs spent. Therefore, the advisory process in proper use of fertilizer has reached the farmers without difficulties. As for rationalizing optimum consumption of fertilizer, the research being carried out by the specialized departments in the Ministry of Agriculture and Agrarian Reform to establish an Iraqi agricultural guideline to be the indicative for most agricultural crops.

This picture becomes clearer when we notice that the utilization rates of fertilizers in the private, socialist and state sectors are at an equal level in implementing the fertilizing plans. Water melon areas were fertilized in 1978 at a rate of 197% of the proposed areas, summer vegetables at a rate of 134%, corn at 145%, sesame at 123%, open air planned tomato at 103%, garlic at 114% and linseed at 112%.

As for the utilization level of fertilizers by the agricultural sectors, we can notice that the socialist sector has planned to utilize 10641 tons of ammonium sulfate in 1978 while the real quantities utilized were 36205 tons, i.e. at an increased rate of 340%. The private sector has utilized 140% of ammonium sulfate of the proposed amount for the same year.

- 3 - The experience of using urea as an effective and concentrated nitrogenous fertilizer, did not take a long time in Iraq. A serious trend in using urea was noticed after the long period of using ammonium sulfate by Iraqi farmers and this experience has been accomplished in quite a short period and did not take even half of the time it took in the advanced countries. This is due to the efforts spent in the experiments field and pilot agriculture practices, which demonstrated the effectiveness of urea and provided the farmers with a scientific evidence, especially in the Great Mussayab Project (one of the pioneer experimental fields).

Before starting the local production of fertilizers in Iraq, total consumption in 1970 was 260 tons of urea only, in 1972 (Iraq started producing nitrogen fertilizers), the consumed urea was 3500 tons, in 1978, urea consumption in Iraq increased to 106.5 thousand tons.

Statistics show that the agricultural sector consumed higher quantities of urea than the estimated amounts especially in 1978, when this sector consumed about 50 thousand tons, while it was planned to consume 50 thousand tons and the private sector consumed about 48.5 thousand tons.

- 4 - Field experiments on Maxibac wheat have achieved high consumption rates in fertilizers utilization. It reached about 150 kg. nitrogen and 50 kg. phosphorus ( $P_2O_5$ ) per hectare and the average production is 4760 kg./hectare. The emphasis on fertilizing wheat was placed because the cultivated area for wheat growing was more than half the total area allocated for all other summer and winter crops. This area comes to 7.781.940 donoum in 1978, so the generalization of fertilizing all or most of the wheat crop will yield high results and will be more feasible.
  
- 5 - In fact, no significant improvement has been achieved in regard to horizontal expansion of the agricultural land since such operation is quite slow in nature. Therefore, the cultivatable area allocated for agriculture for the years 1976-1980 did not exceed the average of 13.5-14.0 million donoum and even if the proposed land reclamation plan for the year 1980-1985 will be completely accomplished, it will not add more than 1.5 million donoum to the cultivated land.

Therefore, it seems that there is no choice other than emphasizing the factors enhancing the vertical expansion in agriculture, which means the use of fertilizer, is one of the top priority. As for the long-run planning program, it is foreseen that the total cultivatable land by the year 2000 will reach 12.5 million donoum in addition to the present area.

- 6 - The percentage of the fertilized area compared to the total cultivated land for the plan period 1976-1980 is quite low and it did not actually amount to more than 12%. For example, in 1978, of the total cultivated area - which was 11.6 million donoum - fertilizer was applied to only 1.4 million donoum. This fact suggests the increase of the area to be covered by the fertilizer program.
  
- 7 - It was also noted that fertilizing operation was concentrated on a limited number of crops such as vegetables and other economic



field products which gave plenty of products in a short time as we particularly felt this phenomena within the private sector more than others. Therefore, the use of fertilizer was applied to about 30-80% of the cultivated land which grew such crops while we saw only 6% of the area planted with wheat was covered by fertilizing program and 2.5% of the area used for growing the barley was fertilized.

These facts indicate a great potentiality in Iraq in order to achieve high quantity of grain to contribute in solving the food crisis on national and international levels.

Estimations on Iraq Consumption of  
Chemical Fertilizers Until 1985/1986

According to what we have mentioned before, and the agricultural facts for the late years of the Development Plan 1976-1980 and the discussions of the annual agricultural plan for the summer season 1980 and winter season 1980-1981, we have estimated the chemical fertilizers quantities expected to be consumed during the years until 1985-1986 on the basis of the following objectives which are listed below in detail. At the same time, we tried not to depend on pure statistic factors which sometimes neglect the effects of some specific facts on the agricultural and fertilization conditions, especially that we are dealing with land, irrigation sources and human elements in a developing country. These factors should be taken into consideration. Accordingly, we assumed the following points in our estimations of future consumption of fertilizers:

- 1 - Considering the agricultural plan for 1980, proposed by the Ministry of Agriculture and Agrarian Reform, as a base year for the areas decided for cultivation which amount to 13.2 million donoum, and the areas suggested for fertilization of this total area which is 2.4 million donoum.

2 - Considering the total reclaimed areas to be fertilized, as they are prepared, suitable for fertilization, this reclaimed land shall be at a rate of 300.000 donoum annually. That most of the five-year plan of reclamation contracts are already signed or ready to be signed with specialized international companies. So the added areas to be fertilized on 1985-1986 will be about 1.5 million donoum.

3 - It is possible to fertilize more than 20% of the areas planned to be cultivated in 1985-1986, especially that the actual fertilized areas in 1978 was 12%, and in 1979 reached to 17.6% while the proposed areas for fertilization in the agricultural plan 1980-1981 is about 18%.

Based on the foregoing, it seems possible to reach a 20% rate of fertilized land in the fertilization process.

4 - Assuming that the whole area which will be reclaimed for pilot agriculture projects, State Farms and experimental farms will be included in the fertilization process.

5 - Following the actual rate of fertilizer consumption which were implemented during 1978-1979 in the cultivated areas and the proposed percentage for the 1980-1981, as an average amount of fertilizer used per donoum.

Year	Fertilized Area/Donoum	Total Fertilizers Supplied Per Ton	Fertilizer per Donoum Kg/Donoum
1978	1.362.000	246.000	180
1979	1.817.422	242.335	133
1980	2.400.000	348.055	139.5
Proposed			

6 - Following the decisions of the high committee for fertilization for the quantities and kinds of fertilizers decided for the summer and winter crops, i.g.

- Wheat                                    64 kg. urea/donoum  
    35 kg. super phosphate/donoum  
    (average for irrigated and rain-field)
- Rice                                    55 kg. urea/donoum     ) Average for Philippine  
    25 kg. super phosphate) and Ghabar rice
- Tomato                                 )
- Aubergine                              ) 30 kg. nitrogen/donoum
- Lady finger                            ) 40 kg. phosphor penta oxide/donoum
- Green pepper)                         30 kg. potassium oxide/donoum
- Kidney beans)                         30 kg. nitrogen/donoum
- Negro beans )                         40 kg. phosphor penta oxide/donoum
- Winter vegetables                     ) 25 kg. nitrogen/donoum
- Lettuce, Cabbage                      ) 25 kg. phosphor penta oxide
- Parsley-leaf, beet, etc.)

7 - Fertilizing a considerable part of fruit and palm tree orchards.

8 - Following the instructions and recommendations of the dissemination of agricultural knowledge regarding ways and importance of chemical fertilizers and to increase agricultural extension to:

- continue the price support for the locally produced fertilizers.
- make it possible for fertilizers to reach the whole country especially the small towns and villages by establishing distribution centers in each governate.
- reinforce the principles of agricultural fund lending to cover the cost of fertilizers and to be paid from the yield.
- ensure buying crops at reasonable prices, by the government and to provide the suitable stores for them.
- provide improved seeds which react to chemical fertilizers and Iraqi soil, to develop research centers and enlarge experimental farms.

- complete the land reclamation plans.
- accompany reclamation plans with requirements of irrigation networks to ensure investing them directly after completion of the reclamation works.
- emphasize the role of urea as a suitable substitute to nitrogen fertilizers and to rationalize their utilization because of the limited productive capacity of ammonium sulfate in Iraq, so that the future prospect for nitrogen will depend on urea.
- demonstrate scientific facts which confirm that increased utilization of nitrogen fertilizers will lead to the increase of the rate of soil requirements for phosphate fertilizers.

According to these assumptions, the total areas cultivated by various crops will be about 16.5-17 million donoum in 1985-1986, while the total cultivated areas is about 31 million donoum<sup>(\*)</sup> according to the estimate of the second conference of the Ministry of Agriculture and Agrarian Reform.

Our estimations for the expected land to be cultivated in 1985-1986 are based on the previous facts with a practical view and as detailed below:

- 13.2 million donoum is the proposed area to be cultivated in 1980-81 according to the plan of the Ministry of Agriculture and Agrarian Reform.
  - 1.5 million donoum will be reclaimed until 1985 according to the plan of the State Organization for Soil and Land Reclamation and the irrigation plan of the Ministry of Irrigation for the same period.
  - 0.5 million donoum will be reclaimed directly by the agricultural organizations in Abu Churaib, Dujayla, Khalis and Great Mussayab Organizations.
  - 1.0 million donoum represent the lands prepared for cultivation but is not cultivated because of some reasons such as the non-completion of irrigation resources, mechanization and seed distribution, etc. which will be completed by 1985-1986.
  - 0.5 million donoum covering fruit and palm tree orchards.
- 
- TOTAL 16.7 million donoum minimum.

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(\*) Dr. Maji Abdul Kadi - British Sison International Bureau.

The areas to be fertilized from the total cultivated land as mentioned above are estimated according to the following points:

- 1.5 million donoum newly reclaimed lands which will be naturally suitable to fertilizer application.
- 1.5 million donoum represent the total area of governmental organizations, pilot agriculture plant which are supposed to be subject to fertilization accordingly.
- 0.5 million donoum represent the fruit and palm tree orchards which will be fertilized.

As for the rest of the cultivated areas which is 13.2 million donoum, it will be possible to fertilize 25% according to the actual fertilization rates in 1979, which was 16.7; and the suggested rate in 1980-1981 is approximately 18%. Therefore, the areas included by fertilization from the rest of the cultivated land will be:

$$13.2 \times 25\% = 3.3 \text{ million donoum}$$

and by adding this area to the areas proposed to be fertilized as mentioned above, the total fertilized area will be about 6.8 million donoum in 1985-1986.

If we assume that 90% of these areas will be fertilized, the net fertilized area will be  $90\% \times 6.8 = 6.12$  million donoum. We have also practiced a different method for the estimation of the fertilized areas in 1985-1986 based on the rate of increase of fertilized land from 1979 to 1980 which is 600.000 donoum/annum. It will make about 3 million donoum for the coming five years, therefore, the total estimated areas to be fertilized in 1985-1986 will be about 5.4 million donoum ( $3 \text{ million} + 2.4 = 5.4$ ) which is close to our estimate and supported by taking the average of the two methods of estimation

$$\frac{6.12 + 5.4}{2} = \frac{11.6}{2} = 5.6 \text{ million donoum}$$

Therefore, 5.6 million donoum can be considered the lowest estimate for the land to be fertilized in 1985-1986.

According to these estimates, the quantities of fertilizers consumed for the total cultivatable area in 1985-1986 are calculated on two bases:

- 1 - To use the average consumption of fertilizers for the years 1978, 1979 and 1980 which is 151 kg. of all sorts of fertilizers per donoum, so the total quantities of fertilizers in 1985-1986 for the total area of 5.6 million donoum will be —

$$5.6 \text{ million donoum} \times 151 \text{ kg./donoum} = 845,600 \text{ tons of chemical fertilizers}$$

- 2 - To follow the other system which contain the detailed estimate according to the quantities of fertilizers determined by the High Committee for Fertilization in the Ministry of Agriculture and Agrarian Reform for the year 1980, then the quantities of fertilizers in 1985-1986 will be 862,000 tons according to the following points:

- 1.0 million donoum pilot agriculture at a rate of 150 kg./donoum, this rate is low, for most of the pilot agriculture even though it requires about 150,000 tons.
- 1.6 million donoum cultivated with summer crops of high consumption of fertilizers such as tomato, aiberginè, green pepper, kidney beans, negro beans, etc. at a rate of 220 kg./donoum, i.e. totaling to 352,000 tons.
- 3.0 million donoum for winter crops where wheat and barley constitute the majority, at a rate of 120 kg./donoum, i.e. it needs about 360,000 tons of fertilizer.

According to this method, the total consumption of different kinds of chemical fertilizers is 862,000 tons. This estimate is slightly higher than the first estimate, which is 845,000 tons.

We can therefore conclude that fertilizer consumption in Iraq in 1985-1986 would be about 850,000 to 900,000 tons of different kinds of fertilizers, or, in other words 300,000 tons of nutritional components (N.P.K.).

They are distributed as follows:

- 60% is nitrogen, or 180 thousand tons nitrogen.
- 38% phosphorus, or 115 thousand tons phosphorus penta oxide.
- 2% potassium oxide, 5 thousand tons.

As for the kinds of fertilizers to be consumed, we do not expect an increase in the ammonium sulfate rate compared to the actual rate, i.e. it will be constant at a level of 100,000 tons which correspond to the local production, unless the Ministry of Agriculture and Land Reform's experiments show more need for ammonium sulfate and a new plant to produce this kind of fertilizer is erected. Most of the nitrogen quantities demanded will be supplied in the form of urea. As for the phosphate fertilizers, they will be supplied by the Al-Qaim Complex project, which produces super phosphate, mono-ammonium phosphate, and mixed fertilizer.

Accordingly, the demand will be about 350-400 thousand tons of urea, 100 thousand tons of ammonium sulfate and the rest will be super phosphate and ammonium mono-phosphate. All of them will be supplied locally by the fertilizers factories in Basrah and Al-Qaim, except small quantities of potassium and other complex fertilizers which will be imported.

#### The Fertilizer Industry and its Development in Iraq

The idea of establishing chemical fertilizers industry in Iraq, particularly, nitrogenous fertilizers, goes back to the early fifties when some of the international consulting firms have carried out a comprehensive industrial survey in Iraq such as D. William press and Arthure D. little companies which were hired at that time by the third technical section of the Ministry of Development.

This technical section was later incorporated in the Ministry of Industry after the Revolution of 14 July 1958. In 1956, the nitrogenous fertilizers industry entered a preliminary stage of execution by including such project in the techno-economical cooperation agreement signed between Iraq and USSR on 16 March 1959, yet, nothing actually had been done apart from making reports, studies, negotiations and some other surveys. Therefore, the Iraqi side had to look for other effective methods to execute this project and finally, it decided to hire an international consulting engineering.

Accordingly, in 1967, Iraq signed a project for fertilizer at Abu-Al-Khassib, Basrah governate with the following units:

- 1 - Ammonia unit with a production capacity of 200 tons/day.
- 2 - Sulphuric acid unit to produce 325 tons/day.
- 3 - Ammonium sulphate unit with a capacity of 420 tons/day.
- 4 - Urea unit to produce 160 tons/day. Such capacities were considered quite large at that time compared to the existing units in the world.

This project was completed at the beginning of 1971 and commercial production started at the mid-1971 after passing the contractual guarantees. Such experience was quite a shift to more complicated chemical industries where Iraq's experience was limited then to refinery, cement, edible oil extraction and sugar industry. Therefore, it was difficult to secure the required number of trained cadres for operation and maintenance.

In spite of such difficulties, the Iraqi staff have managed to operate the plant under normal circumstances. The lack of infrastructure, and many other obstacles affected the operation stream and caused many shut-downs which prolonged the maintenance period, particularly those factors related to power supply failure, low voltage, change of raw water specifications which consequently reduced the annual out-put at the first years of the operations to about 60% of the designed capacity. This project is still at regular operation condition and run by Iraqi cadets.

After the great Revolution of 17 July 1968, wherein the first priorities were the full utilization of the natural resources in order to serve the interest of the national development; to utilize the country's returns by adopting a strategy of particular characteristic, aiming at connecting the national interest with a human view to realize the suffering of the world nations from poverty, lack of food and hunger, particularly, in developing countries, Iraq spared no efforts in this respect to help the humanity by putting its capabilities to serve this intention. Since the production of chemical fertilizer may play an effective role in providing sufficient food to those nations, the Revolutionary Government of Iraq



has decided to expand the fertilizer industry which is based on locally available raw materials such as natural gas, sulphur and phosphate deposits. The establishment of such industry is also supported by previous experience and a promising international market.

Accordingly, the first fertilizer project was expanded by erecting a new urea unit having a production capacity of 420 thousand tons per year, which is eight times as much as the capacity of the old urea unit. This project was constructed adjacent to the old plant and was completed on schedule in 1976-1977. Although this new expansion faced some operational difficulties and maintenance problems at the beginning due to its new technology and high capacities, it was possible to maintain it at quite stable conditions.

The capacity of the ammonia unit was 800 tons/year which is equivalent to 4 times of the old ammonia unit's capacity, and the new urea unit's capacity is now 1300 tons/day which is equal to 8 times of the old urea capacity.

This expanded project was operated more efficiently by utilizing past experience in plant number (1) and achieved a higher rate of production which reached to about 70% of designed capacity. In 1975-1976, Iraq entered into a new stage in chemical fertilizer industry both in nitrogenous and phosphatic fertilizers, particularly when results of surveys and studies revealed the availability of commercial phosphate ore at a concentration of 19-23% of  $P_2O_5$  and therefore, contracts for utilizing phosphate was signed with an international firm to produce approximately 3.4 million tons of phosphate ore per year. The year 1975 had also witnessed the signature of the biggest nitrogen complex in this area so as to produce one million tons of urea per year in two parallel lines. This project had been completed before the contractual time limit and started commercial production in February 1979 in the first line and in June of the same year, the other line had started its production.

This new and giant Urea Complex is now on normal operation and achieving a production average of 90-95% of the designed capacity and run by Iraqi staff compared to the operational and maintenance problems faced by fertilizer projects number (1) and its expansion number (2). The new Urea Plant

at Khor Al-Zubair faced no serious problem so far, indicating the return of the experience gained from the other plants for the past ten years in the design stages, execution, operation, maintenance and marketing. At the beginning of 1976, Iraq had also signed the contract for Al-Qaim Phosphate Fertilizer Complex near the phosphate ore with the following units:

- 1 - Phosphate ore concentration unit to bring the phosphate content to about 30-31%  $P_2O_5$ .
- 2 - Production of 1.5 million tons of sulphuric acid/year.
- 3 - Phosphoric acid unit with a capacity of 400,000 tons/year.
- 4 - Ammonium phosphate plant to produce 250,000 tons/year.
- 5 - 600,000 tons/year triple-super-phosphate unit.
- 6 - 272,000 tons/year of different mixed fertilizer.

This complex includes all the required facilities mainly, road connection, living quarter, water electricity, railway connection, etc. It is also planned to erect an ammonia unit for production of mixed fertilizer instead of transporting the required ammonia from Basrah which is about one thousand kl. away. This complex is expected to be completed by 1980 and commercial production starts at the middle of 1981, however, some delay occurred due to its remote location. Looking at such progress achieved in the chemical fertilizer industry, Iraq occupies today a significant position among Arab countries as well as at the international level in fertilizer production.

Iraq had produced about half a million tons of nitrogen in 1976 while the total production of Arab countries reached about 390 thousand tons of nitrogen during the same year, and also in the case of phosphate fertilizer, Iraq planned to produce about  $\frac{1}{2}$  million tons of  $P_2O_5$  while the total production of Arab countries in 1976 was about 737 thousand tons of  $P_2O_5$ .

Summary and Conclusion

After surveying the agricultural situation in Iraq and its development prospects during the six coming years; and surveying the development of chemical fertilizers industry during the period since its establishment; and the large volume reached as well as the high technological and commercial level; the position achieved in the world market as a big exporter, taking into account the achievements of the required infrastructure to facilitate storage, transport, loading and export operation especially after erecting the industrial export facilities for exporting chemical fertilizers in Khor Al-Zubair region in quality and quantity; measures have also been taken to build railroads between the phosphate complex and exporting locations. Accordingly, the following conclusions can be drawn:

- 1 - The horizontal expansion of agricultural area in Iraq will be quite limited and required a long time to implement the plans of land reclamation, and to execute the irrigation projects. It is worthwhile to mention that the reclamation plan for 1985-1986 shall not cover more than 1,650,000 donoum, i.e. less than half a million hectares.

As for the future expansion plan, at the long run, it is estimated to reclaim about 12.5 million donoum until the year 2000. Therefore, Iraq will have to depend on vertical expansion for increasing the agricultural production to a large extent. In other words, to use higher quantities of chemical fertilizers per cultivated unit, taking into consideration the technical capability aspects.

- 2 - There will be a production surplus of chemical fertilizers during the next ten years, according to the actual situation of chemical fertilizers production of Iraq. This surplus is ready for export with all requirements to facilitate the export such as storage, transport and shipping.

It will be possible to export not less than 70% of the produced nitrogenous and phosphatic fertilizers during the next five-year plan of 1981-1986.

- 3 - More emphasis is required to advise farmers on optimum utilization of the chemical fertilizers.
- 4 - There is a large potential to increase agricultural production by extending the uses of chemical fertilizers to cover a larger area of the cultivated land by fertilization plan. The highest percentage of the fertilized land still did not exceed 13% of the total cultivated lands according to the last agriculture report for the summer 1980 and the winter season of 1980-1981. This rate is considered low in comparison to the available potentiality and capabilities of chemical fertilizer.
- 5 - The quantities of chemical fertilizer used per unit are considered reasonable and represents medium level which is a rather good rate. We therefore, recommend expansion of the fertilized area before trying to increase the quantities actually used per unit, because the latter requires particular conditions and specific soil, and excess water, etc.
- 6 - The chemical fertilizer industries in Iraq have been remarkably developed, particularly in the field of nitrogenous fertilizer which was established before ten years progressively and successfully. The newly established phosphatic fertilizer industry has also a promising future. The developed industry of fertilizer in Iraq has formed a very solid base for future expansion in this field.

Moreover, this industry is welcomed in the world markets for its reasonable prices. It has achieved economic benefits and is still heading for better prices in the future.

- 7 - This industry has created specialized and well trained cadres in the country which can carry on the needs of this industry, and is a source for the future projects either in the Iraq or in other Arab countries.

8 - Iraq has the privilege among the neighboring countries in achieving a developed chemical fertilizers industry, this privilege is presented by its national cadre which have the experience of operating and managing its own projects as well as the implementation of a large service facility for this industry to facilitate its expansion and development. The strategic position of Iraq in chemical fertilizers production enables the country to have a weight in the world markets and to play an effective role in keeping the commercial balance of this major commodity especially in the developing countries which are mostly in need of support to abolish exploitation and repression.

Iraq has always been against the exploitation by adopting rational pricing policies for commodities and goods exported in the world market and by its humanitarian views and principles to establish justice, free economies and equal opportunities.



