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AGRICULTURAL DEVELOPMENT IN LEBANON

BY



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Preface

The importance of agricultural and rural development in the improvement of the standards of living in low and medium-income countries is increasingly recognized as new nations gain experience in economic development processes. Many of these nations are faced with the task of transforming a subsistence level agricultural system into a more productive contributor to national economic growth at a time when their rate of population increase is placing great demands on national capabilities for the production of food and fiber.

Although materials and methods from agriculturally advanced nations can seldom be transferred directly to developing nations without testing and adaptation to local environments, the evaluation of factors that have contributed to agricultural progress in the developed countries is useful in isolating principles or procedures that may help to accelerate agricultural development elsewhere. These factors are numerous, interrelated and complex, but they have permitted achievement of an abundance and efficiency in the agricultural sector such as developing nations aspire to, as they strive for economic, social and political stability.

The past 25 years have witnessed very rapid progress in agricultural development in many of the developing nations. This has been marked by a steady infusion of science and technology. Increased productivity from improved materials and techniques, rather than from more land and farm labor, accounts for a greater part of the expansion in agricultural output.

Annual increases in agricultural output are usually very low, and do not match with population growth rates. Even in a country like the U.S., it has rarely exceeded 2 percent. Therefore developing nations with their tremendous task of meeting needs of growing populations must try to assemble all possible effective measures and apply them in modernizing agricultural practices.

Lebanon like all agriculturally developing countries, must establish the basic economic and social conditions that will encourage farmers to expand production. This agenda paper has attempted to present some of these conditions. Among these are systems of land tenure, essential agricultural production inputs, stable and adequate prices for farm products, accessible and dependable markets, adequate social and capital infrastructure, and supplies of consumer goods that enhance and improve living standards. External agencies may be helpful at times furnishing

the kinds of support and technical assistance that are involved most directly in expanding production.

This agenda paper presents in brief the status of the agricultural sector in Lebanon prior to 1975. It then goes on to present some of the authors' views and outlook on development of the various components of agricultural production. It is hoped that it will be helpful in furnishing some background information and experience for the use of agricultural planners and administrators for the reconstruction and development of Lebanon.

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Agriculture in Lebanon¹

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SECTION ONE INTRODUCTION

Lebanon is considered as one of the greenest countries of the Middle East since almost 1/3 of its total area is either arable land or cultivated with permanent crops (Table 1.1). About 1/4 of these cropped areas are irrigated, and the remainder is dry land. As compared to the Middle East, Lebanon has a mild climate, with dry summers and rain coming during the winter season. The annual precipitation along the coast is about 900mm, in the mountains it exceeds 1000mm and in the Beqa'a plain about 400mm. The southern portion of the Beqa'a is drained by the Litani river which flows south to the Mediterranean Sea. The northern portion is drained by the Orontes (Al-Assi) river which flows north into Syria and then cutting through the mountains into the sea. The soils are derived primarily from limestone, calcareous, with medium to heavy texture, low in organic matter and nitrogen and have in general a high pH.

Agriculture in Lebanon plays a minor role in the economy of the country, since most of the gross national product (GNP) depends on human services. It has been reported that the GNP of Lebanon amounted to 6,308 million L.L. in 1973 (Statistics of the Ministry of Planning as reported by K. Kubah, 1977). The contribution of the Agricultural sector was 11% (675 million L.L.); whereas industry contributed 16% (1,038 million L.L.) and human services 73% (4,595 million L.L.). It has been estimated that in 1965 about 30% of the economically active population was involved in agriculture whereas in 1976 the percentage dropped to 13.5% (Table 1.2).

1. Contribution from the Faculty of Agricultural and Food Sciences, American University of Beirut as Journal Number 512 C. Commissioned by the Council for Development and Reconstruction, Lebanon.

2. Associate Professor of Agricultural Economics
Professor of Poultry Science and Nutrition
Professor of Entomology
Assistant Professor of Irrigation
Professor of Weed Science.

Table 1.1 Total Area and Land Use in Lebanon*

	1000 HA
Total area ¹	1040
Land area ²	1023
Arable land ³	240
Land under permanent crops ⁴	108
Permanent pastures ⁵	10
Forest and wood land ⁶	80
Other land ⁷	585
Irrigated land**	65
Coastal areas	20
Mountain areas	15
Beqa'a plain	30

1. The total area of the country, including area under inland water bodies.
2. The total area, excluding area under inland water bodies.
3. The land under temporary crops, temporary meadows for mowing or pasture, land under market and kitchen gardens, and land temporarily fallow or lying idle.
4. The land cultivated with crops which occupy it for long periods and need not be replanted after each harvest, such as shrubs, fruit trees, nut trees and vines, but exclude land under trees grown for wood or timber.
5. The land used permanently for herbaceous forage crops, either cultivated or growing wild.
6. The land under natural or planted stands of trees, whether or not productive, and includes land from which forests have been cleared but which will be reforested in the foreseeable future (during 1975-76 troubles 1/2 of the forest trees were cut or burned).
7. Includes unused but potentially productive land, built on areas, wasteland, parks, ornamental gardens, roads, lanes, barren land, and any other land not specifically listed under items 3 through 6.

* FAO Production Yearbook, Vol. 30, 1976.

** F. Saadeh, Development studies Association Conference on National development and Agricultural Development in Lebanon, 1969. Irrigated areas may increase to 100,000 hectares if irrigation projects are implemented.

Table 1.2 Total, Agricultural, and Economically Active Population (in thousands*)

Year	Population		Economically Active Population ²		
	Total	Agricultural ¹	Total	Agriculture ³	% Agriculture
1965	2151	626	572	166	29.1
1970	2469	487	644	127	19.7
1975	2869	404	745	105	14.1
1976	2959	399	768	104	13.5

1. All persons depending for their livelihood on agriculture. This comprises all persons actively engaged in agriculture and their non-working dependants.

2. All persons engaged or seeking employment in an economic activity, whether as employers, own-account workers, salaried employees or unpaid workers assisting in the operation of a family, farm, or business.

3. Includes all economically active persons engaged principally in agriculture, forestry, or fishing.

* FAO Production Yearbook Vol. 30, 1976.

SECTION TWO

THE STATUS OF LEBANESE AGRICULTURE PRIOR TO 1975

Major Crops

Although the area of agricultural land in Lebanon is relatively small, the diversified topography and climate of this area permits the production of a wide variety of crops. Along the narrow coastal strip, citrus, bananas and vegetables are grown. At medium heights, olive groves and stone fruits are the predominant crops, while apples constitute the major crop at high elevations. In the Beqa'a plain which is the major agricultural area constituting 43% of the total agricultural land, a variety of crops are grown including wheat, barley, potatoes, sugarbeets, and vegetables. Grapes vines also occupy a sizeable area of the plain. Tobacco, another important crop, is mainly grown in southern and northern Lebanon.

Tables 2.1 and 2.2 summarize the information on major crops only. The tables indicate that the yield of a number of these crops is low and can be considerably increased with the utilization of improved agricultural practices. These will be discussed in Section Four.

The value of all agricultural products for 1973 was slightly below 700 million L.L., out of which, crops were valued at about 500 million L.L. and animal produce accounted for the major portion of the remaining 200 million L.L.

Table 2.1 Areas and Yields of Major Annual Crops. 1973 Statistics*

Crop	Area (ha)	Total Yield (tons)	Yield (tons/ha)
Wheat	50,125	55,138	1.1
Potatoes	8,891	116,236	13.1
Tobacco	7,509	9,876	1.3
Barley	7,332	6,511	0.9
Sunflower	5,420	665	0.1
Tomatoes	4,359	59,127	13.6
Peanuts	3,461	4,840	1.4
Lentils	3,067	1,232	0.4
Cucumbers	3,065	29,827	9.7

Table 2.2 Areas and Yields of Major Perennial Crops. 1973 Statistics*

Olives	30,160	32,250	1.1
Grapes	18,157	107,420	6.0
Apples	12,291	166,177	13.5
Citrus	11,939	306,735	25.7
Stone fruits	7,669	62,948	8.2
Bananas	2,660	43,900	16.5

* Statistiques Libanaises No. 9, 1973.

Animals

The animal industry in Lebanon has always been an important part of the total agricultural sector particularly during the sixties and early seventies when the poultry industry was rapidly expanding in the country. The value of the animal products has varied between 25-40% of the total agricultural output and the increase during that period was mainly due to increases in egg and poultry meat production in the country. In spite of this overall increase, animal production in Lebanon has not kept up with increases in local demands for animal products. Approximately one third of the deficit in balance of trade of agricultural products is due to imports of animal products.

Prior to 1975, Lebanon used to import approximately 4/5 of the red meats consumed in the country and 3/5 of the milk and milk products consumed. This is in addition to imports of fish, canned meats, animal fats, skins and hides, wool and others.

Land Used as Pasture or for Fodder Production

Studies conducted by the Animal Production office prior to 1975 have shown that sub-lands cover approximately 800,000 hectares in Lebanon.

Land that was actually planted with fodder crops did not exceed 18,000 hectares (2% of the agricultural land) and therefore as a result of this shortage in feed crops, Lebanon has been importing grains, oil seeds, concentrates and other feedstuffs valued at over 120 million L.L. per year.

The Animal Feed Industry

The animal feed industry in Lebanon started at approximately the same time as the poultry industry. In 1956 a couple of poultry producers started to import concentrates from the U.S. containing protein supplements, vitamins, trace minerals and certain feed additives. These concentrates were locally mixed with grains to make up the complete feed according to specifications of the manufacturers of these concentrates. In 1964, feed manufacturers shifted from importing the regular concentrate to that of a super concentrate containing animal protein supplements, vitamins, trace minerals and additives excluding the plant protein supplement which was mainly soybean meal. This was done because importers started getting soybean meal by bulk in large quantities and therefore this contributed to a lowering in feed costs.

This practice continued until 1968-69 when few feed manufac-

turers started learning more and more about feed formulation and manufacturing and the applications of linear programming to least cost formulations. At this time, feed manufacturers started depending less and less on imported concentrates and more and more on local concentrates because few manufacturers went into the concentrate producing business. Some plants established their own feed analysis laboratories which enabled them to use new feedstuffs more and more in their formulations. Others went into computer formulation which enabled them to make frequent changes in their rations to keep costs at a minimum. They developed into a highly sophisticated business with life cycle feeding and seasonal rations. The feed industry in Lebanon was on its way to becoming a highly developed industry before the war broke out.

Livestock and Poultry Numbers*

The most important animals produced in Lebanon are dairy cattle, sheep, goats broiler, and laying chickens. There are others of less importance like pigs, horses, mules, donkeys, camels, and rabbits.

Cattle

The number of cattle in Lebanon before 1975 did not exceed 100,000 head. About 50% of these could be classified as dairy or milk animals and the rest used for various purposes, particularly work animals. The amount of fresh cows' milk produced in the country did not exceed 200,000 liters per day, 60% of which was consumed in the rural areas of production and about 40% sent for processing and consumption in big towns and cities.

Sheep

The number of sheep in Lebanon varies between 200,000-250,000 depending on when the count is made. It is very difficult to get exact figures on sheep because of the roaming flocks and their movement into Syria and back into Lebanon. Sheep flocks in Lebanon are an important source of milk, meat and wool, but there are no reliable figures on these products.

Goats

It is estimated that there were about 450,000 goats in Lebanon before 1975. Most of these are Baladi goats of very low productivity. This large number of goats contributes sizeable

* Appendix III gives detailed information on the status of animal production in Lebanon for the years 1968-1973.

amounts of milk and meat. The goat has always been referred to as the menace of the Lebanese mountain because it is very active, climbing trees to eat their leaves and cleaning the land of its vegetation. The fault does not really lie on the goat as much as the owner that allows it to overgraze.

Poultry

The poultry industry has taken gigantic steps during the sixties and early seventies in Lebanon and many countries of the Middle East. Poultry meat production in Lebanon increased from less than 5,000 metric tons in 1960 to 18,000 in 1970. This broiler production is similar in technique to U.S. standards. It is estimated that there were about 3 million layers in Lebanon before 1975. The yearly production of table eggs ranged between 550 to 600 million per year, out of which 200-250 million were exported to various countries in the region.

Mechanization

The agricultural land holdings in Lebanon are small and fragmented. A statistical sampling of these holdings in 1961 showed that the average size was less than 2.4 hectares. Out of these small holdings, 88% were fragmented. In spite of this condition, which greatly reduces the economic viability of mechanized farming, and limit the use of machinery, one-half of the workers in Lebanon earn their living from farming, and the number of tractors being used on farms is increasing annually. Lebanon is considered as a country with the largest number of tractors per hectare (13 tractors per 1000 hectares). Mechanized farming has been stimulated in part by the rising costs of labor. In the case of the very poor areas, and those which are terraced and need specialized machinery, such a trend has not been observed.

Table 2.3 shows the trend in the increase of the number of tractors used in agricultural from 1948 to 1972. Figures for harvesters-threshers have also been reported to be for 1961-65 for 1970 (60) for 1971 (70) and for 1972 (80).

Table 2.3 Tractors in use from 1948-1972*

Years	1948	1961	1966	1967	1968	1969	1970	1971	1972
	-52	-65							
Crawl	63	110	100	106	110	120	140	160	170
Wheel	57	1349	1980	2140	2140	2230	2360	2540	2685
Total	120	1459	2080	2146	2250	2350	2500	2700	2855

Water Resources

The total area under irrigation in Lebanon amounts to only 65,000 hectares. Each hectare is supplied by 10,000 m³ annually. Hence the total water that is being used for irrigation is 650 x 10⁶ m³.

Distribution of Water Resources**

The water resources are distributed as follows:

Annual rain fed water (precipitation)	9700 x 10 ⁶ m ³
Annual surface water (river and spring flows)	4025 x 10 ⁶ m ³
Annual recharged underground water	600 x 10 ⁶ m ³
Total available water	4625 x 10 ⁶ m ³
Total lost water as evaporation and uncontrolled run off (9700-4625)	5075 x 10 ⁶ m ³
The surface water that flows outside Lebanon, that is Syria through Alassi-River and Alkabir river, and to Palestine through Hasbani river, is	650 x 10 ⁶ m ³
Total surface water available in Lebanese rivers and springs, is	3375 x 10 ⁶ m ³

* FAO Production Yearbooks.
 ** Ministry of Water and Electricity; Minister J. Sharaf El Din report, April, 1971, and the Agricultural Development Plan, Green Plan.

This water is distributed as follows according to season and regions in Lebanon:

	During Dec.-May	During June-Nov.
Western basins	1958 x 10 ⁶ m ³	515 x 10 ⁶ m ³
Beqa'a basin		
Assi river	43 x 10 ⁶ m ³	54 x 10 ⁶ m ³
Litani river	488 x 10 ⁶ m ³	153 x 10 ⁶ m ³
Hasbani river	4 x 10 ⁶ m ³	9 x 10 ⁶ m ³
Other springs	12 x 10 ⁶ m ³	35 x 10 ⁶ m ³
Drinking water	52 x 10 ⁶ m ³	52 x 10 ⁶ m ³
Total	2557 x 10 ⁶ m ³	818 x 10 ⁶ m ³

From the 818 x 10⁶ m³ available from June to November, 125 x 10⁶ m³ are available during August, where only 100 x 10⁶ m³ are used, due to the conventional methods of irrigation, which do not allow irrigation at night. From the 600 x 10⁶ m³ underground water, only 160 x 10⁶ m³ have been used for irrigation, industry and home consumption; leaving 440 x 10⁶ m³ that is not utilized. Part of this water is lost as underground water flow to the sea.

Actual Water Use in Lebanon

Out of the 2557 x 10⁶ m³ available during the winter (December-May) season only 200 x 10⁶ m³ are used for irrigation, 200 x 10⁶ m³ are stored in the Qaroun Lake for later use and 52 x 10⁶ m³ are used for drinking. The rest 2105 x 10⁶ m³ are lost as surface flow to the sea.

Existing Irrigation Projects

The irrigation projects that have been developed since 1943 are:

	Area under irrigation (hectares)
1. Yammouneh irrigation project	3000
2. Anjar irrigation project	1000
3. Akkar irrigation project	1800
4. Adonis (Ibrahim river) irrigation project	500
5. Kasmieh irrigation project	5000
6. Experimental Litani irrigation project (Saida region)	1200
Total	12500

Projects under Study

	To Irrigate (hectares)
1. Qa'a and Hirmil irrigation project	6000
2. Akkar plain irrigation project	6000
3. Zghorta-El-Koura irrigation project	7000
4. Southern Lebanon irrigation project	13000
5. Western plain irrigation project	31000
	63000

Ministry of Agriculture and Autonomous Boards Ministry of Agriculture

An organizational chart of the Ministry of Agriculture is given in Appendix I. It is self-explanatory and thus there is no need to discuss the functions of the various divisions, departments and sections within the central administration. However, the functions of the autonomous boards which report directly to the Minister are not given on the chart. So the functions of each of these boards is given here.

Autonomous Boards Fruit Office

The function of the fruit office is to organize and encourage the export of Lebanese fruits. To achieve its goals, it can take the following measures:

- Attempt at the improvement of fruit quality.
- Set specifications for grading and packing of fruits for export.
- Establish pilot packing houses.
- Supervise private packing houses.
- Ensure the availability of fruit storage houses.
- Collect statistics on agricultural trade in Lebanon and abroad.
- Advertise the Lebanese fruits and participate in national and international agricultural fairs.
- Establish branches for the office abroad.
- Expand the export market of the Lebanese fruits.
- Ensure the availability of transportation for the export of fruits.
- Set specifications for the export of fruits and agree on minimum prices with the importing country.
- Limit the illegal competition in the export of fruits.

Inspect and certify fruits ready for export.
Negotiate contracts on behalf of the Lebanese contractors and see that they abide by the terms of the contract.
Guarantee to the importing country the quality of the imported fruits.
Encourage the establishment of cooperatives.
Suggest means for organizing the trade and setting tariffs for the export of fruits.

Green Plan

The main function of the Green Plan is rural development. This is done by the following means:

Increase of the agricultural area by land reclamation.
Construction of rural roads.
Development of water retention techniques such as the building of reservoirs and canals.
Reforestation and water shed management.
Introduction of greenhouses and hydroponics so as to increase crop production.
The Green Plan has carried out econometric studies of possible markets for the Lebanese produce so as to advise the farmers on what crops to plant.
It has also conducted studies on agricultural industrialization.

The Green Plan cooperates with a number of International Organizations such as the FAO, UNDP, ECWA and the World Food Program.

Animal Production Office

The function of this office is to encourage the packing, storing and marketing of animal products, attempt at limiting their importation, and help in the export of locally produced animal products. To achieve its goals, it can take the following measures:

Assist the Ministry of Agriculture in the improvement of beef, dairy and poultry production.

Advise the Ministry of Agriculture on the prices of equipment, supplies and drugs used in animal production and processing of animal products.

Supervise the various private concerns dealing with the processing, storing and marketing of animal products through the:

Establishment of pedigree records of animals.

Suggesting ways and means for the improvement of animal production, marketing importing and exporting of such products.

Setting specifications for the production, grading, packaging and storing of animal products and animal feed.

Licensing the establishment of plants for the processing and storing of animal products.

Establishing pilot plants for the processing of animal products.

Setting standards for the import and export of animals and animal products and giving licenses for the export of animals and animal products.

Collect data and statistics on animal production in Lebanon and assess its future potential in relation to local and foreign markets.

Advertise the Lebanese animal products and participate in local and international fairs.

Aim for the improvement of marketing of animal products on the local and foreign markets.

Assist local animal producers and cooperatives through:

Helping cooperatives in obtaining short-term loans to increase animal production and marketing of the products.

Assisting cooperatives in securing animals, drugs and machines for the processing of products.

Processing of animals for the cooperatives in the pilot plants operated by the Office.

Assist in setting reasonable prices for animal products based on the actual cost of production.

Submit suggestions pertaining to trade and tariffs of animal products.

Silk Office

The function of the silk office is the production of the silkworm and raw silk to satisfy the local demand and the development of silk products. To achieve its goals, it can take the following measures:

Establish and operate facilities for the production of the silkworm.

Establish and operate facilities for the drying of cocoons and extraction of silk.

Establish and operate laboratories for the quality control of silk and silk textiles.

Supply the local demand with mulberry seedlings and silkworm either by importation or by local production.

Export silk textiles in excess of the local demand.

Purchase all locally produced cocoons.

Collect data and prepare studies for establishing a policy to encourage production of silk.

Carry out studies on methods to increase silk production.

Participate in a training program on silk production.

Organize fairs and meetings on silk production.

Examine locally produced silk and issue necessary certificates.

Agricultural Research Institute

The agricultural research institute maintain and operates several research stations. They are:

- a. Tel Amara — research on soils, water and crops is carried out.
- b. Terbol — research on animal production.
- c. Fanar — has three branches.
 1. Middle East Animal Health Institute
 2. Research on insect and disease pests of crops
 3. Secondary agricultural school
- d. Abdeh — research on citrus production and diseases and field crop production.
- e. Lib'a — research on soils and water.
- f. Kfardan.

Aspects of Rural Development

Introduction

In this paper rural development is defined as improving living standards of the mass of the low-income population residing in rural areas and making the process of their development self-sustaining. This simple definition has three important features with substantial implications for how rural development programs are designed and implemented:

- a. Improving the living standards of the subsistence population involves mobilization and allocation of resources so as to reach a desirable balance over time between the welfare and productive services available to the subsistence rural sector.
- b. Mass participation requires that resources be allocated to low-income regions and classes and that the productive and social services actually reach them.
- c. Making the process self-sustaining requires development of the appropriate skills and implementing capacity and the presence of institutions at the local, regional, and national levels to ensure the effective use of existing resources and to foster the mobilization of additional financial and human resources for continued development of the subsistence sector. Self-sustenance thus means involving, as distinct from simply reaching, the subsistence populations through development programs.

Rural Communities Farm Sizes

According to the data shown in Table 2.4, the situation with regards to farm sizes in Lebanon is alarming because most of the holdings are widely scattered in small parcels which result in poor management and poor farm efficiency. The situation with large farm sizes is also unsatisfactory. Holdings falling between 10-200 dunums category, over 40% are having 5-9 parcels and about 17% have 10-24 parcels. Even in the category of 200 dunums or more nearly 31 percent of the farms consist of 10-24 parcels or even more in some cases. This type of fragmentation is quite prominent in Mount Lebanon and some parts of South Lebanon where the fragmentation of holdings go up by 35 parcels in certain cases. The farm communities thus can never make best use of their human and physical resources.

Out of total holdings of 142,923, nearly 90,000 farm sizes are less than 20 dunums which are not economic units. These small

Table 2.4 Fragmentation of holdings by size of holding in Lebanon according to the 1970 agricultural census

Size of holding (in dunums)	Total number of holdings reporting	Less than 5 parcels	Number of holdings consisting of:					25 to 34 parcels	35 and over						
			5 to 9 parcels	10 to 24 parcels	5 to 9 parcels	10 to 24 parcels	25 to 34 parcels								
Without land	225	225	100	%											
Less than 5	402	361	94	23	6	143	0	0	0						
5	19	43	100	23	6	143	0	0	0						
10	23	14	100	612	23	327	0	0	0						
20	223	12	100	917	39	638	20	0	0						
30	12	5	100	554	44	988	0	0	0						
50	13	5	100	329	40	787	81	0	0						
100	12	3	100	555	43	341	265	2	163						
200	5	1	100	111	38	659	122	2	102						
500	3		100	495	42	045	143	4	142						
1000	1		100	409	33	389	102	8	60						
2000 & over	425	180	100	65	15	164	0	0	16						
Size not reported	204	65	100	46	23	66	18	9	9						
	3	3	100	163	5	20	0	0	0						
TOTAL	142	923	100	91	152	64	36	961	26	13	567	9	751	1	492

L. The figures are provisional and unchecked. A sensible margin of error may therefore be expected.

holdings are again widely scattered into small parcels ranging between 5-24 parcels. Another serious problem is the findings of a survey study conducted by Dr. Al-Haj (FAS, AUB) in 1974, which indicated that on the average 52% of the land in the three districts of Lebanon is in the hands of owner-operators, 9% with renters, 12% with share-croppers and 27% is under a combination of the three types. The owner-operators practice is mostly prevalent in irrigated areas and surprisingly most prominent in Akkar (66%), followed by South Lebanon with 57% and 33% in Beqa'a. This situation indicates that owner-operators and tenants have equally important roles in the operation of agricultural lands in the three districts, that is North Lebanon, Mount Lebanon and Beqa'a. Around 80% of all contracts in these districts are seasonal or annual and lease contracts are in these districts seasonal or annual and lease contracts are generally made verbally which reduces the security of the lease contracts due to absence of precautionary measures and thereby result in disputes between the owner and the tenants. The renting is usually much higher than the rental value of the farm. This situation warrants the attention of the Lebanese government to conduct more intensive investigation of the land tenure problems and take appropriate steps to streamline the procedures and tenurial status of land.

General Infrastructural Conditions of the Rural Areas

The condition of agricultural roads in most rural areas with the exception of Mount Lebanon is very poor. There also appears to be an absence of farmers' cooperatives which if properly organized can help develop local potentials and generate capital which could best be used for constructing agricultural roads on self-help basis, arranging marketing of fresh fruits and vegetables as to improve the socio-economic condition of the rural communities. The health and education facilities are also very remote in most rural areas of Lebanon and there is a general trend of migration from rural to urban areas. Most of these migrants having poor economic background not only confront housing problems, but also create health hazards by polluting the entire city environments. Some of them are self-employed and earn their livelihood by unknown means.

It may be pointed out here that there are several agricultural service institutions in different ministries working for the welfare of the rural communities but unfortunately all these institutions are operating independently. Their functions overlap with each other and duplicate in many cases which adversely retard the efficient utilization of limited human and physical resources and therefore the quality of the services extended to the farming communities is far below the desired standards.

Agricultural Cooperatives

Lebanese Law of Cooperative Societies

According to the law of Cooperative Societies in Lebanon promulgated by Legislative Decree No. 17199 of August 18, 1964:

- a. A cooperative is an association of persons with an unlimited capital for non-profit making objects. It is founded according to the aforementioned law of Cooperative Societies and its primary object is to improve the economic and social conditions of its members through their concerted efforts in accordance with cooperative principles.

No association other than a genuine cooperative society is authorized to utilize the term cooperative in its name.

- b. Every cooperative society must have a name specifying its nature, type of work and location. The expression "Cooperative Society" must be an integral part of the name. If the society has a limited liability, this must be added. The full name must be added. The full name must be mentioned together with its registration number with the Cooperative Department on all its books, records, agreements, contracts, correspondence, and printed matter.
- c. A cooperative society operates within the geographic area delineated in its bylaws. Its headquarters must be located within such an area. It is not authorized to establish branches outside the territorial boundaries of said area, except for sustaining its own interests like purchasing needed agricultural inputs or marketing its produce, provided it obtains prior approval of the Department of Cooperatives.
- d. The Law does not permit the establishment of more than one cooperative society for the same purpose within the same village, with the exception of organizing a cooperative society for a specific subsidiary purpose that falls within the scope of a multi-purpose cooperative society in that village.

However, the Department of Cooperatives reserves the right to resolve the issue in this case.

In cities whose populations exceed 20,000, the law allows the formation of more than one society for one object. But a distinction should be made in the respective names of the societies.

The number of persons who join to establish a cooperative society shall not be less than 10. However, the Department of cooperatives may for justifying reasons authorize the formation of cooperatives whose founders are less than this number.

Brief History of the Cooperative Movement in Lebanon

The history of the cooperative movement in Lebanon, may be reviewed in two phases.

The first phase begins in 1937 and ends in 1970, and the second starts in 1971 up until now. This distribution focuses on the second phase the evaluation of cooperatives during the years of 1971, until 1976. It should be mentioned however at the outset that the first cooperative in Lebanon was an agricultural association established in the village of Aabadiye in 1937.

The Historical Evolution of the Cooperative Movement Throughout the Years of 1971-1976

The cooperative movement in Lebanon started progressing as of 1971; and its growth has been impressive in subsequent years. This was significantly influenced by: (1) Legislative Decree No. 2989 issued on 17.3.1972 which organized the activities of the cooperative societies; (2) Decree No. 2981 dated 17.3.1972 which established the Bylaws of the National Union for Cooperative Credit, and (3) amendments in the laws governing the cooperative societies and the National Federation of Cooperative Societies.

It was also due to the policy and active role pursued by the Department of Cooperatives, its preparation of the conditions for success, like its preparation of sample bylaws, its conducting of economic and sociological studies, its organization of audit services, and its training courses and educational sessions.

In order to have a clear picture of the development of the cooperative movement, Table 2.5 is cited below to show us the progress made by the cooperative movement from 1971 until 1976.

Thus, by 1974 the number of cooperatives in Lebanon reached 104 with a total of 22269 members, a share capital of 11.41 million L.L., a working capital of 76.7 million L.L. and reserve funds of 1.46 million L.L. In 1975 the total number of cooperatives reached 115 with 29999 members, a share capital of 12.32 million L.L., a working capital of 72.71 million L.L., and reserve funds of 2.62 million L.L.

In 1976 the total number of cooperatives did not change and remained at 115, but the total number of their members increased to 33096, with a share capital of 12.43 million L.L., a

working capital of 35.9 million L.L. and reserve funds of 1.9 million L.L.

These figures reflect to a certain extent the successful growth of the cooperative movement in Lebanon, as well as the overall effects of the 19-months civil war on the movement as a whole.

Below is a description of the evolution of the different types of cooperatives.

Agricultural Cooperatives and their Development from 1971 to 1976

The first cooperative legislation in Lebanon, pertained to the agricultural sector. Accordingly, the earliest cooperative societies established were agricultural. The economic and social importance of the agricultural sector in Lebanon and its need for organization and modernization made it an appropriate field for cooperative work, whether from the financial and productive aspects or from the industrialization and marketing of its products. Many large cooperatives appeared on the agricultural scene like (1) the cooperative of the sugarbeet growers which undertakes the marketing of all sugarbeets produced in Lebanon; (2) the Beqa'a cooperative for the production and distribution of eggs which markets 47% of the Lebanese egg production; (3) the potatoe cooperative that markets about 55% of the Lebanese potatoe production; and (4) the vegetable, the fruit, the grape, the olive, the silkworm growing and the collection and marketing of milk cooperatives and others. These achievements in the Agricultural sector contributed to the establishment of agricultural industries, which in turn had positive effects on the technological progress in agriculture and on increasing its contribution to national income. The progress attained by the cooperative movement in the agricultural sector is reflected in a general way in Table 2.5 up to 1975. This table also shows a downward trend owing to the damages that befell the agricultural cooperatives in the course of the War Time events. These damages have seriously inhibited progress in agriculture, hindering it from realizing the expected goals. In 1974 the number of agricultural cooperatives reached 64, encompassing a total of 4007 members with a share capital amounting to 8.3 million L.L., actual working funds were 50.77 million L.L. and the reserves were 1.19 million L.L. By 1974 the agricultural cooperatives owned machinery, equipment and real estate valued at about 2.5 million L.L. These cooperatives owned 30 tractors, 16 trucks, and other kinds of agricultural machinery and sorting and refrigeration centers. The workers employed by the agricultural cooperatives were as many as 350.

In 1975 the number of agricultural cooperatives was 67 with a

membership of 4137 and a share capital of 8.45 million L.L. and working funds of 44.66 million L.L. and reserve funds of 1.8 million L.L. However, in 1976 the number of agricultural cooperatives did not grow beyond 67 with 4144 members. The share capital totalled 8.46 million L.L., the working funds 17.71 million L.L., and reserve funds 1.42 million L.L. The agricultural cooperatives have proven their utility and effectiveness in connection with the improvement and development of the agricultural sector by providing: multiple and various services to the farmers, means of production, e.g., machinery and equipment, requisites of production, e.g., fertilizers, seeds, pesticides, animal feed and so forth; by insuring the sorting and marketing of the produce; and by facilitating access to credit that the farmers needed for the development and modernization of their activities. It is estimated that the increase in the income of the members from the reduction of the cost of production and/or the sale of the produce at better prices at not less than 10%, which enabled the farmers to improve their living conditions.

The Evolution of Consumers Cooperatives During 1971-1976

Consumers cooperatives were first launched immediately after the creation of the service of cooperatives within the Ministry of Agriculture on the basis of Legislative Decree no. 11618 dated Jan. 4, 1969. This service was entrusted with the primary responsibility of promoting the interests of all types of cooperatives. These responsibilities have been transferred to the General Directorate of Cooperatives within the Ministry of Housing and Cooperatives pursuant to law no. 73/9 issued on Jan. 31, 1973. The consumers cooperatives have progressed because of the loans they secured from the State Treasury advances via the National Union for Cooperative Credit. These societies gradually included the labor syndicates and their respective federations and the various popular groups of limited income. These societies provided their members with consumer goods at low and just prices. Its worth noting that they have also marketed some of the agricultural produce of agricultural cooperatives. The trend of the development of consumer cooperative is reflected in Table 2.5.

At the present time the number of employees in these cooperatives is 345. Their wages total about 1 million L.L., although many of these societies started operations towards the end of 1974. The increase in the volume of working funds enabled the consumer cooperatives to assume an important position within the distribution channels of food commodities and consumer's goods. They purchased food commodities from the agents and the producers and sold them to the members at cost price which covered the administrative expenses involved.

Table 2.5 Cooperatives in Lebanon by Type from 1971 to 1976

Type of Coop	Year	No. of Coops	No. of Members	Share Capital LL	Working Capital LL	Reserve Funds LL
Agricultural	1971	52	2110	3059537	26768753	615595
	1972	50	2804	7044033	37446330	1023673
	1973	61	3596	7942641	44155172	1177286
	1974	64	4007	8306895	50767541	1194965
	1975	67	4137	8459053	44663350	1797638
	1976	67	4144	8459273	17709900	1416853
Consumer	1971	8	1383	104880	724503	89039
	1972	16	4784	652384	1661610	131716
	1973	22	11458	1345190	6505200	286025
	1974	35	18147	3029404	25867287	267089
	1975	41	25724	3781320	27930227	463430
	1976	41	28814	3890115	18179786	497010
Cultural	1971	1	14	560	11776	2657
	1972	1	14	560	500	3646
	1973	2	22	29160	36600	3950
	1974	3	40	24450	28619	700
	1975	3	40	27950	33220	1150
	1976	3	40	27950	15622	800
Crafts	1971	--	--	--	--	--
	1972	--	--	--	--	--
	1973	1	15	1900	--	--
	1974	1	16	1900	32000	800
	1975	3	36	2900	35000	1200
	1976	3	36	2900	28000	1000
Savings & Credit	1971	--	--	--	--	--
	1972	--	--	--	--	--
	1973	1	51	14275	--	--
	1974	1	59	47007	39598	--
	1975	1	62	47375	45600	--
	1976	1	62	47375	20100	--
TOTAL	1971	41	3507	3164977	27505032	707291
	1972	67	7602	7696977	39108441	1159035
	1973	87	15142	9033176	50696972	1467261
	1974	104	22269	11409655	76735045	1463554
	1975	115	29999	12318598	72707399	2263418
	1976	115	33096	12427613	35953408	1915663

These cooperatives represent a new competitive force since they do not operate for profit. Accordingly, they have constrained a greater increase in prices and contributed to some extent to price stability. This resulted in the wide spread of the societies' benefits not only among their members but among the rest of the citizens as well.

Cultural, Craft, Savings and Credit Cooperatives in Lebanon: Their Evolution During the Period, 1971-1976

Up to the year 1974, the cooperative movement in Lebanon was limited in scope to the agricultural and consumers' sectors. Only minor progress had occurred in the organization of cultural, craft, savings and credit cooperatives, inspite of the economic and social benefits of such societies.

Cultural Cooperatives

In 1971, there existed only one cultural cooperative. It had 14 members, a share capital of 560 L.L. and working and reserve funds in the magnitude of 11,776 L.L. and 2,657 L.L., respectively.

The number of cultural cooperatives increased to two in 1973. Likewise, the members increased to 22, the share capital to 29160 L.L., the working funds to 36,600 L.L. and the reserve funds to 3,950 L.L.

A year later (in 1974), the number of cultural cooperatives mounted to three, the membership to 40, but the share capital decreased to 24,450 L.L., the working funds to 28,619 L.L. and the reserve funds to 700 L.L.

The number of cultural societies and members thereof remained in 1975 the same (namely, 30 and 40 respectively). The share capital amounted to 27,950 L.L., while the working funds to 33,220 L.L. and the reserve funds to 1,150 L.L.

But, in 1976, the working funds diminished to a level of 15,622 L.L. and the reserve funds to 800 L.L.

The progress of cooperative societies in the cultural sector, will undoubtedly, give the intellectuals opportunities for deriving material benefits from their intellectual output by reducing the costs of printing and publication which currently take away most of the sale proceeds from books. Simultaneously, the cooperative venture will make it possible for students and seekers of knowledge and culture to secure books at more convenient prices.

Craft Cooperatives

The first craft cooperative society was founded in 1973. Its members numbered 15, while its share capital amounted to 1900 L.L. A year later, this society had 32,000 L.L. in working funds and 800 L.L. in reserve.

By 1975 there were 3 craft cooperatives encompassing 36 members and having share capitals of 2900 L.L., working funds in the magnitude of 35,000 L.L. in addition to 1200 L.L. in reserve funds.

However, the volume of funds in circulation diminished in 1976 to a level of 28,000 L.L. Similarly, the reserve funds decreased to a level of 1000 L.L.

The cooperative can play a major role in the modernization and development of crafts by enabling the craftsmen to secure the modern means of production such as machines and tools which lead to both, improved quality and increased production. Furthermore, the craft cooperative will enable the rural people to engage in the production of a variety of non-agricultural goods and, in so doing, multiply the sources of their earnings by undertaking productive activities out of the agricultural seasons.

Savings and Credit Cooperatives

The first savings and credit cooperative dates back to 1973. It encompassed 51 members and had a share capital of 275 L.L. A year later, the membership increased to 59 and the share capital doubled. The volume of working funds in circulation totalled 39,598 L.L.

The year 1975 witnessed further growth. The members reached 62, the share capital 47,375 L.L. and the money in actual circulation 45,600 L.L. These funds were, however, diminished by more than 50% in 1976, and amounted to 20,100 L.L.

The savings and credit cooperative societies have a significant developmental role to perform by providing needed loans for their members on convenient terms, thus reducing the burdens which they would, otherwise, have to carry in the form of unnecessary expenses and exorbitant interest rates.

Agricultural Research

Since research is considered as the primary factor in the development of agriculture, Lebanon has been interested in promoting agricultural research through various organizations. These include both the public and the private sectors.

Research in the public sector has been conducted mainly by the Agricultural Research Institute of the Ministry of Agriculture. The Institute has several stations and laboratories in the different regions of Lebanon namely Tel Amara, Terbol, Fanar, Abdeh, Tyre and Kfardan. The aim of these research stations is to solve problems facing the Lebanese farmer in the areas of crop production and protection, soils and irrigation, and animal production and protection.

Another public agency which promotes agricultural research is the National Council for Scientific Research (NCSR) which allocates funds for many research projects which are conducted either in the laboratories and fields of the government Agricultural Research Institute or at the various Universities in Lebanon. In addition to the personnel of these institutions, the NCSR has its own research staff who conduct research in the various disciplines of agriculture.

Private research is carried out by the Faculty of Agricultural and Food Sciences (FAFS) of the American University of Beirut (AUB). The FAFS research program is oriented towards the solution of basic as well as applied problems of agriculture in Lebanon and the Middle East. This is conducted either at the laboratories of the A.U.B. campus or at the Agricultural Research and Education Center (AREC) in the Beqa'a in the areas of crop production and protection, animal production and protection, soils and irrigation, food technology and nutrition and agricultural extension, economics and rural sociology.

Prior to 1975, the Ford Foundation cooperated with the Agricultural Research Institute in Tel Amara through its Arid Lands Agricultural Development (ALAD) program. Most of their research has centered around cereal and grain legume improvement. The work is carried out now under the newly formed International Center for Agricultural Research in Dry Areas (ICARDA) which is headquartered in Beirut, Lebanon, with field stations in Aleppo, Syria, Tabriz, Iran and the Beqa'a, Lebanon.

Agricultural Education

Agricultural education in many parts of the world is administered at all levels and covers elementary education, secondary education, college or university education, and adult or extension education. The picture in Lebanon today is very grim in relation to most of the above phases.

Elementary Education

Unfortunately government elementary schools in rural areas do

not provide any agricultural subjects for their students. In fact the program is very weak in the biological and applied sciences which fails to acquaint the student with his immediate environment.

Secondary Education

The objective of agricultural education at the secondary school level is to produce technically skilled people in various phases of agriculture. It is referred to in some countries as Agricultural Vocational Training. There is such a school in Lebanon at the present time (Fanar), but unfortunately graduates of this school have been barely enough to satisfy the needs of the Ministry of Agriculture for such technical help. Other schools are in Abdeh, Gahzir, Tel Amara, which are basically for short term training and demonstration purposes.

College or University Education

There is at present one agricultural private college in Lebanon. This is the Faculty of Agricultural and Food Sciences of the American University of Beirut. This Faculty provides training in both undergraduate and graduate agricultural education. The undergraduate program is of three years' duration (six semesters and two summer sessions) following satisfactory completion of one year of university study in Freshman Science or presentation of the Lebanese Baccalaureate Part II which is required of all Lebanese students. It leads to the Degree of Bachelor of Science in Agriculture and the Diploma of Ingenieur Agricole.

Graduate study has been concentrated thus far on programs for the Master of Science Degree in all the departments of the Faculty of Agricultural and Food Sciences. Two general programs are available: one is research oriented where an acceptable thesis is required in addition to a set of course credits, and the other is a production and management oriented degree with no thesis required. Also a Ph.D. program in Agronomy was authorized several years ago but has not been offered yet.

SECTION THREE

LOSSES IN THE AGRICULTURAL SECTOR AS A RESULT OF THE 1975-76 CONFLICT

It is very difficult to give accurate statistics on the losses in the agriculture sector as a result of the troubles in Lebanon. However, the total losses in this sector have been estimated to be worth 300 million L.L. The damage of the cooperative movement has been estimated at 8.4 million L.L. with 40% losses in the agricultural cooperatives and 60% in the consumer cooperatives (Kubeh, 1977).

Certain aspects of agriculture incurred heavier losses than others. Poultry farms received the most serious blow; about 90% of the farms were damaged to an extent which prevented their utilization. Next in line came the damage to water pumps and other agricultural machinery especially in the Beqa'a plain where a large number of these pumps were either stolen or blown-up. However, since the end of the troubles, these two areas have started to build-up again. Poultry production is recovering at a rapid pace and has reached now about 60% of its 1975 level as indicated by several prominent poultry producers in the country.

In the crop production aspect of agriculture, even though the losses were less than those of the animal production sector, the recovery is much slower especially where fruit orchards are involved. Orchards located in regions where armed clashes occurred had to be neglected for long periods of time. Consequently, the production of these orchards dropped sharply because of the lack of proper care and the build-up of pests. Olive groves were the most seriously damaged, and it is estimated that three years of proper care of the trees are needed before they go back to their original level of production.

The most serious problem facing all sectors of agriculture in Lebanon at present is the severe shortage of labor at all levels of training. With the extended civil strife and the uncertainty of the future, many agricultural workers left their jobs and moved to neighbouring countries where job opportunities are increasing constantly. A solution to this problem is not easy. At the same time, labor cost has increased sharply in the last two years which in turn is reflecting on the increase in prices of agricultural products.

SECTION FOUR

THE ROLE OF AGRICULTURE IN FUTURE DEVELOPMENT

Contribution of Agriculture to Economic Growth

The agriculture sector could contribute to economic growth in several ways:

Increase food supplies, release labor to industry, provide for industrial development, create markets, and increase export earnings.

Increase Food Supplies

An increase in the net output of agriculture itself represents a rise in a country's gross national product. A marked advance of food supplies is central in the chain of economic development.

A rapid growth of agricultural productivity is important as it enables food supplies to be available at relatively lower prices. The non-agricultural sector then requires less of its income to purchase food, so increasing the effective demand for the output of the non-agricultural sector. This in turn increases the profitability of an expanded output in the non-agricultural sector and encourages entrepreneurs to invest there. Concurrently, expansion of the non-agricultural sector will increase the availability of job opportunities in that sector, both for the urban population and the labor released from rural areas.

Release Labor to Industry

Industrial development requires a substantial and steady increase in manpower to facilitate expansion of output.

There are three potential sources of this increased labor for the industrial sector: natural population increase, immigration, farm population.

Agriculture will be able to release labor for employment in other sectors of the economy if there is underemployment in agriculture or when improved productivity brings about a structural shift in the kind and quality of resources used.

The release of labor stems from two sources: First, the natural increase in farm population is usually greater than that of the non-farm population, allowing a continuing outflow even with a constant farm population.

Second, normally in the later stages of development, increasing

- labor productivity in agriculture enables an absolute decrease in agricultural employment. The release of workers from agriculture represents a significant human capital contribution to the industrial sector as the bulk of the migrants will be already educated.

Increase Capital Formation

Release of labor from the agricultural sector is one structural shift in the economy which enhances development, but economic growth cannot proceed rapidly without industrial capital-machinery, plant and transportation facilities.

Agriculture makes an important contribution in permitting the formation of capital, especially in the early stages of development when agriculture produces and receives a major share of national income.

There are three ways in which the farm sector contributes to industrial capital formation.

First, increased agricultural productivity benefits the non-agricultural sector through lower food prices, enlarging its real income and so providing the means for increased saving and capital accumulation in the urban sector.

Secondly, increased output may generate higher levels of farm income, part of which may be saved. These savings may be utilized in financing the growth of the non-agricultural sectors.

In generating growth it must be emphasized that it is not sufficient merely to have large agricultural savings. In addition, transfer mechanisms must be available to facilitate inter-sectoral capital flows.

Similarly the existence of a class of capitalist entrepreneurs sensitive to investment opportunities cannot be assumed. Whilst such a class did exist in Lebanon before the war it may take some time for such entrepreneurs to develop in present, prevailing conditions in the country.

The major problem facing Lebanon is to use agriculture to make a significant contribution towards industrial capital accumulation without simultaneously hindering agricultural development. (Some of the problems in the Soviet and Chinese agricultures may be due to too rapid diversion of agricultural resources to the non-farm sectors). This is a question for the Government of Lebanon to decide as to how much they would like to use and exploit agriculture in order to redevelop and reconstruct the industrial sector which has been gravely damaged by the war.

The difficulties of capital formation may be mitigated in Lebanon if they are allowed access to the capital markets of the advanced countries, and if foreign companies were encouraged to invest here.

Market Contribution

As agriculture progresses to one producing predominantly cash crops it provides opportunities for the emergence of other sectors. There are two aspects to this "marketization" of the economy.

First, increases in agricultural productivity which result in higher per capita farm income allow farmers to buy more agricultural inputs and consumer goods from the industrial sector.

The spread of modern technology induces a replacement of traditional means of production which originate within the agricultural sector, for example natural fertilizer and draught animals by chemical fertilizer and tractors.

This sets up a virtuous circle, the improved inputs enhancing productive efficiency in agriculture and so providing increased amounts of marketable agricultural products, over and above the farmers' own requirements, which can be exchanged for goods and services in the industrial sector.

The second element in the market contribution occurs as services such as processing, packing and distribution are developed to process and transmit the marketable agricultural produce to final consumers. This undoubtedly leads to higher employment opportunities which are so badly needed in the rural areas of Lebanon.

Short Term Solutions for Credit Cooperation and Extension

- a. The government in Lebanon must play a leading role in the organization, financing and growth of agricultural credit, as well as in developing ancillary services which enhance the effectiveness of agricultural credit.
- b. A government-sponsored agricultural credit institution in Lebanon is needed and should be primarily a "public service", an instrument for agricultural development, rather than a banking business enterprise.
- c. The combination of agricultural credit, cooperatives, marketing and extension services is especially needed in specific rural development projects, such as irrigation, land settlement, land reform, etc.
- d. Credit does not in itself create new resources. It is not in itself

a solution to agricultural problems and a means of rural progress; but it is an important element in an integrated approach, which also covers advisory services for improving production and productivity, marketing, land tenure, farmers' organizations and other aspects. All these elements are interrelated; none of them can produce lasting satisfactory results without being supported by the others.

- e. The encouragement of savings within the agricultural sector is a vital factor and should therefore be included in any agricultural credit system.
- f. Other sectors of the economy will compete with agriculture for the use of finance, so that the amount available for agriculture is never unlimited. Agricultural policy, and the funds available, must be considered in the setting of over-all plans.
- g. The provision of agricultural credit is not an isolated approach to development and welfare but must be considered in relation to the other aspects of agricultural policy, including decisions as to which products should be encouraged, the types of organization which are aimed at in production, processing, marketing, and the provision of other agricultural services.
- h. Multipurpose cooperatives should be set up particularly in the rural areas to serve the isolated farming communities effectively with their diversified range of services.
- i. An effective extension system must be set up to provide diversified services and advice to the farmers.

Crop Improvement

Progress in crop production is the outcome of agricultural research. Any change from traditional agriculture to the use of modern technology, requires the implementation of local research findings. In Lebanon, many growers make use of one or two techniques or innovations for the improvement of their farm production. However, such a practice may not be adequate enough unless we consider all possible agricultural inputs to be utilized as a package for crop improvement. Such a package may include the following components:

New Improved Germplasm

One of the most important criterion in crop improvement is the introduction, selection and breeding of new germplasm which is adapted to local growing conditions — Lebanese growers are currently making use of such new improved crop varieties which

have been tested locally. The new wheat variety "Najah" has a grain yield which is 25% more than the local or "Baladi" varieties. In addition, this variety is early maturing, resistant against lodging and shattering and the grains are rich in protein. Another variety which was used recently by farmers is "Mexipak" which is a dwarf wheat, high yielding, rust-resistant and responds well to fertilizers. However, Lebanon's local production of wheat does not satisfy its requirement of grain. Therefore most of the wheat or wheat flour needs have to be imported. Hence crop improvement will remedy this deficit by increasing grain yields. In the case of barley, the newly developed variety "Beecher" proved to give an early high yield with good quality grain which is used for animal and poultry feed. Lebanon has also introduced many new crops into its traditional crop rotation. Farmers are planting sorghum, sweet corn, soybeans, sunflowers, sugarbeets in addition to the many vegetables and fruit trees. As a result, the Lebanese market is supplied all the year with fresh fruits and vegetables of all seasons. Traditional crop exports include apples, citrus and tobacco. Work should be continued on the improvement of these crops.

Use of Fertilizers and Multiple Cropping

In spite of the use of superior germplasm, maximum crop production cannot be attained without the use of fertilizers. Lebanese farmers have realized this fact and are using chemical fertilizers as well as barnyard manure in most of their production areas. Some growers are also using micronutrients particularly in the citrus orchards. Since the prices of fertilizers are steadily increasing, the establishment of fertilizer factories should be encouraged in the country.

Most farmers are still keeping their land fallow in summer with excessive use of tillage practices. It is worthwhile to cut down on the use of cultivation and start practicing minimum tillage or "chemical fallow" by the use of contact herbicides to control weeds. Local research should be encouraged to study the value of multiple cropping so that farmers can plant their lands with two or three crops sequentially during the year with maximum economic returns.

Use of Pesticides

Farmers usually lose 30-50% of their produce due to attacks from insects, disease organism and weeds. In Lebanon, the use of pesticides is widely practiced, particularly the spraying of insecticides and fungicides. More recently, farmers are realizing the importance of weed control and are starting to apply herbicides specially in citrus orchards and wheat fields. This modern technology

was introduced due to the lack of manual labor and expensive hand weeding. However, farmers should not overuse pesticides or apply them prior to harvesting the produce, in order to avoid contamination of the fresh fruits and vegetables.

New Irrigation Techniques

Water is the major factor limiting agricultural production in Lebanon; Hence the adequate of available water becomes of great importance. In addition to the classical uses of basin and furrow irrigation, farmers have introduced the use of sprinkler irrigation. This system simulate natural rain and economize on the use of water. Very few progressive farmers have also introduced the use of drip irrigation for growing fruits and vegetables. This system saves on the use of water, and minimizes evaporation losses. Such a system is very useful for the growing of out of season vegetables in plastic greenhouses.

Agricultural Mechanization

Mechanization of agricultural operations is a labor and time saving technology. Many farmers in Lebanon have left their oxen-drawn plows and replaced them with tractor-drawn plows, harrows and cultivators. Some have changed from sowing seeds by hand into the use of planters. Few other mechanized operations like planting potatoes, fertilizer spreading and use of boom sprayers and combine harvesting of grains came into practice as a result of the establishment of farmer cooperatives or the availability of contractors. What is encouraging about the future of agricultural mechanization in Lebanon is the interest in the local design and manufacturing of small farm equipment. All these mechanized operations help in improving the yield and quality of crops.

Although the package approach is the ideal road to crop improvement, one should not stop agricultural progress if one of the inputs is inadequate or absent. On the contrary, we should try to improve crop production with whatever available components we have, and then try to concentrate our efforts to complete the requirements of the package. In addition, more areas should be opened or reclaimed to increase present crop production. Table 4.1 summarizes the present and potential production picture of the main crops in Lebanon.

Reforestration

Lebanon has an area of 80,000 hectares of forest and wood lands (FAO production yearbook, 1976). It has been estimated that during the 1975-76 troubles in Lebanon, about 25% of the

Table 4.1 Present and Potential Production of Main Crops in Lebanon

Crops	Present yield (mt./ha.)	Potential yield (mt./ha.)	Present crop area (1,000 ha.)	Potential crop area (1,000 ha.)	Present Production (1,000 mt.)	Potential Production (1,000 mt.)
Wheat	1.0	3.4	66.5	84	67.8	285
Barley	1.2	3.2	13.4	16	15.8	51
Corn	1.8	6.3	3.0	26	5.2	164
Sorghum	.9	6.3	1.3	24	1.2	151
Legumes for grain	2.1	3.0	13.8	22	29.2	66
Vegetables	11.4	15.0	30.5	40	348.0	600
Fruits	8.7	10.0	74.6	75	650.0	746
Industrial	—	—	13.2	13	—	—
Total crops	—	—	216.0	300 ^a	—	—
Fallow	—	—	56.0	none	—	—
Total	—	—	272.0	300	—	—

^aIncludes 28 from double cropping legumes or corn after wheat.

* Clawson, M., Landsberg, H.H. and L.T. Alexander. The Agricultural potential of the Middle East, American Elsevier Publishing Company, Inc., New York. 1971.

natural vegetation has been either cut or burned by uncontrolled fires. This has created several problems for which the government and the local communities have to face in the near future. The first outcome of the misuse of our natural resources is the loss of the aesthetic value of our forests which gave Lebanon its natural beauty, and allowed it to be considered as one of the major touristic sites of the Middle East. Since trees help protect soil from erosion, aid in moisture conservation, provide mild climatic conditions, and produce food and timber, it becomes very obvious that the mutilation of our forestry resources are going to have serious changes in our environment. Since Lebanon is a semi-arid country, such a change could lead to desertification. Therefore, it is extremely important to start planning now a reforestation scheme for the development, management and protection of our vegetation.

The following points should be considered in the planning program:

- a. Local communities should be involved in the project, and should be convinced that such a scheme will have a direct

benefit on the lives of the people and their environment.

- b. Nurseries should be established by government agencies close to the planting sites to supply the necessary adapted tree species which can thrive well under the ecological characteristics of the site.
- c. After cleaning the ground in the site, holes are dug and trees are planted before the rainy season at the proper spacing depending on tree species and groundwater tables. Firebreaks should be established at right angles to prevailing winds to cut down on future fire hazards.
- d. Planting field days could be made in the various regions of the country to accelerate the execution of the reforestation scheme. Local volunteers from different organizations such as scouts, youth clubs, schools and universities, professional syndicates, farmer cooperatives and others may help in this useful project.
- e. The government should legislate and implement regulations against cutting trees and starting forest fires.

Water Resources Development

Due to the population growth, the agricultural production should increase in order to satisfy the needs of the market in the year 2000. The production can be increased by having intensive agriculture (climatic controlled agriculture), and more of the arable land under irrigation. Research has proven beyond any doubt that irrigated agricultural output is higher than the non-irrigated as shown in Table 1. The estimated arable land that needs to be under irrigation should exceed 250,000 hectares which means more than $2000 \times 10^6 \text{ m}^3$ of water should be available annually for irrigation. The Lebanese water resources can supply the above volume of water, if these are properly utilized and managed.

Short term measures

Increase the Onfarm Irrigation Efficiency

With the conventioned methods (surface irrigation) being used the irrigation efficiency does not exceed 50% and this is mainly due to:

- a. Poor land preparation for surface irrigation: To overcome the land preparation problems new methods of irrigation should be encouraged and used, such as sprinkler and drip irrigation. The

efficiency under these systems ranges from 75-90% depending on the design and management of the system. These new systems need a high initial investment and in order to encourage farmers to use them, long term loans should be available.

- b. Low cost of irrigation water: The charges for irrigation water on government and private projects is almost negligible. So farmers tend to use more water than needed, thus wasting water and causing drainage problems, to encourage farmers to make better use of water, all water outlets to farmers from private and public projects, should be metered, and if any farmer makes use of more than what is needed for his crop he should be charged a high price for each extra water unit being used. The quantity needed on each farm can be predetermined according to area of crop, kind of crop and the climatic conditions. The allocation of water and the charges for it (similar to the allocation of electricity) will encourage farmers to select proper irrigation methods.

Training or Production Experimental Farms

Training farms should be established in each agricultural zone. These farms should be able:

- a. To train farmers on how to use new techniques to maximize their productions.
- b. To be a source of information to farmers i.e. extension service.
- c. To schedule irrigation as to the quantity needed and time of application; so that proper utilization of water is achieved for maximum crop production.
- d. To select the proper irrigation method for each crop growing in its zone.

Long Term Measures

Evaluation of existing irrigation projects

Each of the existing irrigation projects was planned and implemented to meet certain objectives and irrigate a defined area.

An evaluation of these projects is necessary to check if the objectives are met, and the area under irrigation can be increased utilizing the existing volume of water on the project, by using new irrigation methods and techniques.

Land Classification — Irrigable Land

The land classification must initially identify the land areas having adequate productivity to warrant consideration of that land for irrigation. The selection of lands for irrigation is a two step process.

- a. Selecting an arable area as guided by farm production economics.
- b. Selecting irrigable area as guided by economics of plan formulation.

The selected arable lands should be adjusted to meet the formulation criteria. In adjusting it the following points should be considered.

- a. The elimination of uneconomic increments such as those that are too costly to serve, drain, or provide distribution network.
- b. Conformance of the land area to the available water supply.
- c. Elimination of areas unable to meet minimal criteria for economic returns under the plan.

Some of the arable land classification is available on project basis. The need is to classify all Lebanese land before the water resources development plan is initiated.

Control and Use of Water Resources

- a. Surface Water: The surface water flowing in the Lebanese rivers and from springs constitute 14% of the total precipitation in Lebanon; 80% of this surface water is lost as surface run off to the sea. Development and control of this surface water is necessary. Data on peak and minimum flows, average daily and monthly flows and seasonal flows are required for each river to be developed. According to the analysis of data, dams can be planned to store and or divert water to where it is needed.
- b. Ground Water: Out of $600 \times 10^6 \text{ m}^3$ of annually recharged underground water, only $160 \times 10^6 \text{ m}^3$ are being used for irrigation and industry. This water resource should be developed to make maximum utilization of the water. Search should be conducted for successful development. The search is for permeable rocks containing sufficient water of usable quality. Geologic studies are of prime importance in ground water

exploration, and should be a first step in the prediction of the distribution, depth, thickness and other characteristics of aquifers. Ground water reservoir sites should be selected. These reservoirs provide storage for deep-percolation from precipitation and stream flow, and for water artificially recharged in them. Moreover, ground water reservoirs serve as conduits to convey water from areas of recharge to those of production and use.

Livestock Improvement in Lebanon

It is obvious from import and export figures that the need for animal products in Lebanon has continually been increasing during the last two decades. This increased demand for agricultural products has been met from local production only in the case of poultry meat and eggs. It is interesting to note here that as far as red meats are concerned, Lebanon still imports about 85% of its local needs for this product and in the case of milk and milk products this figure drops to about 70%. In essence, therefore the local production meets the demand only in the case of poultry meat and eggs. The improvement therefore in livestock is absolutely essential if Lebanon is going to reduce its imports of these important agricultural products. There is no question that environmental conditions in Lebanon are very favorable for livestock and poultry production. This factor makes Lebanon somewhat unique in contrast to nearly all other countries in the region who do not enjoy the same favorable climatic conditions as that of Lebanon. Although the compounded feed industry in Lebanon has moved into a very sophisticated and well developed industry which has certainly helped the development of poultry production in the country, the need for locally produced forage and fodder for livestock has not been met; and since this is the key to increased livestock production, it seems that livestock improvement cannot go any further before extensive developments in range management and fodder production in the country. The growing of fodder crops on irrigated land will involve weighing the long term benefit to be gained from increasing the level of protein intake through increasing livestock production, against the sacrifice of short term, remunerative returns from the growing of alternative cash crops. Feed production is of course not the only factor impeding livestock development in the country. Improved methods of management and disease control are two important and very closely related factors in livestock improvement in Lebanon. These cannot be brought about without the training and education of the livestock producer by the strengthening of technical, advisory, extension and other services required by the producer. One of the most important deficiencies confronting livestock improvement in Lebanon and in the region as a whole is the inadequate number of trained and experienced personnel

available at the technical level. The Ministry of Agriculture in Lebanon has a number of responsible positions in the field of animal production and range management.

Solutions for Livestock Improvement in Lebanon

As mentioned earlier, the demand for animal products in Lebanon continues to increase and this has to be met by increased production which will reduce imports and thus improve the balance of payments for the country. There is no one solution for livestock improvement and development but several directions should be taken for that purpose.

- a. More land should be devoted to feed and fodder production.
- b. Good breeding stock should be made available to those farmers who have had necessary training and experience in livestock production.
- c. Agricultural and industrial by-products should be investigated for use as feed sources.
- d. There should be cooperation between the private and the public sector in planning and execution of all animal production schemes in the country.
- e. The Ministry of Agriculture should establish animal quarantines in all border areas of the country to minimize the spread of disease.
- f. Adequate slaughter houses should be established in all major cities with these slaughter houses, animal by-product plants and rendering plants, should be constructed for the production of various by-products such as blood meal, meat scraps, bone meal, animal fats, etc.
- g. Cooperative movements should be established for the production, processing and marketing of animal products.
- h. One of the most serious problems endangering the livestock and poultry industry is marketing of animal products. This has been the only serious problem as far as poultry meat and eggs are concerned and if milk production is going to be increased in the country, a set up has to be established for collecting, cooling and processing of this milk.
- i. As the poultry industry picks up in the country and resumes its 1974-75 level of production, serious thinking should be given to the development of poultry processing and marketing cen-

ters, poultry by-products processing and possibly egg breaking plants at a later stage. The problem of marketing could become serious enough to justify the establishment of marketing boards for animal products composed of representatives of both the private and the public sector. The objectives of these boards is to study both import and export potentials of these products and assist in all marketing aspects both local and foreign.

- j. Manpower development for agriculture production has been mentioned earlier and cannot be overemphasized because of the essential backing that this provides for livestock improvement in the country.
- k. Financial assistance should be secured from both local and foreign agencies not only for establishing all these public sector activities that had been mentioned but more important to provide credit to livestock producers to enable them to move into greater mechanization in animal production.
- l. There needs to be some government inspection of feed mills to see that they satisfy minimum standards of hygiene and safety. The quality of feedstuffs used should be checked and accurate information placed on feed labels. The whole question of government legislation of compounded animal feeds in the country should be evaluated. This is an issue that should be of concern not only to the feed manufacturer and animal producer but also to the consumer of milk, meat and eggs.

Government inspection of animal feeds requires the setting up of a central feed analysis laboratory. This lab should keep a register of all feed manufacturers in the country, collect samples of feeds manufactured from all these plants at intervals and finally run the necessary chemical tests on all these samples collected. All this information should be published in an annual report prepared by such a national laboratory.

Agricultural Research and Education

Research and education in agriculture are the pillars of agricultural development. They have to be closely associated in any country or region of the world because the teaching of agriculture should be based on research findings in applied agriculture in the region in question.

Agricultural research and education including extension education constitute the foundation for agricultural development. Without these institutions, we can not possibly be able to develop our agriculture in Lebanon. These institutions provide the manpower,

the new scientific know how, the auxiliary services, and the techniques for getting information to farmers promptly.

Agricultural Research

Lebanon enjoys three different climatic regions. It has a coastal area that stretches from north to south with a subtropical climate and high precipitation, a mountainous area with a temperate climate and high precipitation and an inland area that is characterized by a continental climate with relatively low precipitation. It is conceivable therefore that Lebanon should develop three agricultural experiment stations, one in each of these areas for carrying out research activities most suitable for these regions. These experiment stations should be manned by research personnel and should be closely related to the extension services of the Ministry because research findings are of no value if they are not communicated to the farmer and used by him. Agricultural research is currently going on in Lebanon in at least two institutions as pointed out in a previous section, but very little of the results of research are being applied. The Extension services in Lebanon are weak and need to be strengthened. The educational level of extension personnel is low and needs to be raised. Not a single program on TV deals with agriculture or farm life and communication with farmers is practically non-existent

Agricultural Education

Much of the poverty and disease in our rural areas can be attributed to the failure of our rural people to adopt the lessons of science and apply them to their problems of health and agriculture. Agricultural development can not take place without improvement in the level of education of rural people and those involved in agriculture. The needs of Lebanon for trained people in agriculture are not known and have not been studied. This area has to be studied within an overall plan for agricultural development for the country. There will probably be need for few Ph.D. level graduates, every year, some M.S. graduates, about a hundred B.S. graduates and thousands of high school and elementary school graduates with some education training in agriculture. Until the Faculty of Agricultural and Food Sciences develops its own program, Ph.D. training should continue to be done outside Lebanon for several years to come while all the others can be trained in Lebanon.

In a recent report by the Green Plan authorities on agricultural development in Lebanon, it was recommended that the Lebanese Government cooperate at present with the Faculty of Agricultural and Food Sciences at the American University of Beirut to educate each year the needed number of B.S. and M.S. graduates

in various specialities needed for the country. We feel that this is a worth while venture and should be pursued. This will save the Lebanese Government substantial amounts of money needed now for the establishment of an Agricultural College at the Lebanese Univeristy. The full cost of educating a student in the Faculty of Agricultural and Food Sciences at AUB is now about LL 18,000/year. However, if personnel, funds, and facilities become available in the future, the Lebanese University may develop a faculty of agriculture of its own to serve the needs of the country and the Middle East region.

Ministry of Agriculture and Autonomous Boards

The Central Administration of the Ministry of Agriculture includes basically all divisions, departments and sections needed for the proper functioning of the Ministry. However, the Ministry faces many problems which hinder its proper functioning.

Problem Areas

- a. The image of the Ministry of Agriculture is rather poor mainly because its budget is very low. Furthermore, the Lebanese crisis has added more problems since the Ministry building was completely looted. It is now being housed in temporary quarters and most of the employees are not reporting to work. Repair of the Ministry headquarters is underway.
- b. Many positions in the Ministry have been vacant for sometime which has curtailed the proper functioning of the Ministry.
- c. The creation of autonomous boards has resulted in duplication of functions between some of these boards and certain divisions within the Ministry. Two examples could be cited: the Animal Production Office and the Division of Animal Resources; the Green Plan and the Forests and Ranges Department.
- d. Many staff members of the autonomous boards were originally Ministry employees. The higher salary scale and the more challenging type of work in the autonomous boards has lured them away from the Ministry, which in turn became depleted from qualified personnel.
- e. The Extension Department of the Ministry has always been understaffed and thus was never able to function properly. This is a very important Department and has a major role in the development of agriculture in any country.

Proposed Solutions

- a. All efforts should be made to increase the budget of the Minis-

try of Agriculture so as to enable it to play a major role in the development of agriculture specially after the losses this sector has incurred in 1975-76.

- b. All vacant positions in the Ministry should be filled with competent personnel.
- c. The Extension Department should be strengthened by increasing the number of extension specialists to 70 or 80. These specialists should all be university graduates with specialization in the various disciplines of agriculture.
- d. Minor reorganization in the Central Administration of the Ministry is needed such as: 1) creation of a Division of Soils and Water. This is a very important discipline in agriculture, and at present, there is only an Irrigation Section in the Engineering and Rural Industry Department; 2) creation of a Weed Control Section in the Crop Protection Department. This is an important area of plant protection which has been neglected by the Ministry.
- e. An evaluation of the nature and functions of the autonomous boards should be undertaken so as to eliminate the duplication in functions that exists at present. Specific suggestions concerning the autonomous boards could be listed here.
 - 1) The functions of both the Fruit Office and the Animal Production Office should be changed so as to become strictly marketing boards with greater autonomy and statutory powers.
 - 2) The function of the Green Plan should be reevaluated even though it is doing a good job at present.
 - 3) The Agricultural Research Institute should be strengthened by increasing its budget and personnel. It has a big role to play in the development of agriculture. It should also have close ties with the Extension Department.
 - 4) The silk office should be incorporated in the Rural Industry Section in the Ministry since this section is responsible for encouraging the establishment of agricultural industries in rural areas. Silk production is an integral part of this type of industry and can play an important role in encouraging the farmers to stay in their areas rather than moving to cities.

Thesese are few suggestions which could help in revitalizing the Ministry of Agriculture so that it can play a leading role in rebuilding and developing agriculture in Lebanon.

SECTION FIVE SUMMARY AND RECOMMENDATIONS

SUMMARY

The purpose of this paper is to stimulate discussion on areas and issues regarding agricultural development in Lebanon.

Agriculture in Lebanon, although at present, plays a minor role in the economy of the country with an 11% contribution to the overall GNP, can in the future contribute more to the overall economic development of Lebanon.

Lebanon's agriculture can contribute positively to the overall country's drive to economic growth by providing an increasing amount of food supplies, thereby contributing to a reduction in deficits in the balance of payments by saving foreign exchange needed to finance imports of food from abroad. This will also help make Lebanon approach a self-sufficient economy with regard to food.

It is also envisaged that once agriculture is put on a path to a self-sustained development particularly through increased mechanization and technical innovations, labor from the agrarian sector can be released efficiently and effectively to industry and other sectors thereby contributing to national development.

In addition, agriculture in Lebanon can offer more resources for industrial development, an expanded market and the foreign exchange through exports which is so badly needed to finance the country's reconstruction and redevelopment plans.

The civil strife has shaken badly the people and the agriculture of Lebanon. However, although material loss and human life is difficult to calculate since devastation and catastrophe has hit Lebanon to unforeseen and unprecedented proportions, the writers of this paper feel most adamantly that Lebanon can be rebuilt and redeveloped fully since the people of this country are full of optimism, enthusiasm and zeal to improve their living standards. This is probably more true in agriculture and in the rural areas than in other sectors. The rural communities of Lebanon suffer from a lack of general infrastructure. Roads, land fragmentation, medical facilities, education, employment opportunities, credit facilities are all in short supplies thereby accentuating the problem of urbanization as more villagers abandon their homes to come and live in the city. The result is more chaos and social unrest. Urbanization in Lebanon must be checked immediately through the provision of all those facilities that are in short supply in the rural areas. Agricultural cooperatives appear to be some

of the main institutions with which the development and reform of the rural areas of Lebanon can be brought about.

The supply of an efficient and adequate credit to agriculture in Lebanon appears to be the most limiting step for development at the present time. An institution of this kind, sponsored by the Government can play a major role in the transformation of Lebanese agriculture.

It cannot be overemphasized that the success of an agricultural credit system in any country largely depends on a positive attitude of the government towards agricultural development and a sound agricultural credit policy. These are particularly important in the gradual transition from subsistence to commercial agriculture which is the critical phase in the process of agricultural development in most newly developing countries. Because agriculture is their preponderant industry, credit to farmers is an important factor which bears upon the extent and pace of the change-over to commercial agriculture. There is great scope here for supervised credit combined with co-operatives and agricultural extension. For successful agricultural development programs, it is imperative that a continuum in agricultural research and education in both the public and private sectors be implemented.

RECOMMENDATIONS

In view of the foregoing observations, the agricultural economy of Lebanon can be reactivated by:

- a. Launching an integrated rural development program through an overall national plan for agricultural development.
- b. Improving land tenure systems and conducting land consolidation work.
- c. A "Package Deal" approach is desperately needed whereby farmers are provided with all necessary inputs and services for the development of an efficient and effective agricultural enterprise. Marketing boards for specific products should be considered by the Government.
- d. A reforestation scheme must be planned for the development, management and protection of our vegetation.
- e. A water resource and land capability survey is necessary to maximize utilization of these two basic resources.
- f. Ways and means must be found for encouraging farmers to bring new areas under cultivation.

- g. More research is needed into methods of agricultural production and water utilization.
- h. Integrating and merging major agricultural service institutions into fewer ones.
- i. Set up a specialized agricultural credit institution which should be Government sponsored.
- j. Multi-Purpose Cooperative Institutions should be introduced in rural areas so that the provision of agricultural inputs and all necessities of life can be accessible.
- k. Implementing suggestions on crop improvement.
- l. Implementing suggestions on livestock improvement.
- m. Implementing suggestions on the reorganization of the Ministry of Agriculture and the Autonomous Bords.

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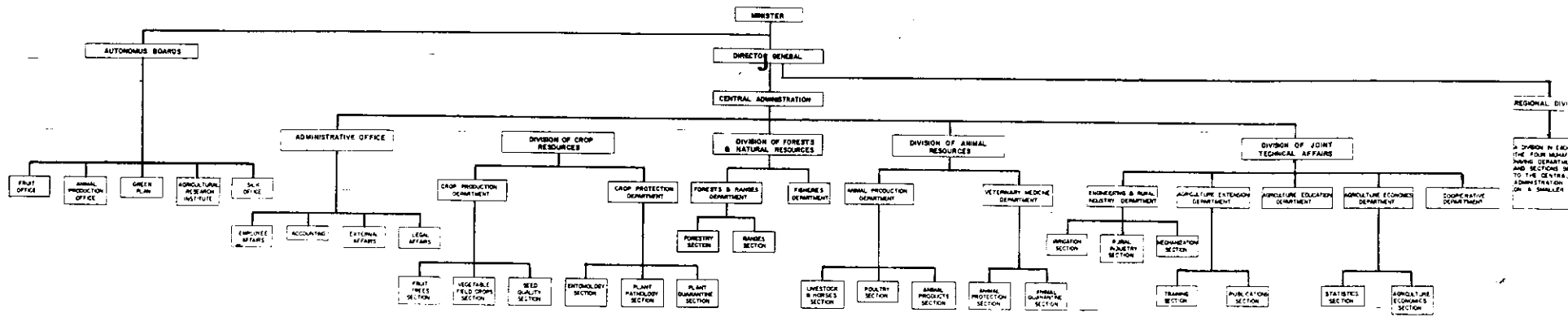
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APPENDIX I

ORGANIZATION OF THE MINISTRY OF AGRICULTURE



الجمهورية اللبنانية

مكتب وزير الدولة لشؤون التنمية الإدارية
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