Focus on Seed Programs
The Lebanon Seed Industry

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Introduction

Lebanon is situated latitude 33.5°E and longitude 35.5°E on the eastern shores of the Mediterranean Sea. The country covers an area of 1.0452 million ha with an average width of 48 km and an average length of 220 km. It has two mountain ranges, Mount Lebanon which runs parallel to the sea overlooking the narrow coastal plain, and the Anti Lebanon range which runs to the eastern side parallel to Mount Lebanon. The two mountain ranges are separated by the Bekaa valley the main productive agricultural area in the country. The northern part of Bekaa valley is, however, semi-arid and almost too dry for agriculture.

The climate is highly variable, thus a transect of 50 km can range from a coastal subtropical climate, through middle slopes that are typically Mediterranean, to high areas that are covered with snow for most of the year (3080m highest elevation), then reaching the fertile Bekaa plain (1000m), finishing in the eastern slopes that separates Lebanon from Syria.

The population is estimated to be 3.2 million. Although 40 % of the Lebanese population lives from agriculture, it is not a priority for the government. The budget of the Ministry of Agriculture is very low and cannot support the development of the agricultural sector in the country.

Agricultural Sector Policy

The arable land use (Table 1) in Lebanon suffers from lack of appropriate policy, planning and management. The total cultivated area is estimated to be about 250 thousand ha (24% of total land area), of which hundred thousand ha is under irrigation. About 85% of the cultivated land is owned by the private sector. Forests comprise 11 % while 45 % is classified as not suitable for agriculture.

Table 1. Land use in Lebanon (1999)

Land Use	Area in ha (000)	% of total area
Cultivated area	248	24 %
Unused cultivable area	137	13 %
Forests	118	11 %
Not Arable	473	45 %
Roads, buildings, etc.	69	7 %
Total	1045	100 %

Source: Ministry of Agriculture and FAO

The major crops grown in the country are fruit trees (29.1%) followed by olives

(23%), cereals (21.1%), vegetables (14% including potato, onions and garlic), nuts (5.7%), industrial crops (4.4%) and grain legumes (2.7%).

Table 2. Area and production of major crops in Lebanon (2001)

Crop	Area cultivated (ha)		Production (tonnes)	
	Area	%	Amount	%
Cereals	52,000	21.1	172,000	7.5
Grain Legumes	6,600	2.7	61,300	2.6
Industrial Crops	10,900	4.4	30,900	1.3
Vegetables	17,300	7	646,100	28
Tubers, roots, bulbs	17,300	7	428,800	18.5
Fruit Trees	71,800	29.1	858,700	37.1
Olives	56,800	23	85,800	3.7
Nuts	14,100	5.7	29,900	1.3
Total	246,800	100	2,313,500	100

Source: Ministry of Agriculture, 2001

National Seed Policy and Laws

Lebanon has a free market economic policy and extensive private sector. This attracted local and foreign investors to participate in the economic growth and development of the country. In Lebanon both the public and private sectors plays an important role in national seed sector development. The public sector has responsibility for providing seed for subsidized crops such as wheat, sugar beet and tobacco. It has also contributed in the production and distribution of transplants of olives and forest plants. The private sector plays a major role in the development of agriculturally important imported crops. The private sector import or produce almost all seed and transplants of vegetables, fruit trees and ornamentals.

There are general regulations governing issues of public interest like plant pests, pesticides, etc. These rules apply more specifically to import and export provisions. In Lebanon most of the seed is imported and general trade laws apply to seed and planting materials. There is no specific seed law governing seed produced locally or imported from elsewhere. A seed law was prepared in the early 1970s, but never implemented. However, appropriate procedures and techniques are followed in seed production and quality control. Plant variety protection is still not implemented.

Lebanon is an active collaborator with international organizations dealing directly or indirectly with the seed sector such as ICARDA, ACSAD, FAO, ISTA, RBG (Kew) and UPOV.

Agricultural Research and Crop Improvement

Agricultural research dates back to the establishment of Tal Amara in the Bekaa Valley immediately after the independence in 1946 as an agricultural training center, supported by the French technical assistance. In 1957, it became the Department of Agricultural Scientific Research (DASR) of the Ministry of Agriculture (MoA). Later on other stations were established at Terbol (Bekaa) for animal and Abde (north) and Tyre (south) for citrus.

In 1964, DASR was re-organized as an autonomous public institution and become the Lebanese Agricultural Research Institute (LARI) managed by the Board of Directors and affiliated to the MoA. More research stations were established at Fanar (Mount Lebanon) for animal health and agriculture, at Kfarshakhna (North) for olive and citrus improvement. In late 1970s, both Terbol and Kfardan were handed over to the International Center for Agricultural Research in the Dry Areas (ICARDA), although part of the research stations were given back to LARI in 1999.

The agricultural faculties of four universities also conduct agricultural research. The Faculty of Agricultural and Food Sciences at the American University of Beirut (1952), the Faculty of Agricultural Sciences of the Lebanese University (1985) and two private institutions, St. Joseph and Kaslik Universities carry out limited research.

The Lebanese National Council for Scientific Research (LNCSR) was established in 1962 with the mandate of promoting, supporting, and coordinating the national research policy. LNCSR supports some contractual agricultural research projects in LARI and the universities.

Genetic Resources Conservation

Lebanon ratified the Convention on Biodiversity (CBD) in December 1994 and has completed its Biodiversity Country Study supported by the Global Environment Facility (GEF) and United Nation Development Program (UNDP). The study documented the status of flora and fauna, identified endangered species and priorities for conservation, proposed measures for the conservation and sustainable use of biodiversity, assessed the benefits of conservation of biodiversity and the cost of intervention. The national biodiversity strategy was completed in 1998 and covered the following elements: the reinforcement of institutions involved in biodiversity conservation, land use planning, strengthening scientific research on biodiversity issues, establishment of protected areas, restoration of the degraded natural ecosystems, biodiversity legislation and education, public awareness and environmental impact assessment of the developmental activities.

In 1999, a regional GEF/UNDP funded project "Conservation and Sustainable Use of Dryland Agro-biodiversity of the Near East" started in Jordan, Lebanon Syria and the Palestinian Authority. The project aims at promoting the conservation and preservation of wild relatives and landraces of important agricultural species in participating countries by introducing and testing in-situ and on-farm mechanisms and techniques to conserve and sustainable use of agro-biodiversity. In Lebanon, the project is executed by LARI and is coordinated at the regional level by ICARDA with the technical support of ACSAD and IPGRI.

Variety Development

The Department of Plant Breeding of LARI is responsible for variety development of cereals and legumes. Generally genotypes from national breeding programs (crosses) or from collaborative ICARDA or ACSAD international nurseries are selected for further testing. The selected advanced superior genotypes are tested for two to three years at Tal Amara station in Bekaa Valley for adaptation to Lebanese conditions.

The private seed companies introduce hybrid vegetables and transplants and tests for adaptability, performance and quality before eventually multiply and market the seed in the country. For example, during the first year introduced varieties are screened in the open field (e.g. potato in Bekaa valley) or green houses (e.g. tomato, cucumber, pepper in coastal areas) for

adaptation. In the second year, the variety is assessed for yield and quality of the product before it enters large scale testing with large scale farmers as part of product development and commercialization.

Variety Evaluation and Release

The Plant Breeding Department is also responsible for variety evaluation by conducting yield and on-farm verification trials. After two years testing at Tel Amara, high yielding advanced lines with good grain quality are selected and tested in multi-location variety trials in collaboration with ICARDA in five major locations across the country: northern coast (sea level and 800-1000mm); south (300-400m and 700-1000mm rainfall); west Bekaa (1000m and 600-800mm); central Bekaa (1000m and 400-500mm); and north Bekaa (1000m and 200-300 mm). The multi-location trials are carried out for at least three years after which better performing varieties are identified for release**.** Apart from yield other aspects of grain quality, water absorption, yellow berry, etc. are also considered in the evaluation of improved varieties.

The Department of Plant Breeding decides on the varieties to be released and recommend it to the Board of Directors of Lebanese Agricultural Research Institute. The Office de Cereales et de Betteraves Sucrières (Ministry of Trade and Economics) conducts on its own grain quality analysis and if results are satisfactory, it accepts the released varieties by LARI for seed multiplication. The list of cereal and legume varieties developed by the public sector and currently under commercial use is given in Table 3.

Variety Maintenance

The Plant Breeding Department of LARI is responsible for variety maintenance and breeder and foundation seed production and supply particularly of wheat to Office de Cereales et de Betteraves Sucrières (OCBS) which is under the Ministry of Trade and Economics.

Seed Production

For winter cereals three classes of seed are produced: breeder, foundation and certified. An official public sector cereal seed multiplication exists for wheat only where the responsibility lies with the Office de Cereales et de Betteraves Sucrières (OCBS) under the Ministry of Economics and Trade. At present OCBS coordinates foundation and certified seed production with technical assistance from LARI and MoA. The OCBS covers the costs of seed cleaning to LARI which does this work whereas LARI and MoA are responsible for technical supervision. All field activities such as land selection, preparation, planting, herbicides application, rouging etc. are carried out by the farmer under the supervision of LARI and MoA staff. Staff from the MoA and/or LARI conducts Field inspection.

Foundation and certified seed are produced on contract with farmers. The seed growers receive a premium of 20% over the grain price for both seed classes. The amounts of seed wheat produced by LARI and supplied to the Office de Cereales et de Betteraves Sucrières in the last five years are shown in Table 4.

In the past LARI was responsible for contracting farmers for certified seed production. However, since 2000 the Ministry of Agriculture took over the responsibility but with a technical assistance from LARI.

Table 3. List of crop varieties under seed multiplication in Lebanon

Barley (2-row)	Litani	ARI	1978
	Faiz	ARI/ICARDA	1997
Barley (6-row)	Rihane 03	ARI/ICARDA	1984
	Chams	ARI	1991
	Assi	ARI/ICARDA	1997
Bread Wheat	Baalbek	ARI	1970
	Haramoun	ARI	1974
	Seri 82	ARI/ICARDA	1988
	Nesser	ARI/ICARDA	1992
	Towpe	ARI/ICARDA	2000
	Tannour	ARI/ICARDA	2000
Durum Wheat	Haurani 27	ARI	1956
	Stork	ARI	1970
	Sebou	ARI/ICARDA	1988
	Lahan	ARI/ICARDA	1992
	Waha	ARI/ICARDA	1993
	Masarra	ARI/ICARDA	2000
Chickpea	Janta 2	ARI/ICARDA	1988
	Balila	ARI/ICARDA	1995
	Al-Wady	ARI/ICARDA	1998
Lentil	Talia 2	ARI/ICARDA	1988
	Toula	ARI/ICARDA	1995
	Rachayya	ARI/ICARDA	2000
Faba bean	Elisar	ARI/ICARDA	1995
Vicia sativa	Baraka	ARI/ICARDA	1997
Vicia ervilia	Ammara	ARI/ICARDA	1997
Lathyrus cicera	Jaboula	ARI/ICARDA	1997

On the other hand LARI is responsible for seed production and supply of barley, chickpea and lentil on small scale without any official mandate. For example in 2000, about 200kg of winter chickpea Al-Wady and 400kg of lentil Talia 2 were distributed free of charge to farmers across the country.

The informal seed sector is provides most of the seed of local varieties of vegetables, fruits and field crops.

Table 4. Public sector seed production of wheat from 1996-2000 (tonnes)

Year	Variety	Foundation Seed	Certified Seed
1996	Stork	6.6	403
	Waha	21.1	313
Total		27.7	716
1997	Stork	16.5	384
	Waha	16	258
	Baalbak	2	11
	Neser	2	33
Total		36.5	686
1998	Stork	15	332
	Waha	15	298
Total		30	630
1999	Stork	14	532
	Waha	20.9	69
Total		34.9	601
2000	Stork	17	384
	Waha	9.5	444
Total		16.5	828

All sugar beet seed is imported by the private companies and sold directly to farmers. Tobacco seed is partly imported by Regie (a governmental organization) and some by the private companies.

Seed Processing and Storage

The seed plant at LARI has the capacity of 3 tones/hour. Seed processing is carried out by LARI on behalf of OCBS on payment. The OCBS pays LARI 3 USD per 100 kg of seeds to be cleaned, which covers all costs including purchase of sacks and chemicals as well as cleaning and operations.

Seed storage facilities are available at Tel Amara station (1000 tonnes, managed by LARI) and Zahle (500 tones, managed by MoA), with a combined total capacity of 1500 tones. However, most of the seed is stored temporarily for three to four months until the seeds are distributed to farmers by the OCBS and only 10% is stored for a longer period.

Seed Marketing and Distribution

Lebanon produces seed of wheat only. The OCBS is responsible for marketing and distributing seed to the farmers. Applications for certified seed purchase of wheat are handled by LARI and OCBS office at Tal Amara. All seed is distributed from Tal Amara and there are no other distribution points in the country. Credit facilities are not available for seed purchase and farmers have to pay in cash. Most of the imported seed is sold through their agents.

Certified seed of wheat is sold to farmers at the equivalent of $33/100 kg compared to grain which is about $20/100kg.

International Seed Trade

In Lebanon there are no variety and seed trade regulations restricting imports. However, the seed companies are responsible for adaptation trials, promotion and marketing of imported varieties and seeds. Seed import requires the certificate of the chamber of commerce and notarization from the Lebanese Consulate from country of import. The following documents should be notarized: (i) original invoice, (ii) original air waybill, (iii) phytosanitary certificate, (iv) certificate of analysis, (v) certificate of origin, (vi) certificate of specialization, and (vii) packing list. The value of seed import and export is shown in Tables 4 and 5.

Hybrids or planting materials are generally imported, though some local production started recently by the private sector. Potato is imported from Denmark, France and Holland; onion bulbs from Syria; and vegetables from Belgium, Cyprus, France, Greece, Holland, Turkey and the United Kingdom. The cultivated varieties of vegetables are shown in Table 7.

Table 4. Quantity (tonnes) and monetary value (USD '000) of seed import and export of major field crops from 1998-2000

Crop	1998				1999				2000			
	Import		Export		Import		Export		Import		Export	
	$	t	$	t	$	t	$	T	$	t	$	t
Sugar beet	858	105	0	0	817	57	0	0	985	62	7.5	5
Other Beets	160	216	6.3	16	192	469	0	0	94	324	0	0
Alfalfa	10.3	20	0	0	5.5	2	0	0	8.9	4	0	0
Fescue	4.4	1	0	0	10.3	3	0	0	12.6	5	0	0
Kentucky blue grass	1.5	1	0	0	4.3	2	0	0	4.2	2	0	0
Rye grass	3.2	2	0	0	8.7	6	0	0	1.1	1	0	0
Timothy grass	32.3	11	0	0	59.2	17	0	0	23.7	12	0	0
Forage seeds	82.8	21	0	0	127.6	40	0	0	43.5	44	1	0
Flower seeds	78.6	14	0	0	49.3	4	2.9	1	64	6	0	0
Vegetable seeds	3992	124	8.3	1	4623	154	24.6	-	4592	168	2.3	1
Fruit seeds	7024	5858	95.3	84	3097	2356	56.8	71	4565	5733	78.8	47
Total	12,247	6373	110	101	8994	3110	84.3	72	10394	6361	89.6	53

The Ministry of Agriculture is responsible for issuing licenses and permits. The import permit is required only for citrus seed, prunus seed and apples. LARI on request from MoA can assist in testing seed samples of imported seed lots but this is seldom practiced.

The quarantine law No 283/1 was issued in November 1998. The MoA is responsible for enforcing the law together with the quarantine offices at the borders. It has no effect on seed import.

Seed Quality Control

In Lebanon various public institutions such as LARI, MoA and OCBS are responsible for seed quality control. LARI is responsible for monitoring seed production fields from planting to harvesting. All recommended agronomic practices is followed to produce good quality seed. Field inspection is carried out at the appropriate stage by inspectors from LARI.

After harvest seed lots are processed, sampled and tested for purity, germination and weight in the seed testing laboratory following official procedures. Seed testing facilities are available at ARI and the American University of Beirut.

After testing seed bags are labeled with the name of the variety, production year, purity and germination and ready for distribution to farmers.

Table 5. Number of vegetables varieties cultivated in Lebanon (2000)

Crop	Number of varieties	Seed suppliers	Seed distributors
Cabbage	11	N.Z., Sakata, OE, Takii, Tokita, Ergon	Lemico, Debbané, Unifert AMC-AMALIA
Eggplant	12	Peto, R. Sluis, Clause, S & G Abond, De-Ruiter	Unifert, Agrimatco, Robinson, Debbané
Cauliflower	3	Clause, Petoseed, Bonanza	Agrimatco, Unifert
Cucumber	35	Peto, R. Sluis, Petoseed, ASG, D.R., Nekrson, Zwan, CALI, S & G, Enza-Zaden, Raci Bruinsma, F.M.	Unifert, Agrimatco, Debbané, Robinson, C.A.L, Bustani, Amalia, AKL
Water melon	13	Petoseed, Peto, S & G, Nuhems, ASG, Clause, Cali Sakata, Hollar	Unifert, Robinson, C.A.L., Sahel, Agrimatco, Lamico
Melon	10	ASG, HOLLAR, NZ, Color, R. Sluis, Asgrow, Petoseed, OE	Agrimatco, CAL, Debbané, Amalia, Unifert
Squash	12	CALI, ASG, Tezier, R. Sluis, Bonanza, Asgrow, Petoseed	Unifert, Agrimatco
Pepper	14	Petoseed, R. Sluis, Technisem, Clause	Unifert, Debbané
Radish	3	OE, Darhn, Vilm, Cali, Daehn, Tropica	Unifert, Agrimatco, Debbané
Tomato	35	Rossen, Peto, R. Sluis, CALI, Sunseed, Amer.S., Bruinsma, Clause, Abond, Berrex, Asgrow, S & G, GSN	Debbané, unifert, Agrimatco, Sahl, Bustani, Salia, AKL, Robinson
Lettuce	4	R. Sluis, Abond, ASG, Clause, Panseed, F.M, NZ	Agrimatco, Unifert, Debbané
Carrots	3	R. Sluis, NZ, Abond Tezier, VIL, Clause	Agrimatco, Unifert, Debbané, Daredo
Sweet Corn	4	PANSEED, ASG, F.M., R. Sluis	Agrimatco, Debbané, UniferT
Onion	1	TECH., Hurst, Daehn, Abond	Unifert, Agrimatco, C.A.L.
Beans	7	ASG, Technisem, R. Sluis Abond, Vilm, Takii, FM	Agrimatco, Unifert, Daredo, Debbané

Constraints in the Seed Sector

The main constraints in the national seed sector of Lebanon are related to policy, regulatory, technical, economic, and policy issues.

Seed Policy and Regulation

At present there is no national seed policy for guiding the development of the seed industry in Lebanon. Moreover, there are no officially sanctioned variety regulation, seed regulation or seed trade (import or export) regulation. Seed production and supply are organized on adhoc basis by various research, development institutions and the private sector.

Technical

In general there is lack of interest, low level of knowledge and expertise in the seed sector. There is a great need for trained manpower in seed technology particularly in laboratory analysis. The most important areas are field inspection, seed processing and seed quality tests (germination and seed health). Local specialists tend to look for jobs abroad.

Economic

In agriculture return on investment is not very high, and perhaps it is the lowest for seed. The land value is high, input prices are

high and labor is expensive. Seed is not considered a priority in agriculture.

Government Agricultural Policy

Government policy is a bottleneck in agricultural development. There is lack of long-term planning and no land classification system. As a result urban development is encroaching into agricultural land.

Recommendations

The following are some of the key recommendation to improve the development of the national seed industry in Lebanon

- Revision of the agricultural policy in Lebanon
- Increase the annual budget allocated to the MoA
- Implementation of a seed law
- Privatization of the seed industry
- Establishment of a seed multiplication center
- Reducing the cost of seed production
- Adequate training for technicians, extension staff and farmers
- Establishing efficient and sufficient agricultural cooperatives
- Provision of agricultural credit services
- Development of the regional seed market
- Provision of extension and support services

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