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Agriculture position in the overall economy

Agriculture is a major productive sector within the economy contributing of about 10% the Lebanese GDP in 1997. Its importance lies in securing food and self-sufficiency, acting as a source of foreign currency through agricultural exports, and in providing job opportunities.

Whereas the economically active population has been stable over the past years and is estimated at 24-25% of the total Lebanese population of Ca. 3 million people, the agricultural labour force has been continuously decreasing to reach a level of 7% of the economically active population in 1996. The drop in agricultural labour force is due to a severe labour migration from rural areas in search for more profitable work in cities and other economic sectors. The agricultural sector has been negatively affected by the 16 years of war (1975-1990).

Lebanon, located at the eastern side of the Mediterranean and with a series of high mountain chains, is characterized by an extremely variable range of microclimates. Several types of crops are produced in the various agro-ecological zones. From a total cropped area of about 262,635 ha, around 50% are dedicated to fruit crops, 17% to vegetables and 33% to field and industrial crops. Agricultural exports accounted for 14% of the national exports in 1997. Lebanon imports almost 75-80% of its food requirements. Self-sufficiency is only reached in fruits, poultry, potato and vegetable production but in some periods during the year the Lebanese

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market needs to import a limited quantity of potato and some other vegetables.

Sector policy

Agriculture is an essential sector of the Lebanese economy through its contribution to food production and the export of several agricultural commodities. The main agricultural objectives have been determined such as testing new varieties with a better environmental adaptation to the local conditions, improvement of the cultural practices and pest and disease management systems (IPM), especially through the reduction in pesticide use, improvement in the postharvest handling of the produce (handling, storage, packaging, shelf-life, etc,…) and improvements in the marketing systems. The strategy worked out to boost agriculture in Lebanon is based on protecting the local horticulture production from the foreign introduced diseases and preventing the spread of diseases through infected plant propagation material. These objectives can be achieved only through serious and well-organized certification and quarantine programs and services.

Fruit tree: production, trade flows and constraints

The fruit crops grown in Lebanon include the temperate zone fruits consisting of apples, pears, peaches, cherries, plums, apricots, almonds and grapes and the subtropical fruits which include mainly citrus (oranges, mandarins, grapefruits and lemons), olives and other fruits.

Citrus, olives, apples, grapes and stone fruits are the main fruit crops, accounting for 90% of the fruit production area and for 80% of the total Lebanese fruit production.

Fruit trees. The fruit species count more than 20 million trees. The total fruit trees production area increased from 21,673 to 33,616 ha between 1973 and 1997. The production increased from 245,977 tons to 405,666 tons in 1997. About 43,202 tons of fruit trees were exported during 1997 lower

than 118,524 tons during 1973. Whereas, a clear reduction in the exportation of apples and pears was noticed.

Constraints: Production problems of fruit trees, mainly apple in Lebanon include socio-economic, and biological constraints. Socio-economic constraints are the increased foreign competition for export markets; decreased foreign demand for the Lebanese traditional apple varieties with the increased regional production; increased orchard expenses; absence of a marketing board and of agreements with international markets. Biological constraints result from the poor fruit quality produced, with most of the Lebanese orchards being old and neglected.

Citrus. Citrus production is very important in Lebanon and is spread all along the coastal zone. The total citrus production area increased from 11,939 to 16,299 ha between 1973 and 1997. The production of citrus increased from 306,735 tons to 375,111 tons between 1973 and 1997 with an average yield from 25 T/ha to 23T/ha. In spite of this decline, citrus is still one of the most important fruit crop produced in Lebanon.

Constraints: The major reason for the reduction in the citrus production is mostly the declining profitability which is the result of the following reasons:

High production costs, declining exports and yields. The exports once over 170,000 tons ranking Lebanon tenth among citrus exporters in the world, were estimated to be only 120,000 tons in 1997. The absence of agricultural exports organization, the quality standards control jeopardised the stability and reduced the credibility of the Lebanese citrus export market. The neglect of growers to their citrus orchards throughout the years of war, the failure to introduce new varieties, the absence of proper cultural, disease and pest management practices are the main reasons for declining yields.

Grapevine. Grapevine is one of the most important fruit crops grown in Lebanon thanks to the favourable climatic conditions and to the old tradition of cultivation. In term of value, grape production comes directly after citrus, thus representing a valuable agricultural commodity for internal consumption and export. The grape area in 1997 was about 15,986 ha, with an annual production of about 127,693 tons. The exportation during 1997 was 30,860 tons, the importation marked 202 tons. Table grapes cover nearly 81% of the total vine-growing area. Native cultivars are by far the most representative. They are economically relevant as they are also used for export. Industrial grapes, covering the remaining part (19%), consist mainly of imported cultivars that support a good-sized processing industry that produces wines, arak, alcohol, vinegar, etc.

Constraints: The absence of a proper extension service, improper pest and disease control strategies, especially regarding Esca and some other viral diseases, the lack of attempts to introduce new improved varieties, especially the sweet and seedless could affect the profitability of grapevine production in Lebanon.

Olives. Olive production is one of the main important crops produced in Lebanon. The olive trees in the country are nearly 9 millions occupying 50,789 ha. The production in 1997 was 93,910 tons.

Production constraints: Socio-economic constraints are mostly the high production costs, the absence of regulations regarding product quality and packaging. Biological problems are mostly due to low productivity and alternate production which is the result of poor grove management practices such as the lack of pruning, inadequate fertilization, poor pest and disease control especially in the case of old trees.

Sanitary status of the crops

Fruit trees. A survey of the diseases of stone fruits was made in Lebanon in 1996. Several viruses

were reported to occur in stone fruit trees. The most abundant viruses found were prunus necrotic ring spot ilarvirus (PNRSV), prune dwarf ilarvirus (PDV) and apple chlorotic leaf spot trichovirus (ACLSV). Mixed infections of these viruses were common. Cherry was highly infected by viruses followed by peaches, almonds, plums and then apricot. Sharka is apparently not present in the country despite its presence in our neighbours. Other viruses tested but not detected in the survey of commercial orchards included apple mosaic ilarvirus (ApMV), and six nepoviruses (SLRV, TBRV, RRSV, CLRV, ArMV and TomRSV). Recently, a survey on the virus and virus-like diseases of almonds in Lebanon was made in 1999. A low incidence of PNRSV, ACLSV, PDV and ApMV was reported. Testing for the occurrence of PPV and TomRSV was negative.

The major fungal diseases affecting stone fruits in Lebanon are peach leaf curl, powdery mildew, rust leaf, verticillium wilt and brown rot. All are endemic and widespread. Two bacterial pathogens were isolated from disease samples "*Pseudomonas syringae* and *Agrobacterium tumefaciens*". Other diseases reported but of less importance include trunk and root rot disorders (*Rosellinia necatrix*), shot hole and fruit spot (*Coryneum carpophilium*), the shot hole *(Xanthomonas pruni)* and silver leaf disease on peach.

Fire blight was found to be widely distributed throughout the pome fruit growing areas in Lebanon expressed mainly as blossom and shoot blights. The host range of fire blight in Lebanon included: Wild species of pear, *Pyrus bovei* and *Pyrus syriaca*, and cultivated varieties of apple, pear quince and hawthorn. The disease was more severe and destructive on all quince varieties surveyed, on the apple variety Sans pareille and the pear variety Miskawi. In some orchards such trees were uprooted.

Grapevine. Surveys made to ascertain the sanitary status of the main fruit crops highlighted the deterioration of grapevine which is heavily infected with the most important virus diseases e.g.

Fanleaf, leafroll, rugose wood and fleck. More than 1500 samples, tested by ELISA, showed the presence of viral agents such as GVA, GFkV, GLRaV-3 and, to a lesser extent, GFLV, GVB and GLRaV-1. The widespread occurrence of GVA and GLRaV-3 may be explained by the presence of high populations of pseudococcid mealybug *Pseudococcus longispinus*.

The major fungal diseases reported to affect the grapevine in Lebanon are powdery mildew, Botrytis bunch rot, Esca, Eutypa dieback, Phomopsis cane and leaf spot, and Black rot.

Citrus. Surveys conducted in the citrus-growing areas (South Lebanon along the coastal area, North Lebanon in the Akkar plain, Mount Lebanon), demonstrated that in Lebanon CTV is more widespread than initially thought. No decline or clear-cut Tristeza symptoms were observed in the fields. Concavities and bark scaling were widely observed. These symptoms affected virtually the locality of the trees in several groves. Leaf symptoms (oak-leaf pattern, mottling, ringspot, curling) were also seen, sometimes associated with bark disorders. Symptoms of cachexia and stubborn showed in mandarin and orange respectively. CCaV and CEV were reported with high level infection during the study. As for the Mediterranean countries, most of Lebanese citrus groves are affected by more than one disease and those caused by viroids are surely the most widespread in all citrus species. CTV is surely the most dangerous threat for the Lebanese citrus industry even if the trees are not apparently affected by the virus and the infection rate everywhere without no evidence of spreading.

The major fungal diseases identified and reported to affect the citrus industry in Lebanon are mal secco which is very widespread and severe on lemons and to a lesser extent on oranges, gummosis (*Phytophtora citrophtora* and *P. parasitica*) which is not so widespread but causes very severe trunk rot. Other diseases reported include root rots (*Fusarium* spp., *Rosellinia* spp.), leaf spot (*Phyllosticta* spp., *Phoma* spp.) fruit spots and rots (*Alternaria* spp., *Penicillium* spp.). Of the bacterial diseases attacking citrus, the citrus blast (*Pseudomonas sy-*

ringae) was reported in Lebanon and sweet lime as being of minor importance.

Olives. The sanitary status of olives in Lebanon is not properly known. No recent survey has been made, but there are several unofficial or unpublished reports which indicate the presence of serious sanitary problems. However, during a recent study carried out by IAM-Bari with the cooperation of the University of Bari, in order to assess the sanitary status of olive trees collected from Lebanon (29 samples) and other countries from the Mediterranean region, CMV, SLRV and CLRV were reported in some native varieties.

The major fungal diseases identified and reported to affect the olives in Lebanon are the olive leaf spot (*Cycloconium oleaginum)* and verticillium wilt. Of the bacterial diseases attacking olives, the olive knot caused by *Pseudomonas syringae* pv. *savastanoi* is spread in Lebanon.

Nursery sector

The nursery activity, organized in public farms, doesn't satisfy the national need. The main activities for the exchange of the propagated material of the domestic market is insured by private nurseries. These nurseries are located mainly in the Bekaa valley and in the South of Lebanon. The sanitary status of fruit trees such as grapevine, olives, citrus, stone and pome fruits is not controlled. At present, a law for the establishment of private nurseries (Nr. 46/1) based on modern and sound management principles is under study.

Plant Protection: service and institutions

The plant protection service is organized in the framework of the Ministry of Agriculture (MA). Plant Protection Research in Lebanon is mainly carried out by the Department of Plant Protection of the Agricultural Research Institute of Lebanon

(ARIL-DPP) under the umbrella of MA, various universities, and to a lesser extent, the private sector. ARIL-DPP is the public institution mostly involved in the introduction and adoption of new technologies that could be subjected to appropriate laboratory examinations and disease diagnosis. Fields of research interest were phytopathology and entomology, but during the war (1975-1990) the facilities and laboratories were severely damaged. Since 1998, the establishment of a new laboratory of Plant Protection with special reference to virology is being envisaged. Unlike ARI, the Department of Plant Protection of the American University of Beirut, has been training and carrying out research involved in the plant protection field for more than 25 years. In the last two decades, Faculties of Agriculture of the Lebanese University, St Joseph University and Holy Spirit University have initiated an educational programme and recently a modern plant protection laboratory has been established at the faculty of Agriculture of the Lebanese University in collaboration with IAM-Bari.

Certification status in Lebanon

In Lebanon, there is no applied certification program. The lack of facilities and equipment for the disease diagnosis, the absence of specialized technicians and scientists, the limited knowledge of preventive measures, the poor organization of nursery and farming activities, the long absence of organized and efficient phytosanitary services due to political problems, the lack of customs control of the plant material increase the possibility of spreading diseases through infected plant propagation material, limiting the exportation of national agricultural products, mainly nursery products. This justifies the necessity to set up and organize a certification programme for the country, to save the sanitary status of fruit trees.

On-going programme

The events and actions provided the basis for the possible start of a certification programme for the main fruit crops cultivated in Lebanon. It started

with the cooperation between the IAM-Bari staff and the Lebanese Universities and Scientific Research Institutes to support the setting up of a certification programme for the country. Recently, in June 1998, an Italian delegation of representatives from the Mediterranean Agronomic Institue of Bari and the Dipartimento di Protezione delle Piante e Microbiologia Applicata of Bari University went to Lebanon to finalize a project proposal regarding the certification programme with the Lebanese counterpart. At the end of the mission, a "Procès Verbal" was drawn up jointly by the Italian and Lebanese delegations.

Facilities needed for certification

International co-operation

Intensive and fruitful scientific exchanges occurred between the IAM-B staff and the Lebanese Universities and Scientific Research Institute. In the framework of the co-operation between Italy and Lebanon a project titled : "Production, conservation and use of certified propagation material in Lebanon: Establishment and organization of a certification programme" was prepared. This project is designed to: draw up the necessary certification and quarantine regulations to be adopted by the Lebanese authorities; obtain the primary sources of local varieties through the sanitary and clonal selection; complete the assessment of the sanitary status of the main crops in Lebanon and monitor the presence of quarantine diseases; establish and activate a national Certification service in Lebanon; produce certified plant propagation material of citrus, grapes, olive, stone and pome fruits; establish and equip the plant pathogen diagnosis laboratory used for certification and quarantine purposes; train researchers and technicians in the field of plant disease diagnosis and in the various areas related to certification.

Personnel training

Within the framework of the courses given at the Mediterranean Agronomic Institute (IAM-Bari), more than 14 Lebanese students were trained in the field of plant virology and rational use of certified propagation material. Moreover, eight of these Lebanese trained attended a Master Course at the IAM-B and some of them, during the preparatory work of their MSc thesis, contributed to the assessment of the sanitary status of grapevine, stone fruits and citrus. Other technicians and private nurserymen have attended short-term stages and made technical visits to Apulia region.

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