Technical Assistance Facility (TAF) for the Government of Lebanon
Evaluation of the Ministry of Agriculture support to the olive sector in Lebanon

Report

Technical findings of the survey to assess MoA support scheme to the olive sector in Lebanon




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List of Acronyms

MoA	Ministry of Agriculture
TAF	Technical Assistance Facility
FAO	Food and Agriculture Organization of United Nation
IOC	International Olive Council
IDAL	Investment Development Authority in Lebanon
LARI	Lebanese Agriculture research institute
GMP	Good Manufacturing Practices
IPM	Integrated Pest Management
GAP	Good Agricultural Practices
Ha	Hectare

1. BACKGROUND

The agriculture sector in Lebanon is considered one of the important sectors at national economy level as well social, environmental and food security levels. The total number of agricultural holdings in Lebanon is estimated at 170,000. More than 67% of these farmers are olive growers. The number of olive growers reach 103.000 (MoA, 2018). These olive growers are widespread from the North (Akkar, Zogharta and Koura) till the South (Tyre and Hasbay-Marjeoun), and recently in region usually unknown for olive cultivation as Baallbeck and Hermel.

The cultivated land in Lebanon cover 273,000 Ha (27 % of the total land area) of which 62,048 Ha dedicated to olive cultivation (MoA, 2018), or 23 % of the total cultivated land. Olive area has increased in the past ten years by a compound annual growth rate of 1.64% from 53,620 Ha in 2010 to 62,048 Ha in 2018.

The olive Fruits production ranges between 70,000 tons (low production years) and 190,000 tons (high production years). 30% of olive fruits are dedicated for table olive processing at industrial level but also at farmers families' level (homemade table olive for families consumption and for direct selling). The other 70% take its way to the mills for the oil extraction.

Lebanon has about 544 olive mills distributed throughout its regions ((MoE, 2010. from IDAL Factsheet 2017), most of these mills are still traditional (about 85%) with low technology and hygiene conditions. It was noted that most of the olive mills established in the recent years, by private sector or development projects, were modern and follow the hygiene rules and Good Manufacturing Practices (GMP). While the traditional olive mills (Press), which have a high cost in terms of maintenance and labor and low productivity in terms of quantity and quality are gradually moving towards closure. They are still "kept alive" by the constant demand from traditional olive growers who misguidedly believe that the quality of the oil, produced by these traditional mills, is better.

The oil yield range from 18 to 25% of the total olives weight dedicated for oil. In 2017.

Table 1: Olives and oil production (MoA, 2016 – 2018)

Production	Season 2016-2017	Season 2017-2018
Olives for oil production (tons)	133.627*	84.232*
Table olives (tons)	14.871	15.285
Total olive fruits (tons)	148.498	99.518
Olive oil (tons)	26.621	16.767

*This variation in production is attributed to the alternate bearing.

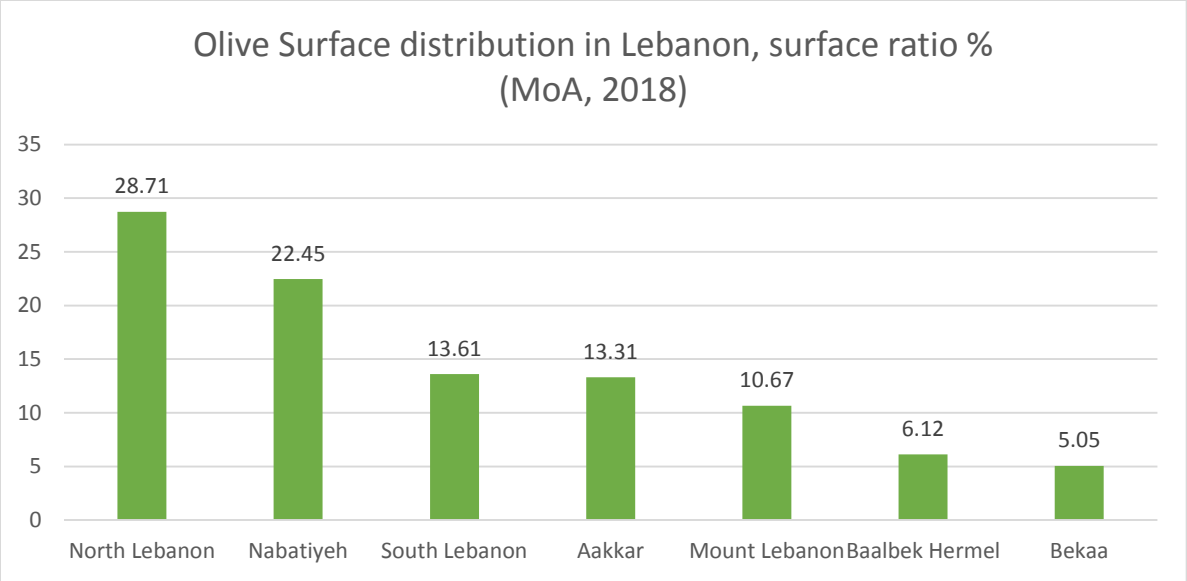
The estimated consumption of olive oil in Lebanon is 20,000 tons/year. Regarding annual consumption per capita in Lebanon, IOC data shows that the olive oil annual consumption per capita is around 4.5 Kg/year which is considered low respecting the other Mediterranean olive

oil producers' countries as Greece (16.3 Kg/year), Spain (10.4 kg/year) an Italy (9.2 kg/year). While the annual Table olive consumption per capita in Lebanon is 5 kg/year.

The olive cultivation is mainly concentrated in North 28.71%, followed by Nabatiyeh 22.45%, South 13.61%, Akkar 13.31$, Mount Lebanon 10.67, and a small percentage in Baalbeck-Hermel 6.12% and Bekaa 5% (MoA, 2018).

Table 2: Olive area in Lebanon (MoA, 2018)

Region	Olive area (Ha)	Surface Ratio %
Baabda	214	0.34
Metn	106	0.17
Chouf	4305	6.94
Aaley	994	1.60
Kesrouan	326	0.53
Jbeyl	675	1.09
Mount Lebanon	**6620**	10.67
Aakkar	8259	13.31
Tripoli / Minyé-Deniyeh	2495	4.02
Koura	7670	12.36
Zgharta	5191	8.37
Batroun	2157	3.48
Bcharré	303	0.49
North Lebanon	17816	28.71
Zahlé	698	1.12
West Bekaa	1345	2.17
Rachaya	1092	1.76
Bekaa	3135	5.05
Baalbek	2600	4.19
Hermel	1198	1.93
Baalbek Hermel	3798	6.12
Saida	2436	3.93
Sour	5020	8.09
Jezzine	990	1.60
South Lebanon	**8446.00**	13.61
Nabatiyeh	2950	4.75
bent Jbeyl	2649	4.27
Marjayoun	2485	4.00
Hasbaya	5890	9.49
Nabatiyeh	13927	22.45
Total Lebanon (Ha)	62048	100.00



The main olive varieties planted are the local ones, like Souri, Balabdi, Airouni, Telyani, Samakmaki, and few foreign varieties like Nabaly (Syrian) and Italian varieties (Frantoio, Leccino,…).and Spanish variety (Arbaquina,…), Recently introduced.

In Lebanon, the olive oil sector is considered to be a family business, and its market is different from the other crops'. Most of the small/medium growers' are marketed their products directly to the consumers (Informal Market). Lebanese consumers rely heavily on the friend/family and contact network when choosing where to purchase olive oil. Only occasionally they purchase olive oil through supermarkets. Olive oil is unlike other food product that can be purchased from any source, great weight is given to ensuring the vendor is trustworthy. The majority of Lebanese consumers select the source of their olive oil very carefully. Lebanese purchase olive oil in plastic gallons or tins (weight from 14.5 till 16.4 Kg, called Tanakeh), and give very little consideration to whether the containers are labeled or not. Consumers rely on their organoleptic evaluation (sight, taste, and smell) for olive oil. The majority of consumers buy olive oil yearly.

Olive oil is priced at 100,000-225,000 LBP/tanakeh (67-150 $/Tanakeh), depending on the high or low production season and region. Olive oil is considered to be an expensive product.

In 2017 olive oil exports reached 7,703 tons and increased 9.03% during the period 2014-2017 (IDAL). There are significant export opportunities for high quality olive oil. Lebanese olive oil exports are mainly destined to the Gulf and North America. More specifically, 26.3% of total exports or the equivalent of 2,635 tons are exported to the Saudi Arabia Kingdome, and 1,351 tons to the United States of America or 13.5% of the total.

A significant share of high quality olive oil being exported could allow a de-saturation of the local market, and thus a significant return to both exporting and non-exporting farmers and cooperatives. Nonetheless, in order to penetrate such market in a significant manner a significant effort to improve competitiveness need to be made at all level of the value chain. However,

Lebanese olive oil is exported predominantly for sale in ethnic markets, where consumers, especially the Lebanese diaspora, will support a price premium for oil that is (or is perceived to be) from Lebanon.

Olive and olive oil in Lebanon is mostly a family run and seasonal business. It provides a significant proportion of household family activity and income in rural areas. Olive production is of great importance in terms of food security for the families of olive farmers, as these families represent the first and largest consumer of oil and olives produced by them. Consumption per capita of these families nearly doubles in comparison with national figures.

The olive sector have been identified by several studies as a sector with high socio economic importance, high opportunities and potential for upgrade and improvement. However, olive oil production faces challenges common to the whole agricultural sector in Lebanon. As laid out in the MoA's strategy (2015-2019), these challenges revolve around the need to increase the competitiveness of agricultural production by increasing its productivity while ensuring conformity with international sanitary and phytosanitary requirements, and facilitating access to international markets.

Furthermore, agriculture in Lebanon faces significant structural problem, starting from land fragmentation, to high cost of production for small and medium scale farmers, and lack of adequate and accessible post-harvest facilities and services. Moreover, the agricultural cooperative movement remains weak, with its inability to attract farmers, organize, or manage its members. This situation has hampered the ability of the agricultural sector to overcome structural challenges and regional competition.

2. OBJECTIVE

In order to help the olive farmers overcome the problems that they are facing and that are influencing the cost of production and the production quality of olives and olive oil, the Ministry of Agriculture, and since many years, is supporting this sector through several programs/schemes which include the following:

- protection of olive fruits from pests and diseases through the distribution of Copper oxychloride (Fungicide, especially for the treatment of olive peacock eye disease) to farmers in the framework of the "National control of peacock eye disease program";
- distribution of monitoring and control materials for olive fly and other insects;
- distribution of olive seedlings;
- improvement of the production quality through the introduction of new technologies i.e. purchase and distribution of harvesting machines;
- distribution of stainless steel tanks for oil conservation.
- extension and technical assistance programs;
- promotion and marketing activities (Olive day, HORECA, Ardi, Souk Al Tayeb, participation to national and international exhibitions);
- establishment of the national olive oil laboratory (2014).

A considerable amount of money is then spent yearly from the budget of the Ministry of Agriculture to cover the cost of the mentioned programs with no information of the extent of their contribution to the improvement of quality of the olive fruits and the olive oil.

To ensure the stated objectives, purposes and expected results of this Technical Assistance Facility to the Government of Lebanon, this report will help the Ministry of Agriculture in assessing the impact of the support programs on the sector and the costs towards benefits analysis of these programs. The results of this evaluation will help decision makers at the MoA level reviewing their support policy and adopting the best ways to support the olive sector.

In line with its strategic plans 2010-2014 and 2015-2019, the Ministry of Agriculture has defined increasing the competitiveness of the agricultural products as one of the main targets to achieve for the improvement of the agriculture sector in Lebanon. In order to achieve this objective, the Ministry will continue baring her responsibility in supporting farmers in Lebanon including the olive farmers and improving the quality of the production of olives and olive oils. The evaluation of the existing support programs will help the ministry taking the right decisions for the continuation of these programs or the proposal of new ones that will have better impact on the sector.
In this context, this report gather and analyse the information collected during a survey done for reviewing the support programs adopted since 10 years, and collecting the required data for the cost effectiveness analysis.

3. METHODOLOGY

In order to assess the impacts of MoA supporting interventions for the olive oil sector in the past 10 years, field visits were necessary to the olive producing regions. 6 regions were selected to be considered as pilot regions for the survey, these region represent the main olive production areas in Lebanon:

- Hasbaya and Tyre in South Lebanon;
- Chouf in Mount Lebanon;
- Koura and Akkar in North Lebanon;
- Hermel in Bekaa.

The criteria for selection was mainly the area of olive cultivation in every region. Consequently, these regions are considered the most important in Lebanon. In the specific case of Hermel, the region was chosen since it could be in the future one of the important olive growing area, due to the fast expansion of olive cultivation in the last ten years, the potential in terms of uncultivated land availability, accessibility to irrigation water, and climate conditions that prevent the spread of olives pests. The previous experiences within Olio del Libano project showed that in Hermel there is a high potentiality for producing extra virgin olive oil.

In these selected areas, and in collaboration with MoA centers, it was invited to a discussion groups and then interviewed groups of olive producers who may or may have not benefited from MoA's support, in order to reflect on MoA's performance.

A questionnaire template have been prepared, divided in ٦ sections:

1. Farmers general information;
2. Olive orchard information;
3. Olive production information;
4. Marketing information;
5. Information about farmer benefiting from MoA intervention;
6. Evaluation of farmers for Ministry of Agriculture interventions in the olive sector in terms of importance, effectiveness and need.

Field visits were done to the 6 selected regions with the main target to organize focus groups and interview olive producers in order to fill questionnaires and collect data. These field visits and focus groups were done by the Agriculture and Rural Development expert and the Monitoring and Evaluation expert, the focus groups were organized and done in strict collaboration with the Heads of Agriculture Centre in each region while in Hermel it was organized in collaboration with Regional Union of Cooperatives in Baalbeck-Hereml. These focus groups were done separately to respect the local characteristics of each region. The olive production practices and difficulties faced by the farmers were discussed. Then individually, each farmer present was interviewed and an individual questionnaire filled.

Statistically speaking, the interviewed sample represents broadly the individual characteristics for every region which – taken together – account for around 52% of all olive-producing regions of Lebanon. The conclusions in the report are drawn from both the triangulation of the results of the focus group discussions and the analysis of the results of the questionnaires.

Further field visits were done by Agriculture and Rural Development expert to the selected regions in order to meet additional olive producers, fill more questionnaires and also to meet and interview the Heads of MoA Agriculture Centre, since they are on the front lines and on direct contact with olive producers.

After completion of the field work, the data has been analyzed using Excel, to reach results required to evaluate the impacts of MoA support programs on the sector and the costs towards benefits analysis of these programs. In addition, to develop recommendations to help decision makers at the Ministry of Agriculture level reviewing their support policy and adopting the best ways to support the olive sector.

A validation workshop also was organized before drafting the final recommendations. This participatory workshop aimed to discuss the preliminary findings and recommendations of the national study to evaluate the Ministry of Agriculture's interventions to support the olive sector in Lebanon and formulate strategic and operational recommendations for the next phase. 85 stakeholders participated to this workshop. 2 presentations regarding preliminary findings and recommendations of the study at technical and evaluation aspects have been delivered. 4 discussion groups were formed to discuss and amend the preliminary recommendation at 4 levels which are field, harvesting and post harvesting, marketing and legislative and administrative levels.

4. SURVEY TECHNICAL FINDINGS

4.1 Farmers General Information

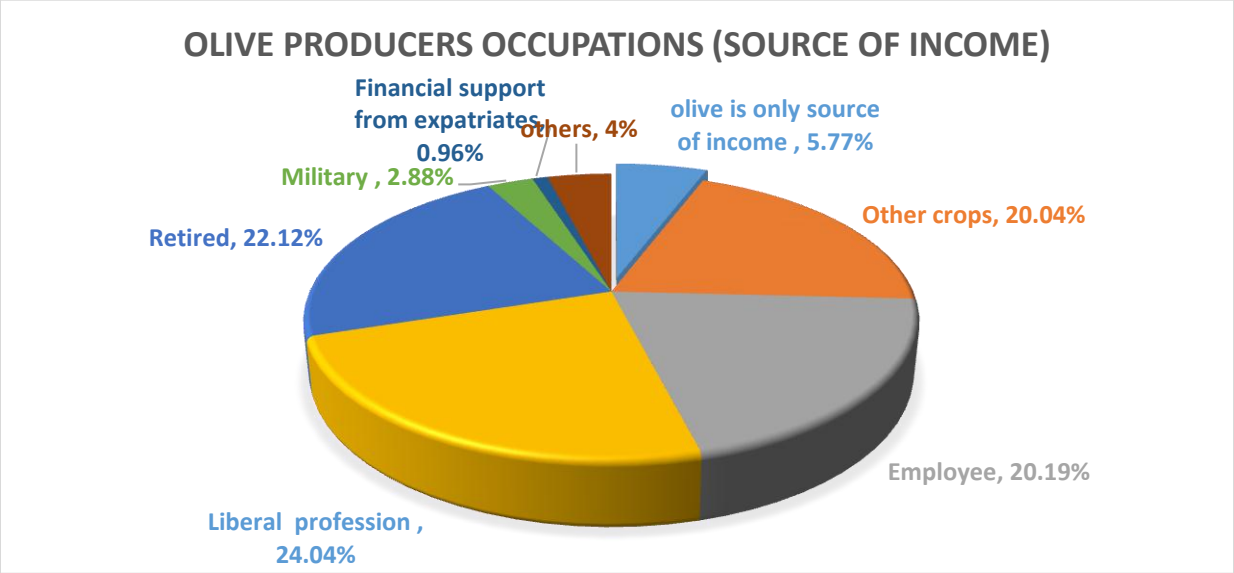
The total number of questionnaires filled was 104 (104 olive producers meet and interviewed). Some questionnaires were canceled, either due to lack of information or the figures provided by the producers were insufficient or inaccurate.

Table 3: Interviewed olive producers by region (Casa)

	District	Region (Casa)	Number of Questionnaire
1	North Lebanon	Koura	10
2		Akkar	21
3	South Lebanon	Tyre (Sour)	18
4		Hasbaya	22
5	Mount Lebanon	Chouf	18
6	Bekaa (Baalbeck – Hermel)	Hereml	15
		Total:	104

Only 5% of the interviewees were females; This indicates that – despite the major role women play in harvesting and processing, still not active or ineffective in the management of olive sector, even though they processing – they are still largely under-represented in decisions related to production and management. The questionnaires confirm that olive production is an aging profession since the average age of interviewees was around 57 years.

The results also confirm by-and-large the decline of olive growing as a major source of livelihood, since only 6% of the interviewees declared that olive production is their only source of income. This figure has declined in recent years, which indicates the seriousness of the problems plaguing the sector and the decline in the profits of farmers from olive production, which led them to diversify crops or carry out other business.



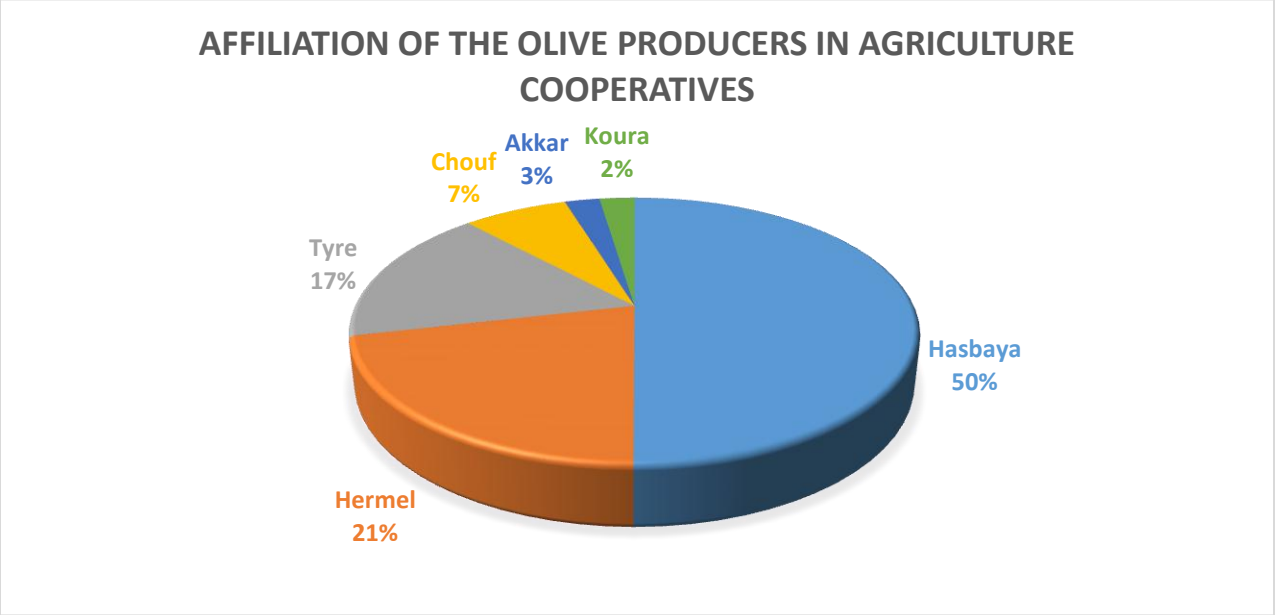
About 40 % of olive producers declared to be members in agricultural cooperatives. This figure may be inaccurate since farmers who respond to calls to meetings are usually active farmers at all levels, including membership in cooperatives. It was noted that their level of satisfaction with their cooperatives activities is medium. They declared that cooperatives activities are limited to the following (by importance):

1. Extension;
2. Distribution of products for pest control and Pesticides;
3. Olive harvesting service.

In terms of expectations from their cooperatives, respondents gave marketing the highest priority.

1. Marketing;
2. Products for pest control and Pesticides supply;
3. Provision of equipment and harvesting services.

The rate of affiliation to cooperatives varies from region to region. In some region, this percentage is very low as in the North (Koura and Akkar). The farmers in these areas were not satisfied with the work of the cooperatives. Thus, the real role of the cooperatives is not clear to them, but more than that, it is distorted.



Recommendations:

- Encourage the active participation of women and youth in the management of the sector in order to maintain and ensure sustainability, by facilitating their enrolment in the production and marketing process through the introduction of profitable and attractive

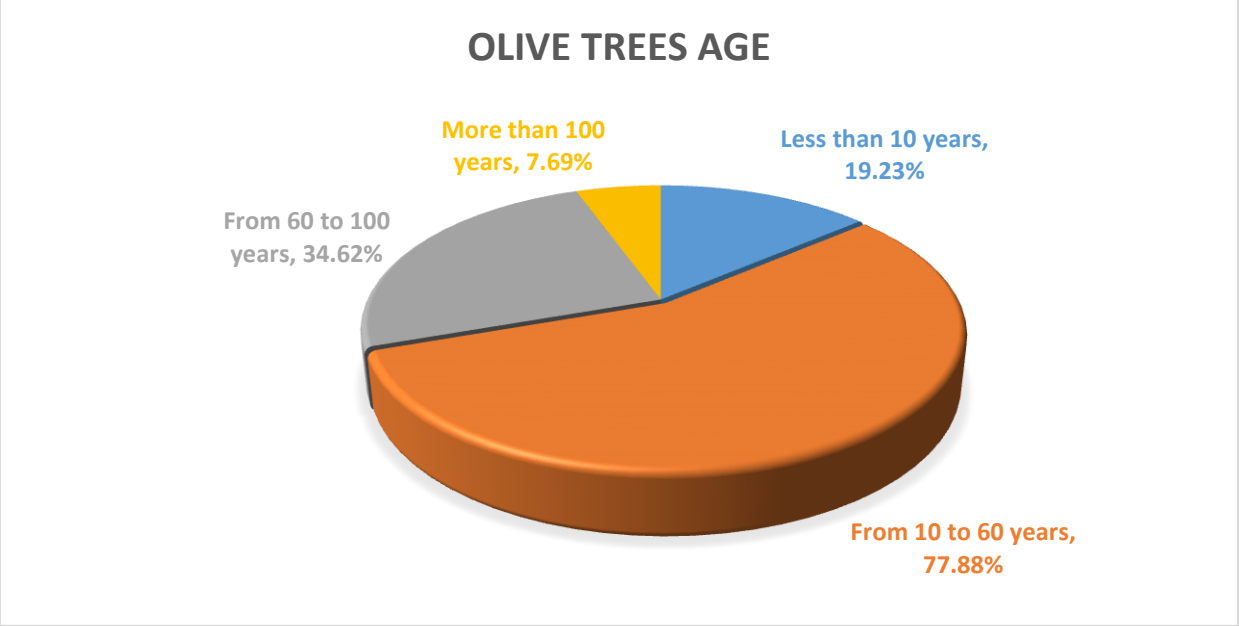
innovative practices and technologies such as GAP, organic production, olive oil soap production, table olive processing, marketing and E-commerce…

- Develop and strengthen agriculture cooperative activities in terms of legislations, management, services and infrastructures.
- Promote awareness and cooperative culture among farmers and encourage their affiliation to the local cooperatives by supporting the activities of these cooperatives as well as strengthening its role at various levels. One of the most important weaknesses of the Lebanese olive oil sector is the land defragmentation, so the development of cooperative activities is the way to mitigate the consequences of this defect.
- Support the creation of specialized cooperatives in terms of olive production or olive products marketing especially in under-represented areas (North Lebanon and Akkar);

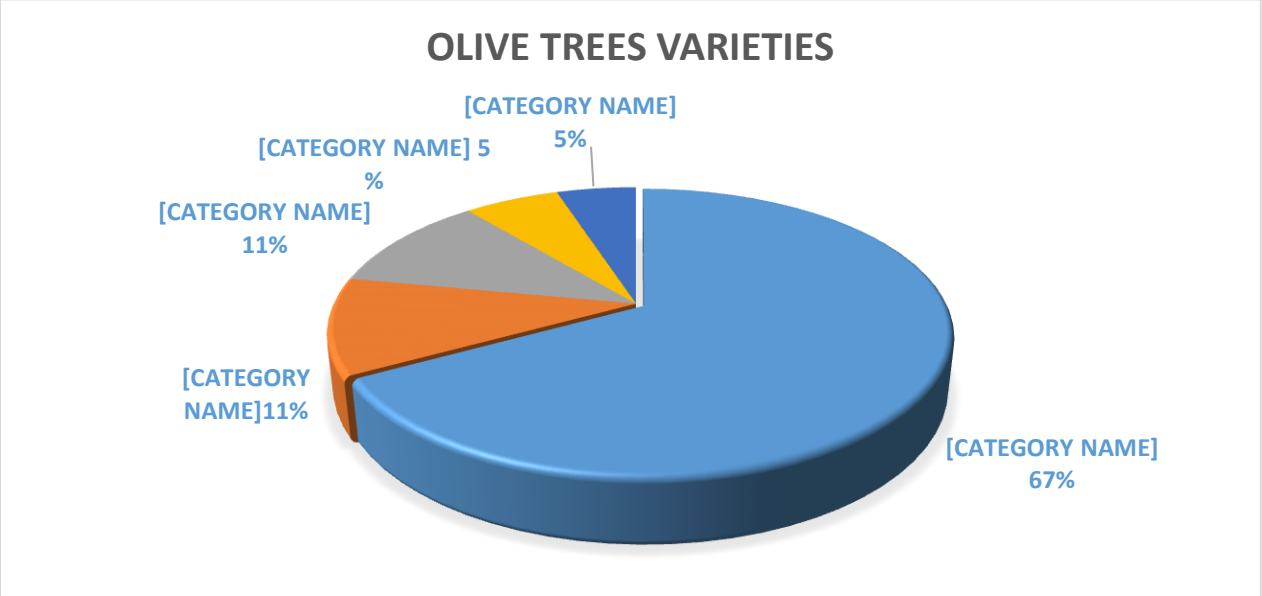
4.2 Olive orchard information

The average area of olive orchards owned by interviewed olive producers was 2 Ha or 20 donums (1 donum = 1000 m^2). Only about 3 % are organic farming certificated, while the majority follow the conventional farming. About 81 % of these orchards are rain fed. The reason why the irrigated orchards percentage is high (19 %) in comparison with the national irrigated land figure (8 %) was caused by the inclusion of Hermel region to the survey, where all olive orchards in this region are irrigated.

It is also noted that orchards are heterogeneous in terms of age of trees, about 20 % of the trees have less than 10 years and only 8% are old trees and have more than 100 years. So most of the olive trees are adults and in full production. This figure can be translated with expected growth in olive production in the future.



In addition, 41% of the interviewees declared that they have planted new olive trees in the last ten years. 11 % got the olive seedlings directly from MoA or indirectly through Cooperatives and Association.

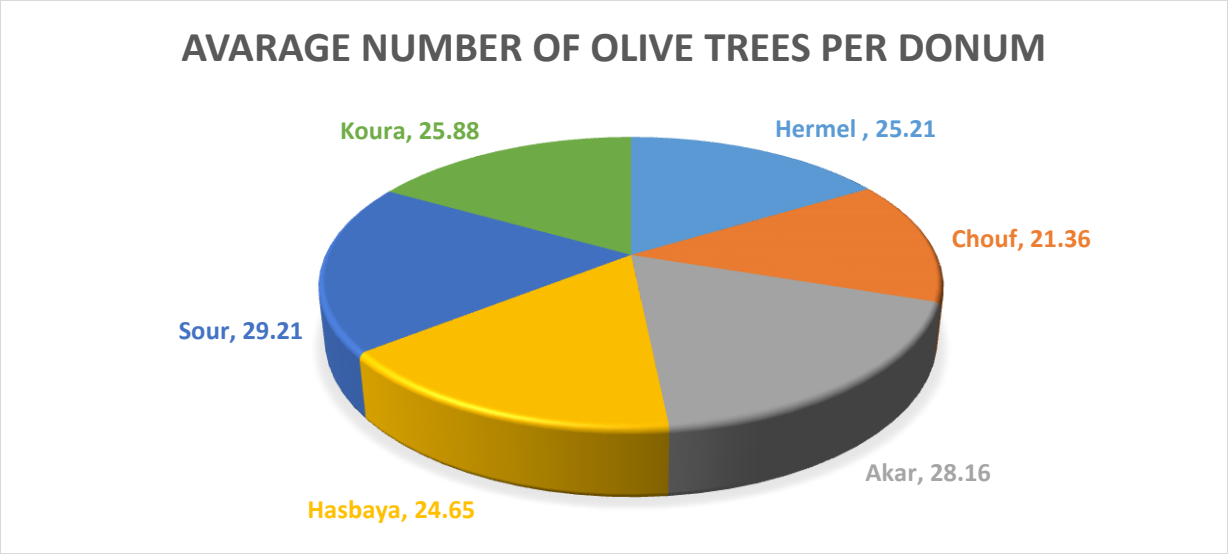


It is also noted that the dominant variety was the Soury-Baladi groups of varieties, about 67 %. While the Telyani and Aayrouni 11 % for each, 6 % Nabali and only 5 % for other Varieties.

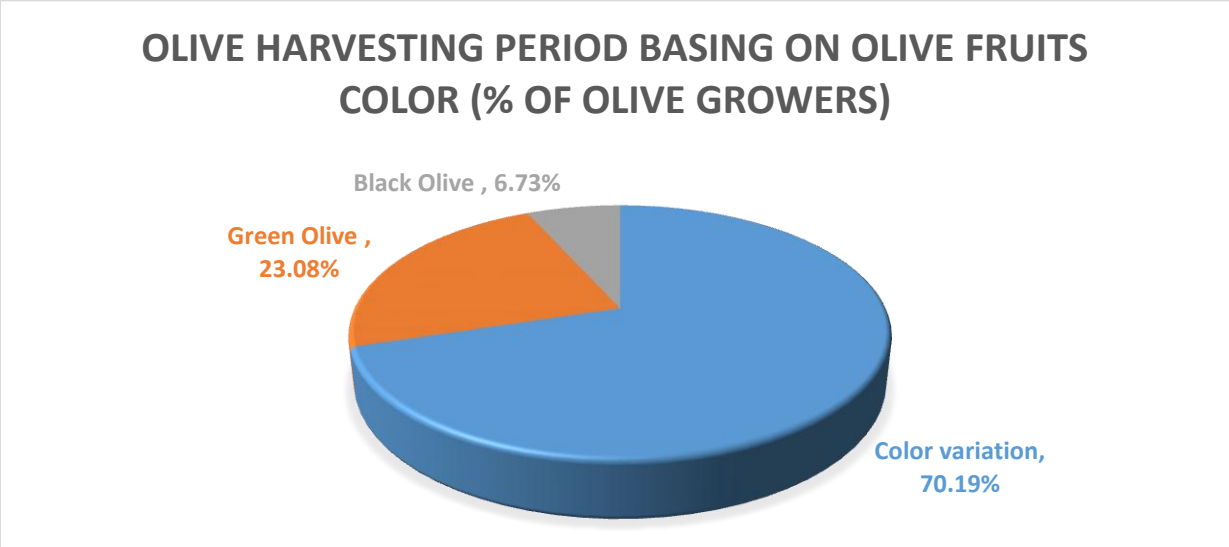
These figures showed that the Lebanese olive growers planted in the past and continue to plant the Soury-Baladi group of varieties.

Interesting to note that around 12% of farmers tried new varieties of olive trees, but most of them were unsatisfied with the results. Therefore, studying the characteristics of the local varieties called by the olive growers Soury-Baladi are urgent as well as organizing and supporting technically the local nurseries in order to produce healthy seedlings (pests free) and conform to the declared variety.

The average number of trees per donum (1 Hectare = 10 d0num) at national level is 25.75, while at selected regions the average can be noted in the graphic below.

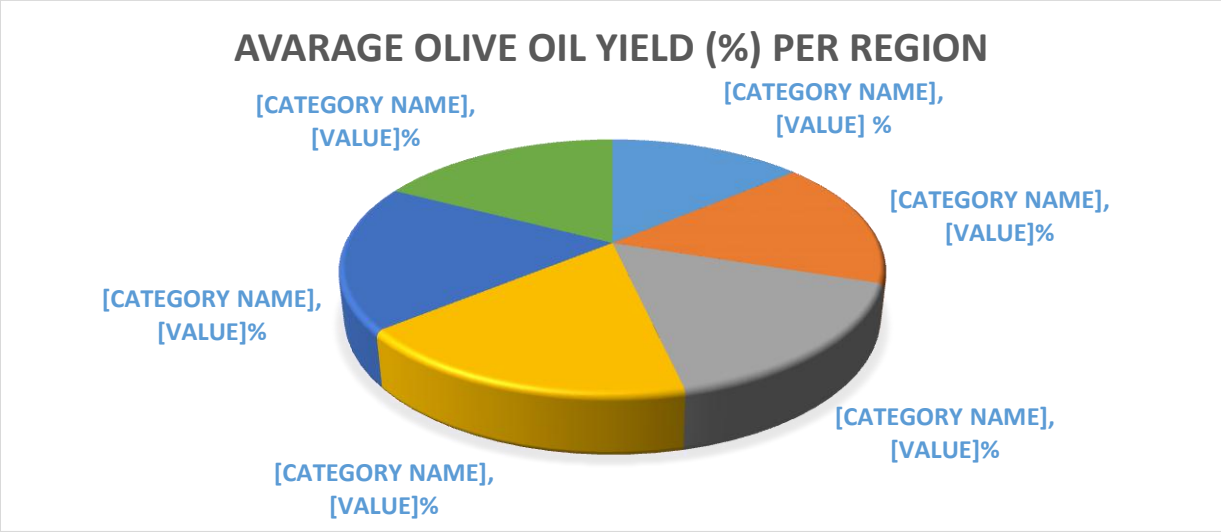


During the interviews, there were noted some changes in the agricultural practices adopted by the farmers towards improving the quality of olive oil. This is certainly due to the role of agricultural extension, which was active in the last ten years, carried out by MoA, NGOs and several development projects. For example, most of farmers give up waiting until the olive fruits become black to harvest, this would give low quality oil and low shelf life. Most farmers 70% now declared that they harvest olives when they start coloring (color variation from green to black) or when the fruit is still green 23%. This early harvesting help greatly to produce extra virgin olive oil rich in polyphenols and anti-oxidants.



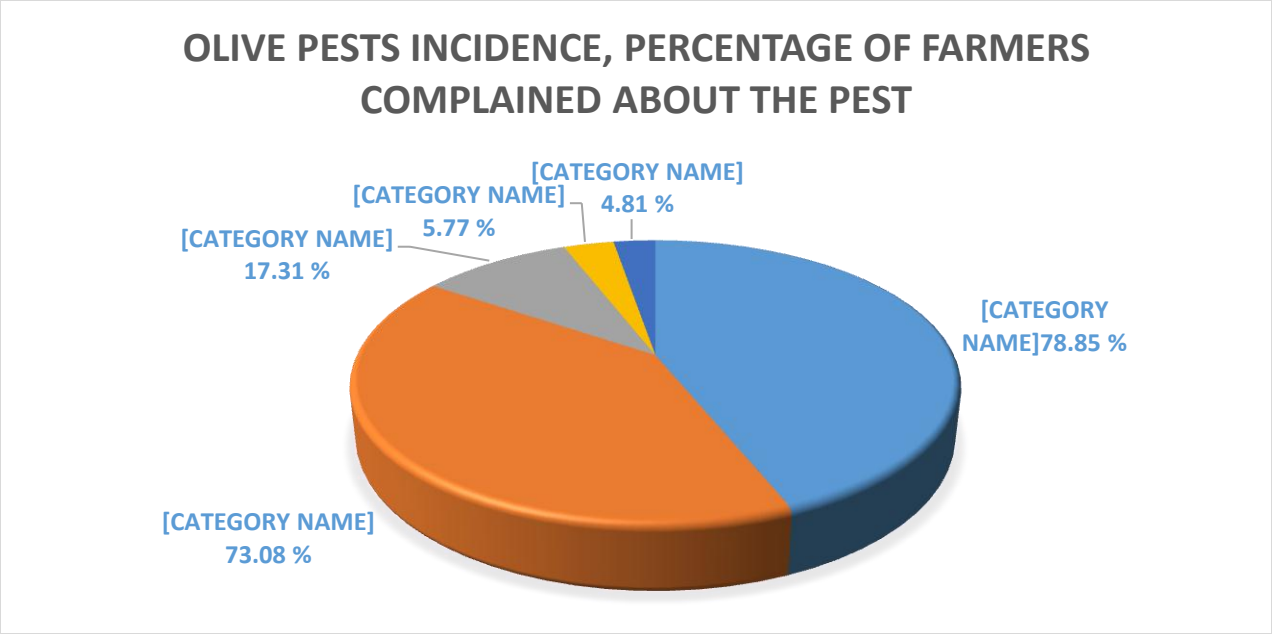
The average olive oil yield was 21.84 % and it is considered high in comparison with other producers' country. As shown in the graphic below, this figure varies from one region to another.

Tyre region represents the highest average yield, as the dominant variety is Soury, well known for it is high content in oil. While Hermel is the lowest. This reduction in the average yield in Hermel might be due to environmental and climatic factors especially high temperature in summer and soil type, or adopted varieties which most of it are imported varieties (Nabli and other Syrian varieties), or the agricultural practices such as fertilization and irrigation.



As for the pests spread in the olive groves, and according to the olive growers involved in the survey, olive fly (*Bactrocera oleae*) and peacock eye disease (*Spilocaea oleaginea*) ranked first. Almost all farmers complained of these two pests, about 75 % of interviewed. Moreover, in the regions where olive fly were absent previously (as in Hermel), farmers complained about the emergence of this insect in the last past years, especially when delay harvesting. This might be due to climate change or increased humidity in the area by the construction of a lake dam. Hermel region has great potentiality for producing organic olive and olive oil. In fact, there is currently a great effort to introduce organic farming in a formal manner by issuing organic certifications for 10 olive growers, trough HASAD Project activities and Regional Union of Cooperative in Baalbeck-Hereml. However, the emergence of the olive fly will require from these farmers to adopt additional biological control measures that may not have been planned or taken into account during the development of this project.

The interviewed olive growers were also asked about other pests. The results was as shown in the graphic below. Knowing that these figures may not be accurate for Verticillium disease or other pests, as farmers could be unaware of the symptoms of these diseases. The figure worthy to highlight is regarding olive knot disease (*Pseudomonas savastanoi*), where the number of farmers who complained about this disease was about 17% and become higher in Koura and Akkar regions.



Recommendations:

- Support olive and olive oil organic producers, since its positive effects on increasing farmers' incomes, penetrate new marketing channels and protecting the environment. This support could be trough provision of equipment, Bio pesticides and pest control materials, and the most important is to support and facilitate the establishment of new certification body;
- Conducting complete scientific studies to evaluate the local olive varieties, especially the groups of varieties called Soury/Balady, to define their full characteristic; morphological, phenological, bio-agronomic features, tolerance to pests, tolerance to rigid climatic condition, and oil quantity and quality. This characterization of the local varieties is of great importance for the future of this sector, especially to establish healthy and productive orchards, as well as to reduce the damages of existing pests and diseases.
- Supporting the local olive nurseries to develop their work by establishing mother fields that could provide safe and secured source of propagation materials in the areas where these nurseries are located, organizing their production and creating a mechanism for issuing certificates of pest free and variety conform. This helps to reduce the spread of pests that may be transmitted by seedlings. (Olio del Libano III project is currently implementing a project with the aim of completing the establishment of a mother field in Nabatieh region).
- Activating the extension program of the Ministry of Agriculture by providing financial and human resources and adopting modern and sophisticated extension tools, able of attracting farmers' attention and persuading them to adopt modern methods of production. The main objective is to reduce the costs, increase production quantity and improve quality.

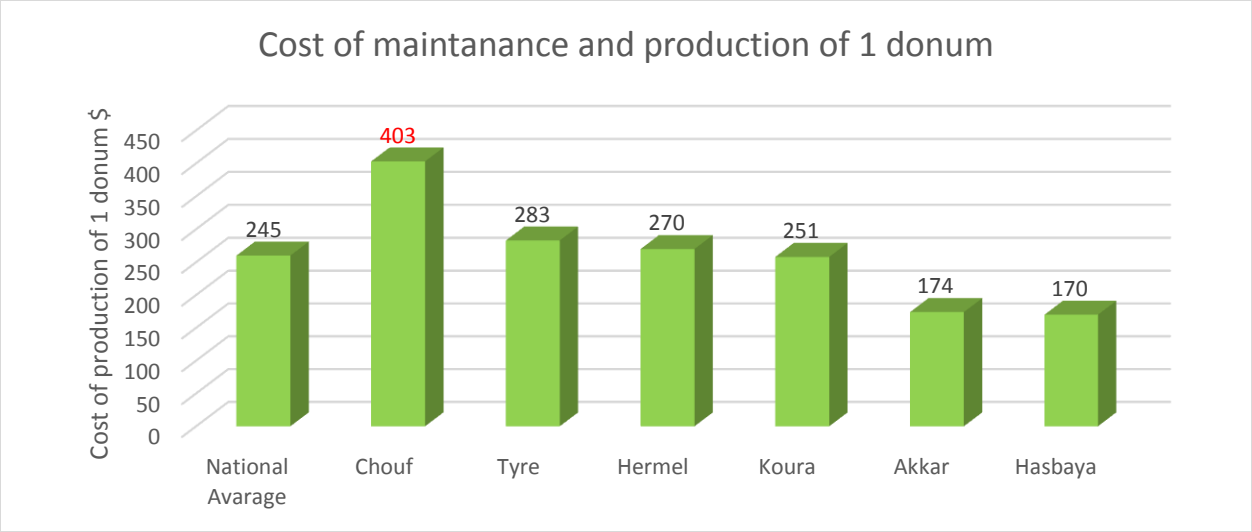
- Investigate the reason for the reduction in the oil yield in Hermel region, and determine the causes, whether by the cultivar or environmental factors or agricultural practices and finding solutions to raise this yield.
- Activate MoA's programs aiming to control the main olive pests, especially the program to control peacock eye disease and the program to control olive fly. Ensuring the continuity of these programs and coverage of all areas of olive cultivation is of great benefit, as these pests cause significant damage most of the years, and therefore the MoA's irregular and incomplete interventions may not reach the desired results.
- Give special attention to infectious bacterial and fungal diseases, which are still limited, but in the affected areas, these diseases are causing great damage to the olive groves, such as Verticillium and olive knot. As for the very serious disease called "olive quick decline syndrome" which cannot be cured or eradicated (caused by the bacteria *Xylella fastidiosa*, one of the most dangerous plant bacteria worldwide, causing the death of olive trees, with huge economic impact for olive sector and environment), raising awareness among farmers, activating monitoring measures at the border and inside the country is very important and cannot be tolerated.

4.3 Olive production information

Through the questionnaire, information has been tried to collect regarding the direct impact of MoA interventions on increasing farmers' production or reducing the cost of production. But in general, the interviewees were not able to give accurate answers. The reason is that most farmers do not have any accounting system, and even a minimum records keeping. The answers to questions such as "how much savings?" or "how much improvement in production?" were not easy to answer by the respondents.

However, it is well noted and from official figures at the Ministry of Agriculture that the area of olive cultivation as well as olive production, have increased in the last ten years. The quality has also improved significantly, and this is what emerged during the competitions, which were organized at the national level as In HORECA – Best Lebanese Extra Virgin Olive Oil competition, at the regional level or the results of Lebanese olive oil participation in international competitions. This rise in production and improvement in quality is certainly the result of the concerted efforts of MoA, local and international NGOs and Development Agencies, as well as the private sector.

One of the key figures in determining the cost/benefit analysis of olive production is the cost of maintenance and production of 1 donum (0.1 Hectare) in the different regions and at national level obviously, for the cost of production, the farmer is subconsciously inclined to increase costs in order to make a point that olive farming leads to very little (not to say negative) returns. In order to mitigate this bias, the productions costs were debated and established during the focus groups discussions by the largest possible cohort of farmers and later validated during the individual interviews.

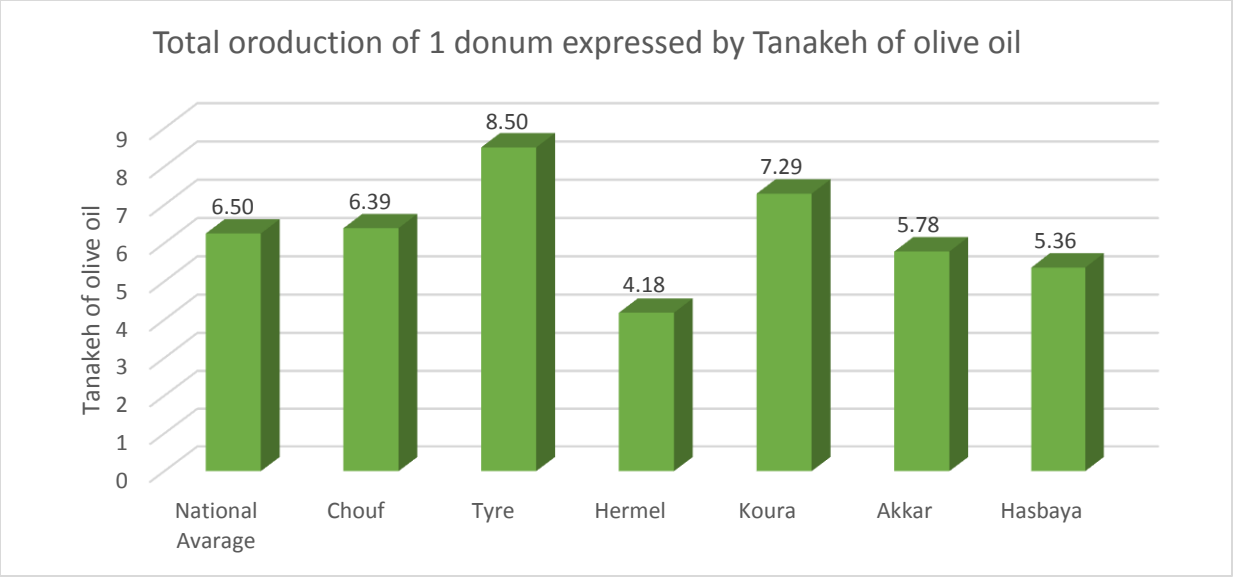


The figures shown in the graph above indicate that the average national cost of maintenance and production of 1 donum (mean average of the six selected pilot regions) is 260 $ and goes down to 245$ if we weight by the percentage of olive trees in every region compared to the total surface of olive plantations in Lebanon. We also get to the almost the same figure (243$) if we remove the highest and lowest 10 answers in the survey.

Wide disparities exist within the six regions. For example, the cost of production in Chouf is 55% higher than the national average, while three areas (Tyre, Hermel and Koura) are close to this national average. On the other hand, Akkar and Hasbaya are 33% below the national average, which might be due to the lower cost of labor in these areas, but also to the fact that olive growers rely less on paid labor in the production process.

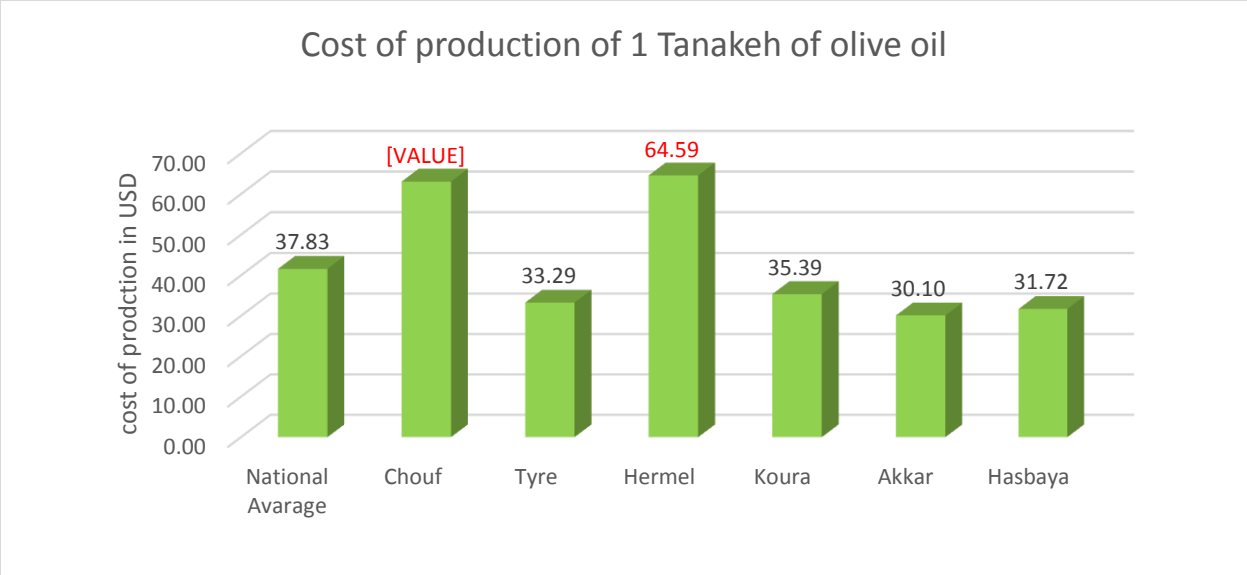
The explanation for the high cost in Chouf could be the exaggerated estimation costs by farmers, or the lack of cheap foreign labor in the region or the topography of the region dominated by terraces, and possibly a combination of both.

The second important figure that was reached through the survey was the total quantity of production per donum (0.1 Ha) expressed in Tanakeh (1 Tanakeh = 15-16 Kg) of olive oil, at national and regional level. This unit (Tanakeh/1 dunum) was used as it is adopted widely by farmers and different actors as well as easy to use.



As illustrated by the figures shown in the graph above, Tyre region is the highest in olive oil production per dunum, while Hermel recorded the lowest production quantity. A possible explanation for the high yields in Tyr is the widespread cultivation of the Soury variety, which is well-known for its high oil content, and the appropriate climate and soil for olive cultivation. In Hermel, the low quantity is not due to the young age of the trees, but to the low content of olive fruits in oil (low yield). This is what prompts the farmers to wait until the late months of the season and the over maturity of the olive fruits so the oil yield improves. Consequently, this leads to a dramatic reduction in the quality of the oil. The reason for this decline might be the adopted agricultural practices (especially irrigation and fertilization), adopted olive varieties, environmental factors such as climate and soil or all these factors combined.

The previous two figures, the cost of maintenance and production of 1 dunum and the total quantity of production of 1 dunum, leads easily to the extraction of an important figure which represent a source of controversy among the different actors in the olive oil sector which is the cost of production of 1 Tanakeh. Additionally this figure helps determine the oil price of selling and facilitate marketing process.



The average of the cost of production of 1 Tanakeh (15-16 kg of olive oil) is 37.83 USD. The figures of the 2 regions Hermel and Chouf that are far from the average might be due to the imbalance in the previous figures.

While the national family consumption rate of olive oil is 1-1.5 Tanakeh annually, the results of the survey showed that the annual rate consumption of the families producing olive oil is quite high and can reach up to 8 Tanakeh per year. This rise may be due to the fact that married children are still considered members of the parent family. However, it is assured that the olive producer families' consume at least 4 tanks per year.

The survey also showed that the average family table olive production rate is 75 kg per family. This quantity is for self-consumption as well for direct sales, which increases the families' income from olive production especially for women, which are involved in the preparation of this product.

The olive oil soap processing (transformation of the low quality olive oil into soap) is also of great importance to producers' families. The results of the survey showed that 63% of interviewees are making soap for family consumption and direct sales.

Recommendation:

- Build the capacity of olive producers and agricultural cooperatives in IPM, GAP, Harvesting and post-harvesting good practices, and modern extraction technologies;
- Encouraging olive producers to adopt these modern practices and technologies by providing incentives;
- Reducing the cost of production should be one of the main objective of the future extension programs;
- Activating MoA program for the control of olive mills, emphasizing on hygiene and GMP;

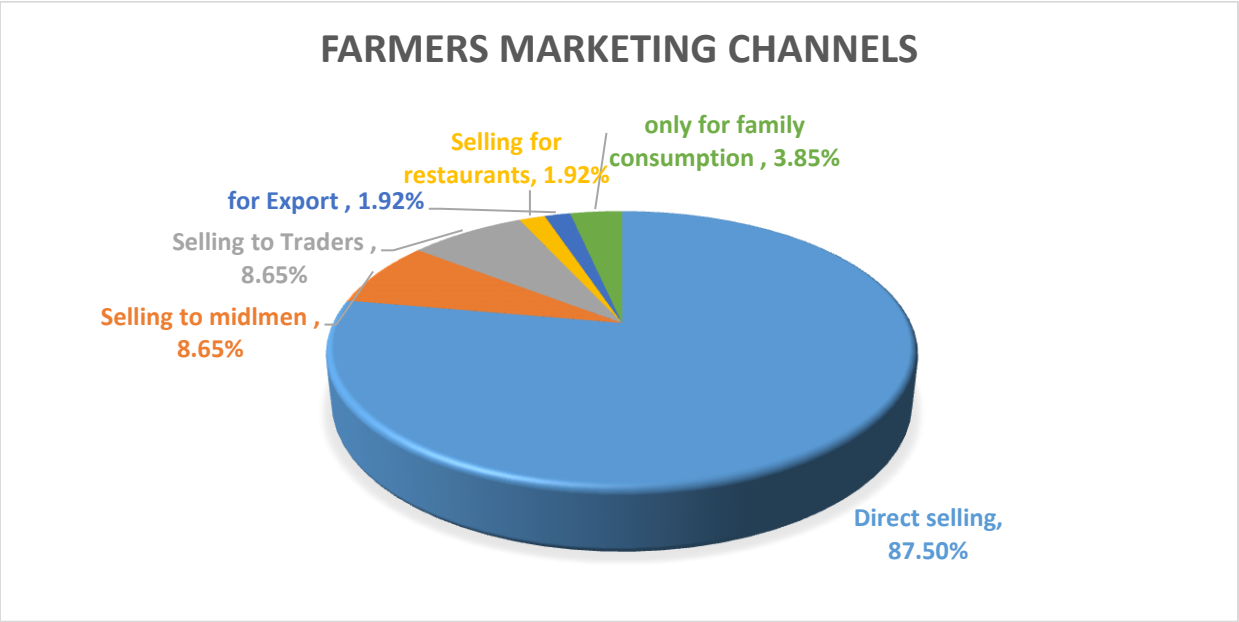
- Facilitate access to finance for mills who wish to upgrade abandoning the traditional presses and replacing with modern olive continuous extraction lines. The modern technologies is well known for the high extraction capacity;
- Build the capacity of producers in accounting and management using simple and easy to use accounting program (Software);
- Strengthen the role of MoA Agriculture Centers present in different region of olive production (In total 32 centers all around Lebanon) in extension and technical assistance for olive producers;
- Launch projects at regional level with clear objectives, clear expected results and time-bound to find specific solutions to the identified problems of the olive oil sector;
- Special effort aims at increasing olive oil consumption per capita at national level, through promotional programs dedicated at highlighting the health and therapeutic benefits of olive oil and its importance in cooking instead of other vegetable oils. Every increase by 1kg in the per capita leads to a 5,000 tons increase of consumption at national level, which – in turn – is enough to absorb all the excess production in the markets.

4.4 Marketing information

Marketing is the most important weakness of the olive oil sector in Lebanon. Marketing is considered the main problem according to the olive producers participating in this survey, and was ranked the first that farmers asked to be supported by MoA and all the actors in this sector.

The main reasons for this lack of success in finding effective solutions so far, and developing the marketing process of olive oil are the following weaknesses:

- The high cost of production and low productivity of olive orchards, which drives the producers to raise the prices of oil selling in retail and wholesale. This sale prices is significantly higher than the international price of olive oil and the prices of neighboring countries. The price of Lebanese oil is double the price of Syrian oil. Lebanon's high cost as well as low yield of olive production has negative consequences for its competitiveness in international markets and recently in the national one;
- The high competition of the imported or the smuggled products in the internal and external market through different channels. It is directly sold through interpersonal sales channels as Lebanese product, or sold through local small retailers, trade shops and restaurants. In some cases, It is also exported as Lebanese oil mixed with local oil or not, and sold for the Lebanese diaspora;
- The quality of olive oil and conformity with the norms. There are several reasons for producing non-conforming olive oil, or sometimes producing extra virgin olive oil whose quality deteriorates with time.There are several steps that compromise the quality of the final product but also reduce overall orchard productivity such as pests control, harvesting and post harvesting practices, traditional extraction technology and low hygiene level in the olive mills, as well as bad storage (inappropriate containers or environment conditions of storage

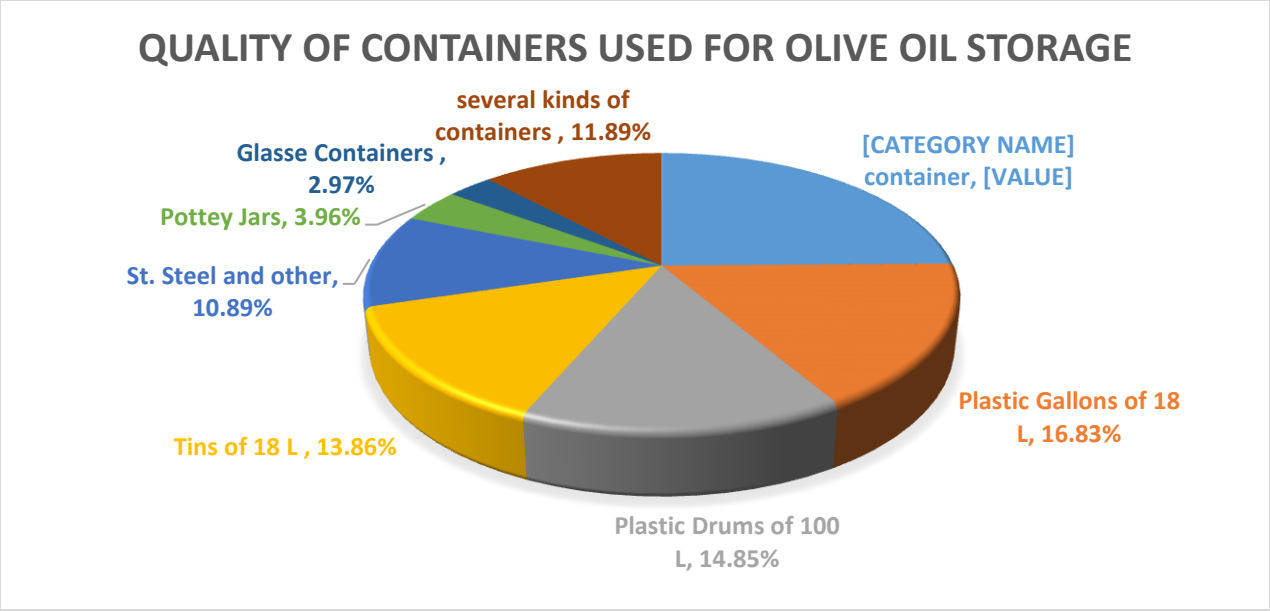


The results of the survey showed that most of the farmers, especially the small and medium which are the majority, rely on the informal market (87.50 %) selling directly to consumers. Only the large producers sell the oil to middlemen, traders or for export. In the past years the informal local market has become saturated with locally produced olive oil and the smuggled one. With the economic crisis, the families are led to save even in the quantity of oil or the prices.

The marketing of the produce takes an average of 6 months from extracting the oil until selling the total production. This period may increase or decrease depending on the alternate season and if the year is abundant production or not.

Storage is another problem, despite the improvements that were made during the last 10 years, specifically the quality of the containers in which the oil is stored and the storage conditions. The poor storage conditions is responsible for the deterioration of the quality of the extra virgin olive oil over time, so farmers have to sell the olive oil at lower prices.

From the survey results, it is noted that about 25 % of the interviewed producers are aware about the good storage conditions, so they rely only on stainless steel containers to conserve the oil quality. Another 11 % are aware about the importance of stainless steel for conservation but cannot afford it, so they rely on containers from other material. This awareness and improvement in the post-harvest practices, are the result of extension activities in the last 10 years that have raised this figure from almost zero to 36% of producers that are convinced on using stainless steel containers.



Despite some interventions by the Ministry of Agriculture to facilitate the marketing, such as participation in some international exhibitions or organization of "Olive Day" in some region in the last years, the results of these activities did not reach the farmers. So, none of them announced that he participated or benefited from this type of activities. Participation in these activities may be has been limited to agricultural cooperatives and local traders.

Recommendations:

- Develop national olive oil marketing strategies based on the production of high quality olive oil, application of clear regulation in local markets, identify marketing channels and the potential international markets;
- Emphasize border control to prevent entry of smuggled olive oil from neighboring countries;
- Develop and implement a practical and legal mechanism to limit the marketing of foreign oil as Lebanese olive oil in the national and international markets;
- Impose traceability and labeling requirements with regards to origin and olive oil quality and classification;
- Develop regulations regarding geographical denomination or protection of olive oil product;
- Build the capacities of olive oil producers on best production practices. olive oil quality and marketing requirements;
- Empower, support and build cooperatives' capacities to mitigate structural, financial and regulation problems that are facing, allowing to play its roles of reducing cost of production, aggregating product and creating linkages farmers/traders;

- Support the creation of specialized marketing cooperatives that could aggregate small and medium producers, with the aim purpose to facilitate olive products marketing and increase Lebanese product selling in the internal and external markets;
- Facilitate effective participation of cooperatives in relevant local, regional and international exhibitions, directly or through MoA participation. MoA participation to this kind of exhibition should be based on clear objectives, focusing on international markets that the Lebanese olive oil is actually exported (GCC, USA, …) or new potential markets where Lebanese olive oil could be able to penetrate;
- Facilitate to cooperatives the direct selling in the local markets, through the adaptation of the already known "Olive Day" organized by MoA in the last years in different regions. In order to increase the direct sale channels for olive producers in the local market, these ceremonial events could be converted to annual exhibitions and direct sale of olives products, organizing it in several cities of the country including the capital.

4.5 Information about benefit of olive producer from MoA interventions

In the past 10 years, the Ministry of Agriculture has completed several interventions to support the olive sector across Lebanon. This support began many years ago and continues until now but intermittently. However, the dimensions of this intervention varies from year to year depending on the available financial resources and administrative process facilitation. This support has not always been from the MoA's budget, but in some years it has been through donor-funded projects. In the questionnaires, the interviewees were asked about 9 interventions of MoA in support to the olive oil sectors:

4.5.1 Copper oxychloride (Jenzara) distribution for the treatment of peacock eye disease and other fungus and bacterial disease.

Peacock eye disease

Spilocaea oleaginea is a fungal plant pathogen, also known as olive leaf spot. This disease commonly affects the leaves of olive trees causing defoliation. The disease affects trees throughout the growing season and can cause significant losses in crop. The disease causes blemishes on the fruit, delays ripening, and reduces the yield of oil. In severe cases, defoliation and twig death can occur, and the disease can have long-term health effects on the trees.
The most common management approach is to spray the foliage with a copper compound after the fruit has been harvested in the fall and again in the late winter if the environment is extremely wet. In case of high infestation a third treatment must be done in September.

Peacock eyes disease symptoms

Copper oxychloride represents a high need for olive cultivation and other crops. MoA used to purchase and distribute this product for farmers, municipalities and cooperatives every year. This intervention has stopped since 2016 for administrative issues. While the fungal disease infestations, especially peacock eye disease, have increased in recent years and threaten production in some areas.

The use of this fungicide annually and for several times (2 to 3 time per year) could be translate into a marked increase in production, more healthy olive trees and lower costs of production.

The survey showed that only 37 % of the olive producers have been benefited from Copper oxychloride distribution in the last 10 years. 26 % depend on MoA distribution and if not, they are not ready to buy this product from the market. 66 % of who received the Copper oxychloride noted that olive trees were healthier after treatment. 79 % of who received Copper compound used all the quantity received and 80 % declared that quantity distributed was sufficient.

There is no possibility of determining whether the entire distributed quantity is used for olive cultivation. This Copper compound could be used for other crops, but in general it is counted as support to the olive sector.

Recommendations:

- Maintain the peacock eye disease control program and strengthen with financial and human resources. Focus on areas with high humidity where this disease causes serious damages.
- Purchase the Copper oxchloride each year and distribute to olive producers after setting up a clear and applicable distribution mechanism that ensure reaching the eligible farmers in selected regions and in sufficient quantity for all.
- Support training programs on olive tree pruning as this practice, when it is done properly, reduce the damages caused by peacock eye disease.
- Develop a system to collect feedbacks form fields, monitor results and evaluate intervention.

4.5.2 Pesticide and traps for the control of Olive fly (*Bactrocera oleae*)

Olive fly (*Bactrocera oleae*)

Olive fly is a species of fruit fly. It is a phytophagous species, whose larvae feed on the fruit of olive trees, hence the common name. It is considered a serious pest in the cultivation of olives. Within a year, generally three to five generations occur. The development cycle is closely linked to environmental conditions, in particular the climate and the state of the olives in addition to varieties. Knowing these parameters, together with the monitoring of the population, is needed to implement effective pest management programs.

The damages caused by the olive fruit fly are of two types quantitative and qualitative:

From a quantitative point of view, the damage is caused by larvae of second and especially third stages, by the removal of the significant proportion of the pulp which as a consequence results in reduction in the yield of olives. Part of the production is also lost due to premature falling of the attacked fruit. In table olives, however, the damage extends to the sterile punctures, which cause the variation in production.

A qualitative aspect to be considered is the significant deterioration in the quality of the oil extracted from olives with a high percentage of attacks by larvae of the third stage. The oil obtained from infected olives has a high acidity level and a lower shelf life as it has a higher peroxide value.

Adult olive fly

Olive fly larva inside olive

Infested olive fruits

MoA used to distribute for several years different environmentally friendly products used for monitoring and control of olive fly, include traps of various types, pheromones, attractive materials, and attract and kills pesticides.

These means of pest control, will be of great importance in the future as Lebanon has banned the largely used pesticide (Dimethoate) for olive fly control. Thus, the Lebanese market is missing an effective chemical pesticide against olive fly.

One of the main conditions, for successful pest control, using these products is that the treatment covers a large olive cultivation area. Therefore, in order to ensure the success of the control process, the quantity of distributed product should be sufficient for the entire season and for a large area of olive cultivation.

About 51 % of the interviewed producers declared to receive this kind of product. This figure is relatively high, may be due to the fact that MoA is currently distributing attract and kill pesticide for olive fly during the same period of the survey.

The effect of these substances was considerable, as 59 % of the interviewed producers reported that the olives fruits were healthy after treatment, and 43 % sad that the quality of the produced olive oil has been improved. 81 % received training on how to use these products. About third of the farmers (32 %) depend totally on MoA distribution and 80 % sad that they received quantity was sufficient.

Recommendations:

- Activate the Olive fly control program and strengthen it with financial and human resources.
- Purchase Traps/pheromones/attractive materials/ attract and kill pesticides each year and distribute to farmers after setting up a clear and applicable distribution mechanism that ensure reaching the eligible farmers in all regions and in sufficient quantity for all.
- Develop system for the monitoring and evaluation of the distributed traps, pheromones, attractive materials, and attract and kills pesticides. Trough creation of demonstration plots to test these products pre-distribution, and collect farmers' feedback post-distribution, in order to avoid the usage of useless and ineffective products and the loss of funds allocated to support the olive sector.

4.5.3 Distribution of live Harvester machine

The major reason for the use of mechanical olive harvester is the high cost of manual harvesting, the most expensive cost in olive production (About 35 – 50 % of the total cost of production). The olive sector is losing slowly but surely the advantage of "family business" and relying more and more on hired labor at higher cost. The adoption of mechanical means of harvesting is the best solution to reduce the cost of production, protect the trees from damages, consequently saving on money and on time.

Not all olive harvester are suitable for olive orchards in Lebanon. Several factors determine the type of machine to be adopted, such as olive variety, fruits detachment force, pruning and training form, the size of the tree orchard, orchard topography, and the density of trees in the orchard. In order to get the proper and useful machine, there is an urgent need to test the various models before be adopted.

Farmer wants machines easy to transport, easy to operate, able to drop the largest amount of fruits without damaging the tree and finally low cost of maintenance. Experts and farmers who actually used these machines over several seasons agreed that the savings in the cost of harvesting is not less than 35 %.

When coming to olive harvester Machines distributed by MoA, the figures were not encouraging, either in terms of the low number of beneficiaries or in the inability of farmers to give accurate figures. It was not possible to determine the reason for the decline in the number of

beneficiaries. Is it due to the shortage in the availability of these machines or because farmers are not convinced of the feasibility of these machines.

Only 12.5 % declared to benefit from harvesting machines. After checking this figure, it was found that most of the beneficiaries (84 %) are members of agricultural cooperatives. 50 % of these beneficiaries are from Hasbaya, 25 % from Chouf, 16 % are from Hermel 16% and only 8 % from Sour.

The saving on term of cost reduction was 35 %. While 55 % are not ready or able to buy these machine and rely totally on MoA distribution.

Recommendations:

- Build the technical capacity of olive growers in terms of harvesting and post harvesting practices (Training sessions, mechanical harvesting demonstration sessions, training on maintenance and operation of these harvester machine…). Encourage and motivate farmers to adopt mechanization for olive harvesting;
- Support small/medium farmers to reduce the cost of production through providing harvesting machine to the cooperatives, which in turn rents them to farmers.
- Develop system to test the various harvesting machine models before adopting them. The system has to take in consideration in particular farmers and expert feedback;
- Follow-up cooperatives which benefit from harvester distribution to ensure the good use and operation of these machines;
- Develop clear and applicable distribution mechanism that also identify the target group of harvesting machines distribution with the preference to be the well managed agricultural cooperatives, able to proper manage the renting and maintenance of these machines. Consequently the number of beneficiaries will increase, distributed machines reach a larger number of beneficiaries and to be sure that these machines will not finish under the stairs or in the forgotten dusty warehouses.

4.5.4 Distribution of stainless steel tanks for olive oil storage

Storing olive oil in an air-tight stainless steel container away from light and heat maintains its quality and could last up to 18 months without losing its sensory and chemical characteristics. The proper conservation of olive oil maintains its quality, improves the profitability for the producer who can sell the production over a longer period of time without an alteration of its quality, especially in low-yielding years due to alternate bearing.

Stainless steel is an inert material that blocks light, can be easily cleaned and shows high resistance to mechanical damage. Stainless steel tanks are used by medium and large olive oil producers, olive mills and olive oil trading companies in order to store bulk extra virgin olive oil and protect it from deterioration. Stainless steel tanks could be of different size, from 5 liters container to thousands liters, and are used for transportation and/or storage, with floater or nitrogen system to isolate and protect oil from oxidation.

In order to have positive impact on the sector and especially to facilitate marketing and increase producer income, it is preferable that medium and large producers (including olive mills), benefit from stainless steel tank distribution. Family size tanks distribution has no impact on the development of the sector in terms of facilitating the marketing process.

Most of the olive producers participated to the survey and own stainless steel container were not beneficiaries of the MoA's distributions, however they purchased these kind of containers from the local market with personal funding. Only 9 % declared that they benefited from MoA distribution of stainless steel containers. It is also noted that ٤٢ % are not ready to buy stainless steel containers at their own expense, and are waiting MoA's distributions that can be done in the future.

Family size containers

Stainless steel containers for olive oil storage – medium size

Stainless steel containers for olive oil storage – Large size

Recommendations:

- The beneficiaries of the Stainless steel tanks distribution should be the medium/large olive oil producers, cooperatives and the olive mills, if they store the oil for long time, and not distribution of small size containers for household use;
- In case of distribution, should be preceded by assessing the needs of each farmer/cooperative/olive mill, in terms of quantity of oil stored (storage capacity).

4.5.5. Distribution of olive seedling

Since the time of South Lebanon occupation, the Ministry of Agriculture used to purchase olive seedlings from nurseries in Nabatieh region and distribute it to municipalities, local associations, cooperatives or directly to farmers in all Lebanese regions. This programs aimed to support olive seedling producers (olive nurseries) and support olive growers to extend their olive plantation. Every year until 2017, MoA used to distribute about 250.000 olive seedlings purchased from the MoA's budget. In addition, private nurseries produce tens of thousands of olive seedlings every year, directly purchased and planted by farmers, which might explain how the total olive surface increased from 53.620 Ha in 2010 to 62.042 Ha in 2018 in Lebanon.

There are some blames about the quality of these seedlings, especially for lack of certification for the variety and pest free. Administrative constrains stopped these distribution process in

2017. The Ministry of Agriculture was urged to accelerate the establishment of olive mother's trees field, a project that has been in process since 2011, In order to provide healthy propagation materials for local nurseries.

There is an urgent need to organize the olive nurseries sector and to guide nurseries to the best agricultural practices for the production of healthy and certified seedlings. Otherwise distribution of infected seedling could spread pests like Verticillium, Nematodes, olive knot (*Pseudomonas savastanoi*,) and others….

There is no doubt that these distributions have had a significant impact on increasing the area of olive in Lebanon. But the figures were not so encouraging, only 18 % declared that they had obtained these seedlings in the last 10 years. The reason may be that the farmers obtained this seedling through local bodies rather than directly from MoA and therefore was unaware of the real source of the seedlings.

Those who announced that they had obtained these seedling said that 14 % of their own olive area was planted by MoA distributes seedlings.

As for seedling quality and conformity with the declared variety, the figures declining on this subject. 42 % announced that the seedling were healthy. This figure is reduced to 37 % when they are asked if the reel variety match the declared variety.

79 % planted all the seedling received, and 40 % still needs more, while 17 % are still waiting MoA distributions to plant more olive trees.

Recommendations:

- The olive sector is in dire need of a project that organizes olive nurseries in terms of Phyto-sanitary control and varieties authentication in addition to good production practices. The project should reach the point that nurseries produce only certified seedlings. This is essential for the successful establishment of healthy and productive orchards in the future and to reduce the spread of pests and diseases.
- Instead of distributing large quantities of seedlings, which many farmers are waiting for, move to a smaller quantity but with higher quality, with emphasis on healthy seedlings and compliance with the declared varieties.
- Develop clear distribution mechanism, giving priority to those farmers who wish to plant 2 Dunums and above. Therefore, this intervention come to be of economic value and helps increase the area of olive at the national level.

4.5.6 Extension and technical assistance

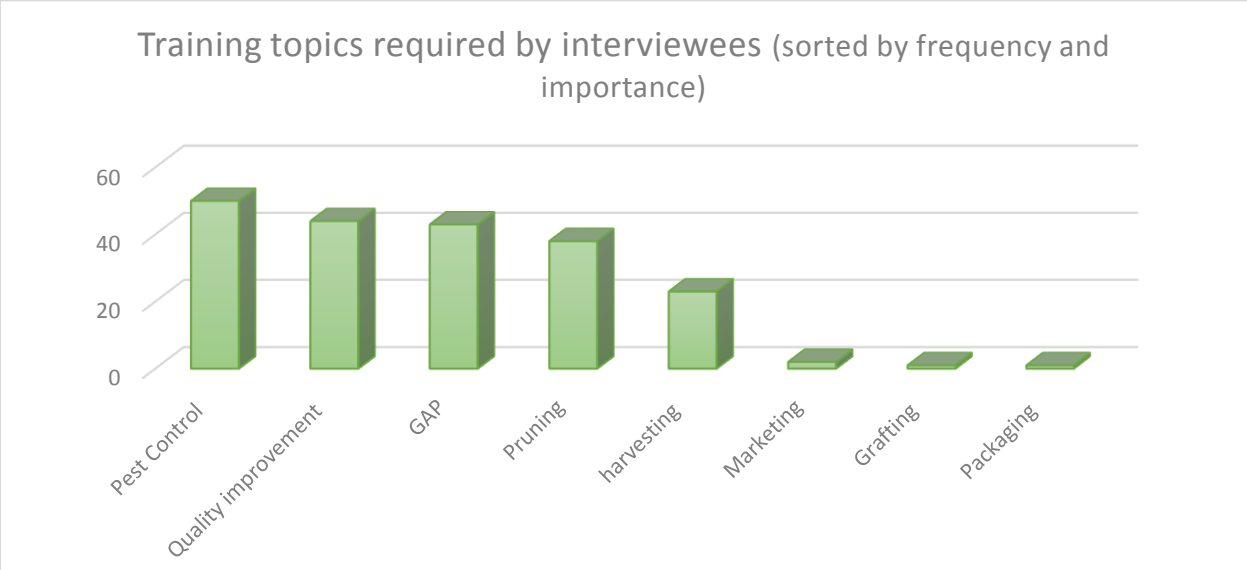
There is no doubt that the great efforts exerted by MoA, Lebanese and international NGOs, International Agencies and United Nations Organizations helped olive producers to improve olive production in terms of quantity and quality. However, the country's economic conditions, the difficulties in the sector and the low incomes of farmers have prevented some of them from

applying good production practices despite their knowledge. Of course, other farmers apply these practices and get a better result.

It was not possible to evaluate MoA extension activities and separate its impacts from the activities of other actors. This is logical, since MoA has undertaken its own activities, as well as in partnership with many NGOs or Development Agencies in the past 10 years. Consequently, it is possible that some figures are inaccurate because sometimes the farmer may not know or forgot who the interface that was doing this activity is.

Thus, 53 % of farmers declared that they benefited from the MoA extension activities. When it came to evaluate the improvement in olive production in terms of quantity and quality, most of the respondents were not able to give accurate information regarding the quantity. However, everyone stressed that the quantity and quality were increased as the result of extension and technical assistance.

63 % still need more extension and this figure is of high importance for MoA strategy for the development of the sector. As for the subjects required, the answers were clear, so the interviewees accurately identified what they need.



Recommendations:

- Strengthening and expanding pluralistic and innovative agricultural extension programs targeting all stakeholders active in the olive sector. Each one according to his competence, focusing on cost reduction, production improvement in terms of quantity and quality;
- Adopting demand-driven extension programs. The extension programs has to consider the collective issues and not only individual concerns (adopt collective-oriented extension strategy);

- Use non formal extension approaches that attract and persuade farmers and transferring smoothly new agricultural practices and technologies;
- Training farmers to use sustainable natural resource management practices;
- Examines the primary investment options, priorities, and procedures needed to address specific weaknesses within existing agricultural extension.

4.5.7 National olive oil laboratory

In 2014, and through "Olio del Libano II" activities, projects funded by the Italian Cooperation and implemented by CIHEAM-IAMB, the national laboratory for olive oil was inaugurate. This project rehabilitated the building, fully equipped, and trained the staff in Lebanon and Italy.

The national olive oil laboratory includes a complete chemical laboratory as well as a tasting room to host the Panel Test (olive oil sensorial evaluation committee), which began its training in 1998 by ICU (Italian NGO) and has not become official and accredited yet.

This stumbling and delay in the launch of laboratory services have been evident in the responses of the producers interviewed. When they have been asked about the services of the MoA's olive oil Laboratory, only 5 % declared that they had benefited from the services of this laboratory, however some of them was confused between MoA's laboratory and LARI's laboratories (Lebanese Agriculture Research Institute).

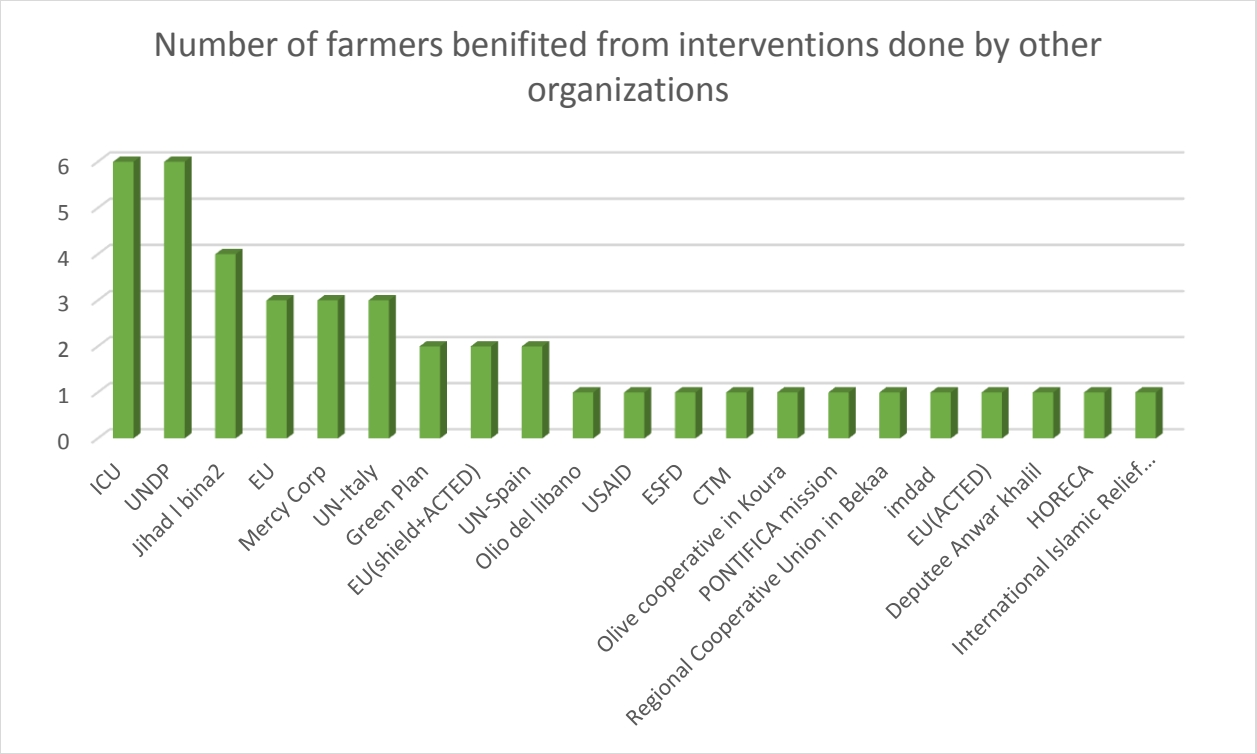
In fact, most farmers did not know about the existence of this laboratory, and even more, did not know its importance for the development of the sector. This confusion extended to the questions about olive producer benefiting from this laboratory. The answer was only 5% with yes to the question if the laboratory helped in marketing the oil. As for whether this laboratory has helped improve the quality of the oil, the answer was yes only for 4 % of the interviewed.

Recommendations:

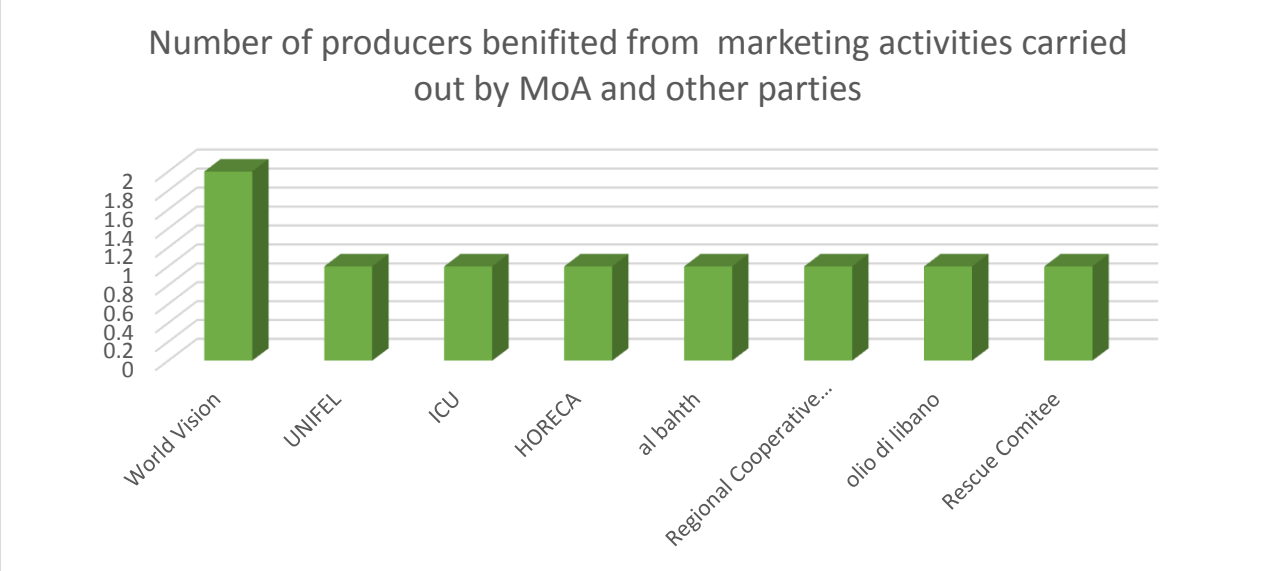
- Activate and develop the olive oil laboratory and introduce farmers to the services that can be provided.
- Accelerate the process of accreditation of Panel test at national and international level.
- Create a legal formula that allows MoA's laboratory to provide paid and not free services. This ensures sustainability and secures the necessary supplies.

4.5.8 Other Information

The farmers were also asked if they benefited from the interventions related to the olive sector from sources other than MoA. The answer was as shown in the diagram below.

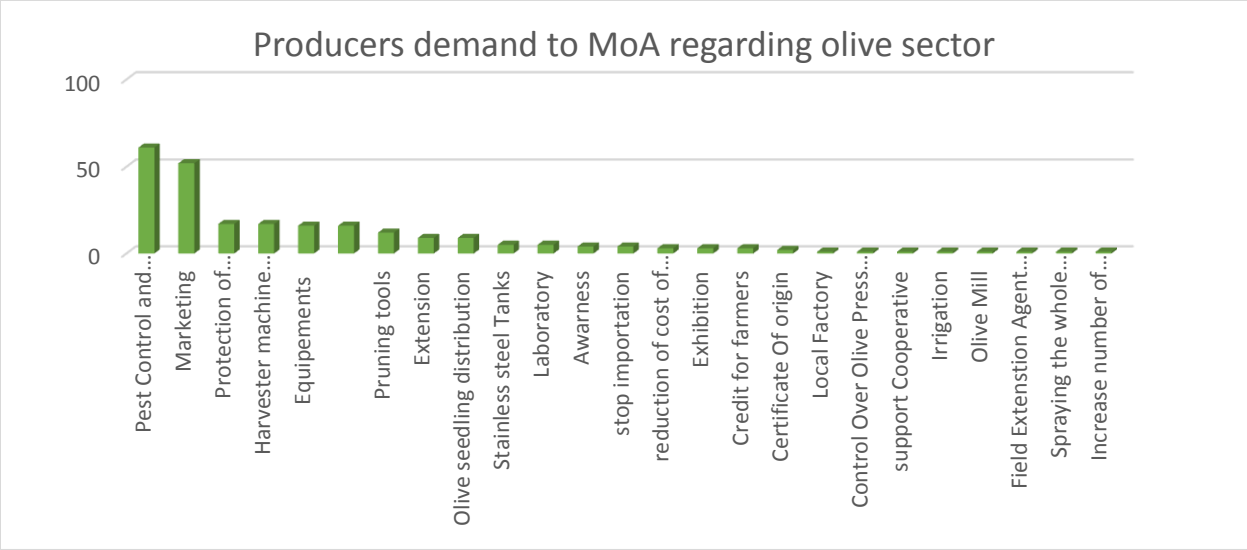


As for the question of whether they benefited from marketing activities carried out by MoA and other parties, the figure was low, indicating that the subject of marketing needs a lot of work from different actor in the sector.



The last question done in the survey was “In which part of the olive production chain would like Ministry of Agriculture to intervene?”. There were no proposed choices in this question, a free

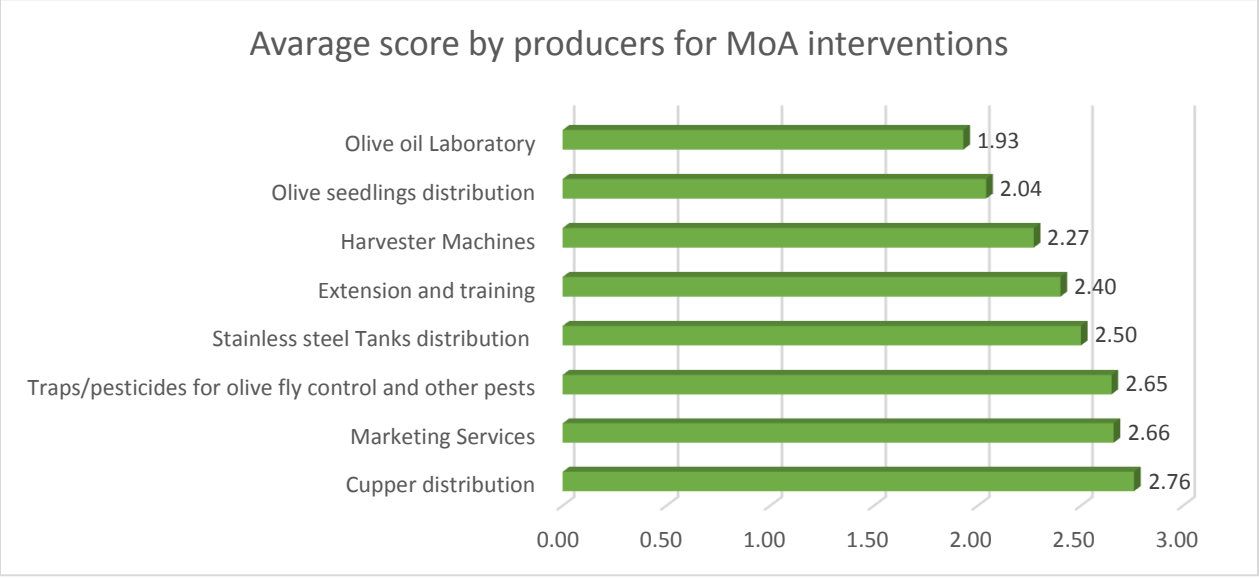
answers was requested. Consequently, the answers, which are actually the producer's demands to the Ministry of Agriculture, are as shown in the diagram below:



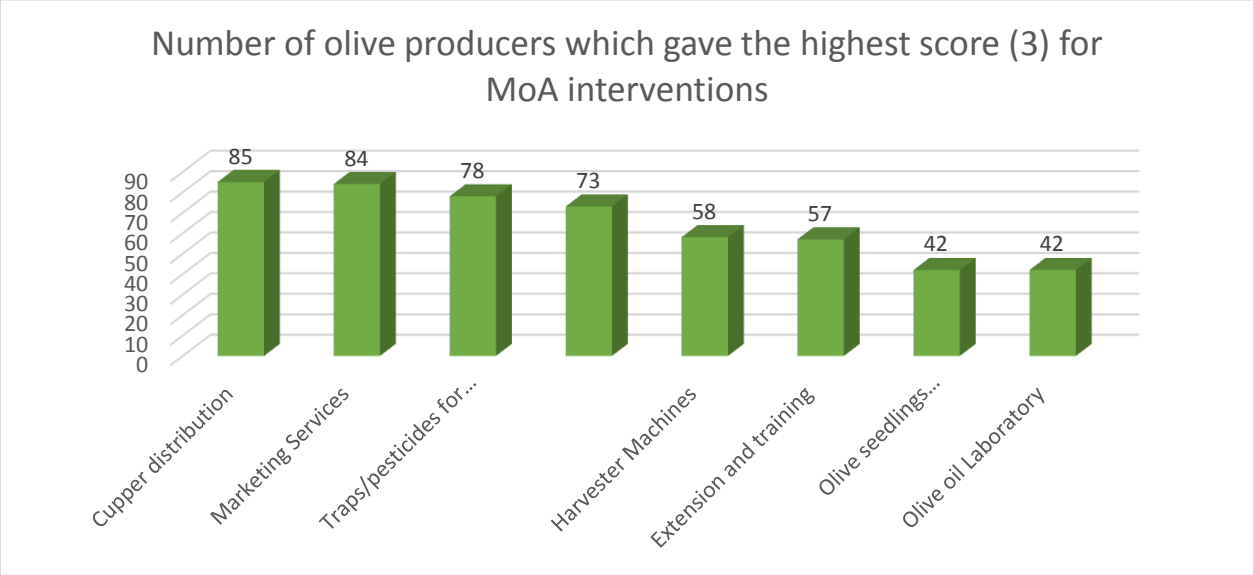
4.5.9. Olive oil producers' evaluation regarding MoA interventions to support olive sector in terms of importance, effectiveness and need

At the end of each interview, the interviewees were asked to evaluate the MoA's most essential interventions in terms of importance, effectiveness and need for the development of the olive sector. Interviewees were required to give a score of zero to three for each intervention of the Ministry. 3 (high) - 2 (medium) - 1 (poor) - 0 (no need)

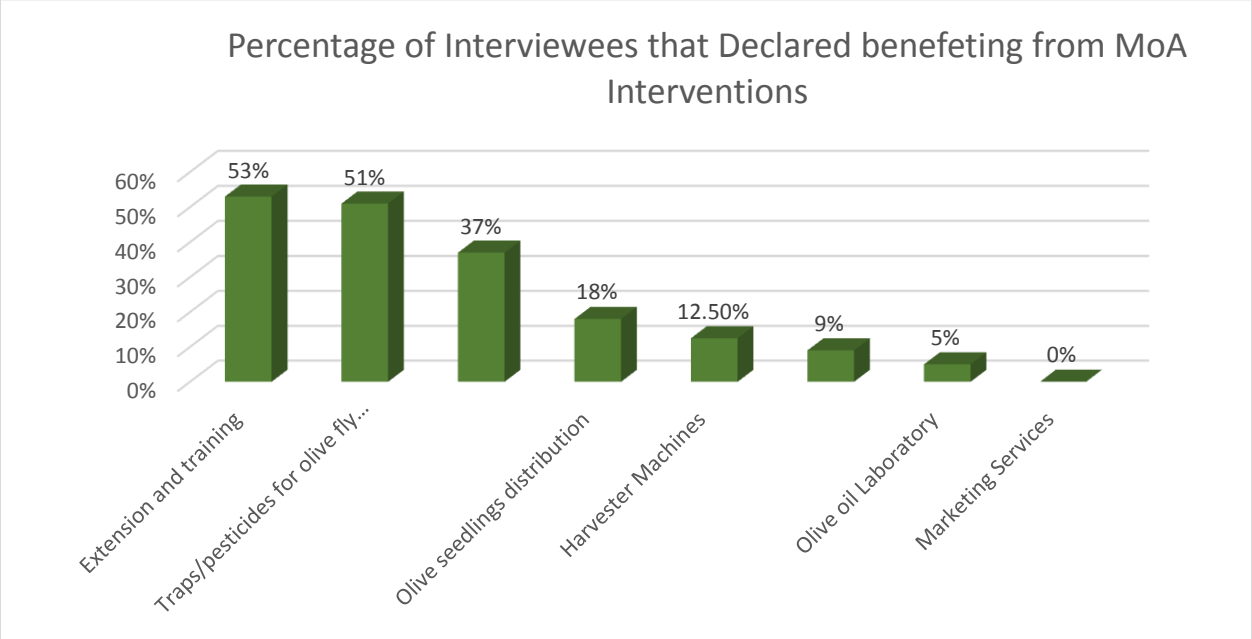
The average score for each intervention was as shown in the diagram below:



For the highest score 3, which means that this intervention is of high importance, high efficiency and an urgent need for producers, the interventions Copper oxychloride distribution, marketing, traps and pesticides for pest control and Stainless steel tanks distribution were the most required. The results are in the diagram below:



The chart below gather all MoA's interventions and shows the percentage of interviewees who announced that they have benefited from MoA interventions in the past 10 years.



4.5.10 Evaluation of MoA Heads of Agriculture Centre (Extension Agent)

In order to complete the evaluation of the MoA's interventions, and to highlight the point of views of the heads of MoA Agricultural Centers in the six selected areas, the heads of the Centers have been interviewed. They are considered the MoA representatives, they are extension agents or they lead the agricultural extension team in their respective areas, and they are in direct contact with the farmers, experiencing their problems, suffering, and daily demands that the farmers complain about it.

The Heads of MoA Agriculture Centers have been interviewed and asked about MoA support scheme to olive sector, their evaluation regarding the accomplished interventions, the problems suffered by the sector and then compare these data with the information provided by farmers.

As for their general evaluation of the MoA's interventions in the olive sector in the past ten years, the answers were satisfactory, with some complaint about the distribution method and the access of eligible beneficiaries to the materials and equipment distributions.

As for the quantity allocated to each area, all agreed that the quantities are not enough. The shortage varies from region to region.

Their assessment of the impact of these interventions on increasing production and improving the quality of the product was in general positive. While for the marketing interventions, the results were limited and all stressed the importance of developing and activating the marketing activity carried out by MoA.

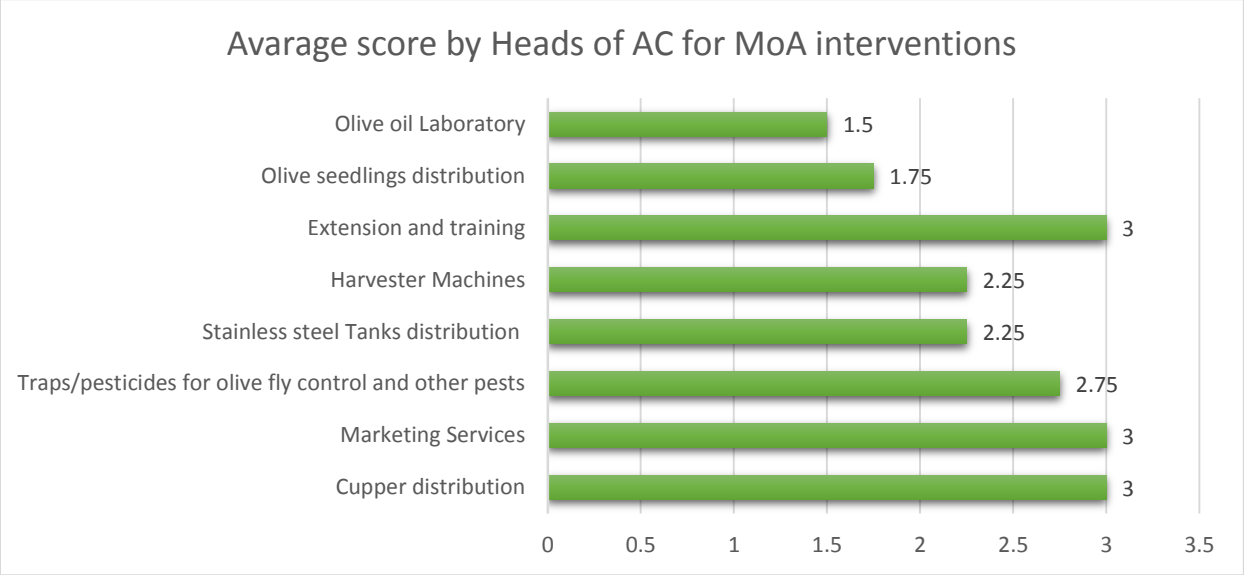
The three most important interventions undertaken by the Ministry were as follow:
1 distribution the Copper oxychloride;
2 distribution of stainless steel tanks for oil storage;
3 distribution of olive harvesting machines.

The fifth question was about what MoA has not done so far, and these missing interventions are beneficial to the olive sector. Among the suggestions were, the establishment of local committees in the regions, activation of the "olive office", or the establishment of a bodies concerned with marketing.

According to the heads of the agricultural centers, the main problems facing the sector are as follows:
- Peacock eye disease and other pests;
- Marketing and the absence of regulations of the sector;
- Smuggling foreign olive oil and selling it in the markets as a Lebanese product;
- Harvesting and post-harvesting practices that affect quality.

As done for interviewed farmers, the Heads of Agriculture centres were asked to evaluate the most essential interventions in terms of importance, effectiveness and need for the development of the olive sector. The average score for each intervention was very nearly identical as farmers scoring, except for extension which was given a higher score.

The average score done by the Heads of Agriculture Centers for each intervention was as shown in the diagram below:



5. CONCLUSION

All indications show that olive production in the last ten years has increased in terms of plantation area, quantity of production and quality of oil. In addition to the Ministry of Agriculture programs, interventions of other development projects have left their mark on the sector. Determining who is behind this improvement in production accurately is difficult. The interventions of MoA have had a significant impact, according to the results of the study. It should also be clear that some of the interventions that had vital effects on production, such as the distribution of pest control materials and the distribution of olive seedlings, were reserved exclusively for MoA in the last 10 years.

Despite the belief among those interested in the agriculture sector that a lot of assistance and support has been done for the olive sector in the past years, the figures collected in a previous assessment and the current survey indicated the opposite. These figures show that this sector did not receive the sufficient supports and funds and still needs more attention in order to resolves the problems that the sector suffer from.

All the data shows that olive cultivation still and will remain in the future of great importance to the families that carry out this activity, the agricultural sector and the national economy. The olive sector have been identified by several studies as a sector with high socio economic importance, high opportunities and potential for upgrade and improvement. Therefore, it is impossible to replace or neglect the olive sector in Lebanon at all. No reasonable person or expert in the reality of Lebanon can recommend this.

What can be recommended is to support this sector cleverly in the future. With the limited available financial resources, MoA can implement smart programs to support the sector at various levels but with clear objectives, clear target groups and concrete expected results. It is very important that these programs should be part of an unblemished strategy to promote this sector, as well as include specific and clear interventions, especially a monitoring system and an impact assessment.

The future MoA's smart interventions should address the olive production chain and focus on problems that can be solved.

6. RECOMMENDATIONS

6.1 Recommendations at field level

Working to improve production and reduce the costs through:

1.1 Support the expansion of olive cultivation, especially in marginal lands, which has economic, social and environmental benefits;

1.2 Build the capacity of olive producers in IPM, GAP, Harvesting and post-harvesting good practices, modern extraction technologies, olive oil quality, management and accounting;

1.3 Adopt pluralistic and innovative agricultural extension programs targeting all stakeholders, each one according to his competence, focusing on cost reduction, production improvement in terms of quantity and quality;

1.4 Support agriculture cooperatives by raising their capacities at various levels and improve the services that can be provide to farmers such as mechanization, marketing. The priority is for cooperatives as beneficiaries of Ministry of Agriculture interventions;

1.5 Support the creation of specialized cooperatives or union of cooperatives, in terms of olive production or olive products marketing;

1.6 Create olive and olive oil high council similar to wine sector;

1.7 Activate MoA's programs aiming to control olive pests, and supplying pest control materials environmentally friendly;

1.8 Provide special attention to table olive and derivate, organic farming olive oil soap and by-products management;

1.9 Encourage the active participation of women and youth in the management of the sector in order to maintain and ensure sustainability, by facilitating their enrolment in the production and marketing process through the introduction of profitable and attractive innovative practices and technologies such as GAP, organic production, soap production, table olive processing, marketing and E-commerce…;

1.10 Support and emphasize olive nurseries sector organization in terms of Phyto-sanitary control and varieties authentication in addition to good production practices (production of e certified seedlings) and creation of controlled mothers' fields in the concerned regions;

1.11 Conduct complete scientific studies to evaluate local olive varieties (characterization of the local varieties), especially the groups of varieties called Soury/Balady;
Studying the possibility of introducing new olive varieties characterized by pest resistance with good production in terms of quantity and quality;

1.12 Examine the primary investment options, priorities, and procedures needed to address specific weaknesses within existing agricultural extension;

1.13 Strengthen the role of MoA's Agriculture Centers present in different olive producing regions in extension, technical assistance and materials distributions;

1.14 Launch projects at regional level with clear objectives, clear expected results and time-bound to find specific solutions to the identified problems of the olive oil sector (Pest control, olive varieties to be adopted, expanding olive plantation, low productivity, low oil yield, …).

6.2 Recommendations at Harvesting and post-harvest levels, (olive oil extraction and storage levels)

In order to produce extra virgin olive oil and conserve its quality:

2.1 Build the technical capacity of olive growers in terms of Harvesting and post harvesting practices with focus on olive mechanical harvesting;

2.2 Develop system to test the various harvesting machine models before distribution;

2.3 Provide harvesting machine to the cooperatives, which in turn rents it to small/medium farmers. Follow-up these cooperatives to ensure the good use of these machines;

2.4 Activate MoA's program for the control of olive mills, emphasizing on hygiene and GMP. Strict application of laws, good production practices and hygiene conditions in mills, and up to the closure of mills in violation of the laws and rules;

2.5 Build the technical capacity of olive millers in terms of olive quality, GMP, Hygiene, modern technologies and by product management;

2.6 Facilitate access to finance for mills who wish to upgrade to modern technology and improve infrastructure, abandoning the traditional presses;

2.7 Supporting switching to good means and conditions for proper storage through awareness, guidance and facilitating access to finance;

2.8 In case of stainless steel tanks distribution, the potential beneficiaries should be the medium/large olive oil producers, cooperatives and the olive mills, depending on their needs and storage capacities.

6. 3 Recommendations at marketing level

In order to identify new marketing channels and organize the internal informal markets as it is crucial for small/ medium producers, olive mills and cooperatives, trough:

3.1 Develop national olive oil marketing strategies based on the production of extra virgin olive oil, application of clear regulation in the local markets, identify new marketing channels and potential international markets;

3.2 tighten border control to prevent the entry of smuggled olive oil from neighboring countries;

3.3 Develop and implement legal mechanisms to limit the marketing of foreign olive oil as Lebanese olive oil in the national and international markets:

- impose traceability;
- impose labeling requirements with regards to origin and olive oil quality;
- develop regulations regarding geographical denomination.

3.4 Build the capacities of olive oil producers and cooperatives on best production practices and marketing requirements;

3.5 Support and emphasize the creation of specialized marketing cooperatives that could aggregate small and medium producers, with the aim purpose to facilitate olive products marketing and increase Lebanese product selling in the internal and external markets;

3.6 Facilitate effective participation of cooperatives in relevant local, regional and international exhibitions, directly or through MoA participation. This participation to this kind of exhibitions should be based on clear objectives, focusing on international markets that the Lebanese olive oil is actually exported (GCC, USA, …) or new potential markets where Lebanese olive oil could be able to penetrate;

3.7 Convert the ceremony "Olive Day" to become an annual activity with the targets of consumers awareness, in addition to facilitate direct selling, in different regions of Lebanon;

3.8 Special attention for other olive products in order to facilitate the marketing, such as table olive, olive tapenade, aromatized olive oil, and finally olive oil soap which has been developing in Lebanon in recent years and needs support to improve its marketing;

3.9 Special effort aims at increasing olive oil consumption per capita at national level, through promotional programs aimed at highlighting the health and therapeutic benefits of olive oil and its importance in cooking instead of other vegetable oils;

3.10 Organize awareness campaigns through the media to inform the consumer about the quality of extra virgin olive oil and encourage its consumption;

3.11 Introduce the Lebanese Extra Virgin Olive Oil in the tourism sector (Culinary tourism) through coordination with the Ministry of Tourism, Restaurant Owners Association and Artisanal Shops;

3.12 Oblige restaurants to use sealed and labeled glass bottles of extra virgin olive oil to be placed on the table, just like the European Union countries that have legally imposed with the intention of consumer protection;

3.14 Establish a legal framework that requires to all public institutions, security and military forces that consume olive oil in large quantities to buy Lebanese olive oil only and make sure its source.

6.4 Recommendation at legislative and administrative level

In order to develop cooperatives activities and protect olive and olive oil local production:

4.1 Coordinate with the Customs Department and the Consumer Protection Department to combat fraud at all levels, especially with regard to origin and quality of olive oil. in addition, combating smuggling of olive oil and tracking it in the local markets to prevent its sale as Lebanese oil;

4.2 Conclude trade exchange agreements with non-olive producing countries to obtain customs exemption for olive oil;

4.3 Develop traceability system, field register framework and geographical indications programs;

4.4 Review the olive oil Norms issued by LIBNOR and make it mandatory;

4.5 Empower, support and build cooperatives' capacities to mitigate structural, financial and regulation problems that are facing, allowing to play its roles of reducing cost of production, aggregating product and creating linkages farmers/traders;

4.6 Organize the olive oil direct sales process (informal market), especially regarding labelling (a label on each container) and bind the use of appropriate container for oil, preventing what is harmful;

4.7 Setting up a clear and applicable distribution mechanism that ensure reaching the target farmers in the selected regions and in sufficient quantity;

4.8 Develop a system to safeguard and archive information related to MOA interventions and a system to collect feedbacks from fields, monitor results and evaluate these interventions. Develop measurable indicators to evaluate these interventions;

4.9 Activate and develop the olive oil laboratory and introduce farmers to the services that can be provided. Prepare a decree or law proposal to amend the management and operation system in order to ensure sustainability.

7. LIST OF ANNEXES

Annex I: Questionnaire templates