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AVOCADO VALUE CHAIN ASSESSMENT REPORT

LEBANON INDUSTRY VALUE CHAIN DEVELOPMENT (LIVCD) PROJECT

MARCH 2014

This publication was produced for review by the United States Agency for International Development. It was prepared by DAI.

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LEBANON INDUSTRY VALUE CHAIN DEVELOPMENT (LIVCD) PROJECT

Program Title: Lebanon Industry Value Chain Development (LIVCD)
Sponsoring USAID Office: USAID Lebanon
Contract Number: AID-268-C-12-00001
Contractor: DAI
Date of Publication: March 2014

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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1. OVERVIEW

The avocado value chain provides LIVCD an excellent opportunity to leverage private sector investment to significantly increase acreage and yields.

Lebanon has a great opportunity to increase its market share in the GCC and Europe. The GCC is a small but growing market. Europe is a large market, with potential for growth as per capita consumption in many countries is as low as 250 grams/annum. In addition to these markets, Lebanon's existing olive oil pressing infrastructure can support the establishment of an avocado oil industry, which will open new markets internationally as well as in Lebanon's vibrant health food and cosmetics sectors.

Production areas are owned by large landowners who derive income from non-agricultural sources, tend to be environmentally conscious and/or interested in agriculture, and take pride in having trees, as opposed to buildings, on their property. Many of these landowners rent the orchards to a handful of 'wood' daman. These 'wood' daman pay annual rent that correlates to the productivity of the orchard. Rental contracts are usually 6 years in duration. Other times there are no rental contracts, but a verbal agreement between the two parties. In some cases, the landowner will co-invest in the orchard with the 'wood' daman. Avocados provide ample opportunities to leverage private sector investment and enter into PPPs with rural enterprises engaged in olive milling and cosmetics manufacturing.

2. VISION FOR VALUE CHAIN

The LIVCD-supported avocado industry's vision is to be a model of organization and collaboration between producers, aggregators, millers and industrialists in Lebanon and be recognized as a reliable and high quality source of fresh avocados, avocado oil and avocado-based cosmetics. LIVCD will work with large lead farmers to develop capacity and skills in production, harvest and post-harvest, for small and medium farmers. The small and medium farmers will be linked with aggregators, millers and processors in order to access better markets. LIVCD will support investment, as needed, to upgrade existing orchards, develop milling capability and promote the use avocado oil among cosmetics manufacturers. LIVCD will support exporters with actionable market intelligence; create linkages and develop information channels between LIVCD-supported producers, aggregators and exporters.

3. END MARKET ANALYSIS

3.1 EXPORT MARKETS

NORTH AMERICA AND EUROPE

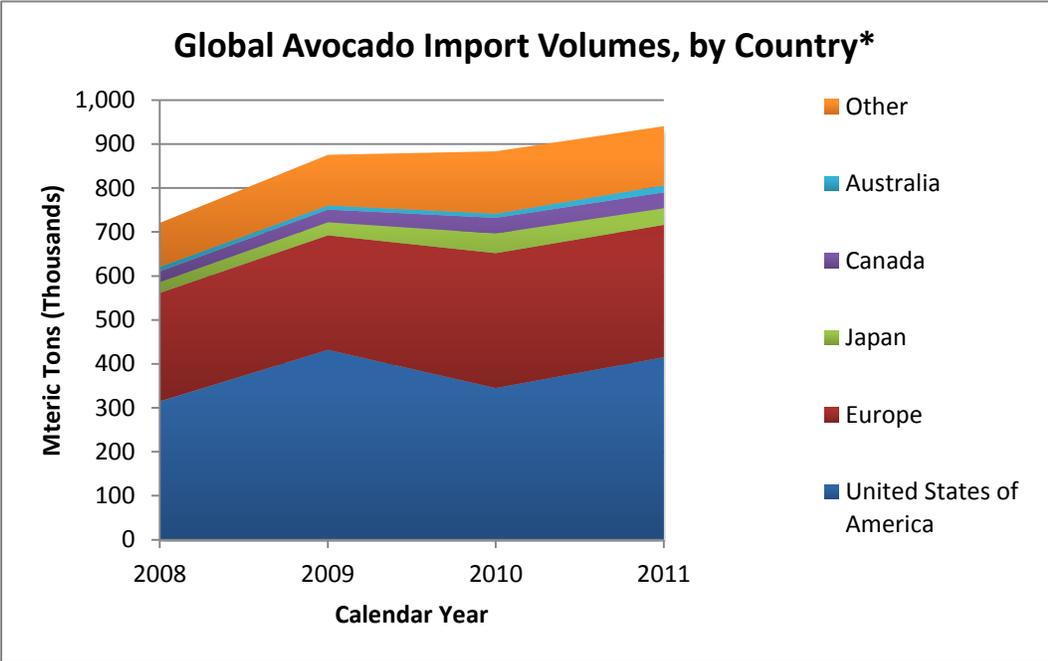
The global avocado trade is growing steadily, with export volumes growing 6.52%, and prices increasing by almost 5% annually since 2008. Two high-income, high consumption markets that are both strong exporters and importers drive the world avocado trade: Europe and the United States. Due to the relatively high price, avocado importers are typically middle and high-income countries. Large, well-established producers, aggregators and exporters including Mexico, Chile, Peru, Israel, Netherlands and Kenya supply these markets.

By far, the largest importer of avocados is the United States, taking almost 45% of international trade volume. However, the number of suppliers to the U.S. is few, with Mexico dominant, followed by Chile, Peru and the Dominican Republic.

Europe is a fast growing market, doubling its imports of avocados to almost 350,000 tons from 2003 to 2011. Europe is supplied by every major avocado exporter, but imports most of its avocados from Peru, Kenya, Israel, and Spain.

The Netherlands serves as an important transshipment hub for avocados destined to Europe, exporting larger volumes than Europe’s only commercial producer, Spain. The Netherlands is also a large consumer, consuming approximately 1 kg per capita in 2011. The Netherlands aggregates avocados from major producers and re-exports them throughout Europe, at an average price of USD 2.35/kg in 2011.

FIGURE 1: GLOBAL AVOCADO IMPORT VOLUMES BY COUNTRY

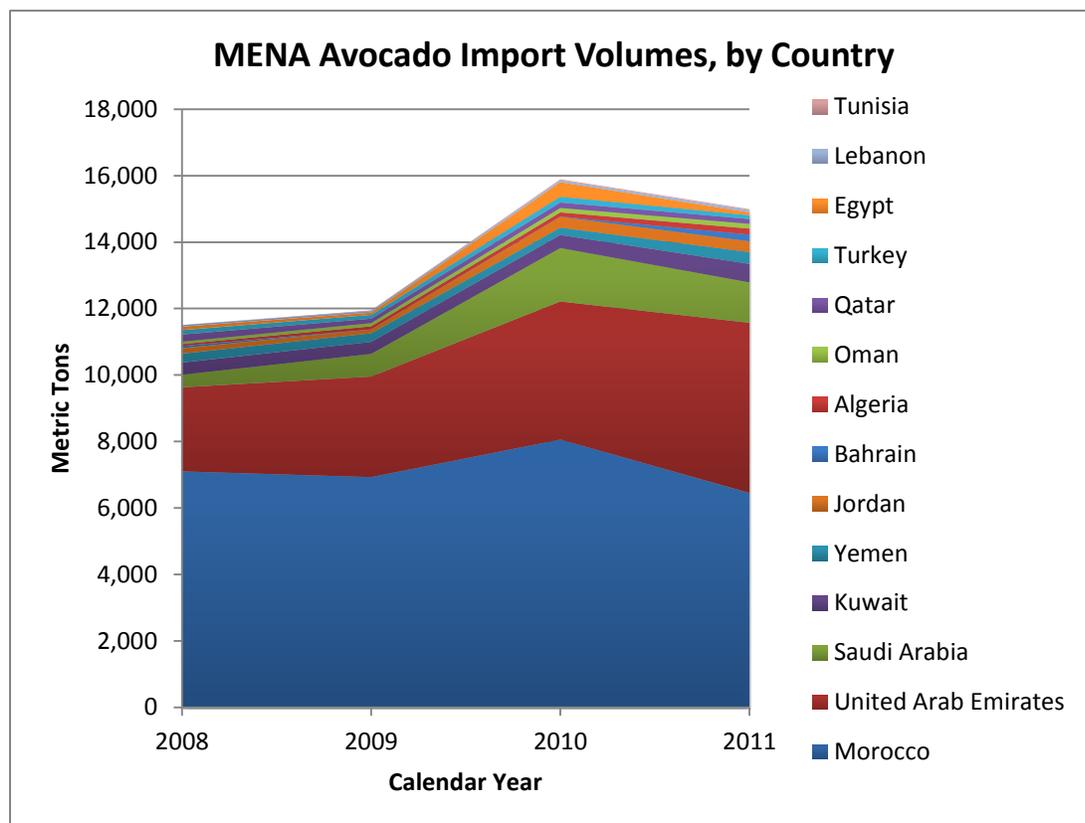


* Europe includes, in order of highest volume imported: Netherlands, France, UK, Spain, Germany, Sweden and Italy. Source: Trademap

MENA

The MENA region represents a small but growing market for avocados. Growth is limited to the GCC region, as high prices constrain demand in lower income countries. Morocco and the UAE are the largest importers, importing approximately 6,452 tons and 5,125 tons in 2011, respectively. Saudi Arabia’s imports have increased 55% per annum, on average since 2008, to 1,216 ton in 2011.

FIGURE 2: MENA AVOCADO IMPORT VOLUMES, BY COUNTRY



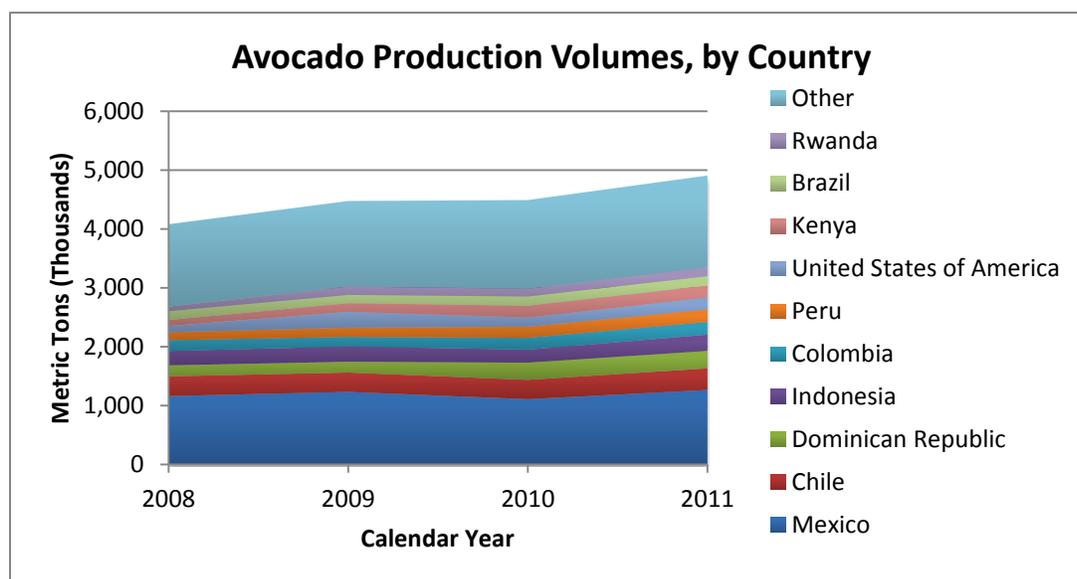
Source: Trademap

The GCC is currently a low price importer, taking commercial and non-commercial green varieties of avocado from Kenya. Kenya holds over 90% market share in the UAE and 80% market share in Saudi Arabia. Saudi and UAE also import from Australia, South Africa and Lebanon.

PRODUCERS AND EXPORTERS

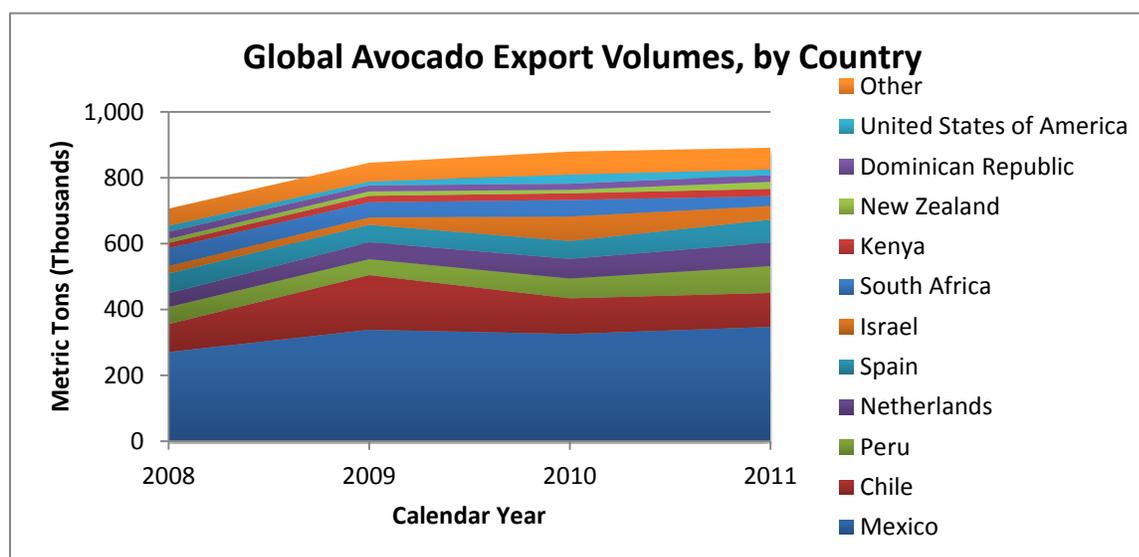
By far, the largest producer and exporter of avocado globally is Mexico, with triple the production and exports of its closest rival, Chile. The top six producers (Mexico, Chile, Dominican Republic, Indonesia, Columbia and Peru) account for 50% of global production volumes.

FIGURE 3: GLOBAL AVOCADO PRODUCTION VOLUMES, BY COUNTRY



Source: FAOStat

FIGURE 4: GLOBAL AVOCADO EXPORT VOLUMES, BY COUNTRY



Source: Trademap

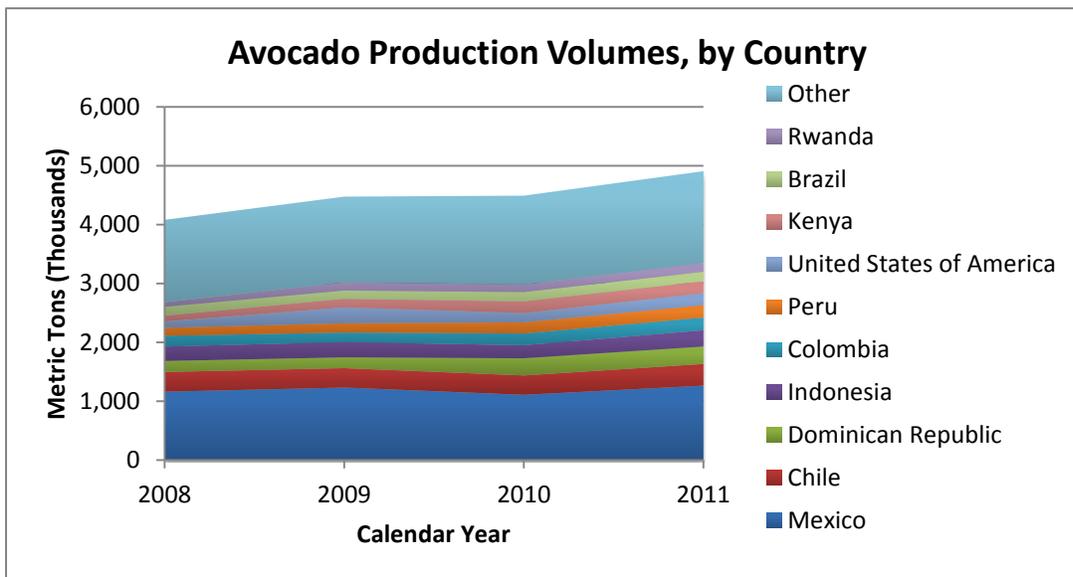
South American producers have a global reach supplying markets in Asia, North America, and Europe. Mexico’s primary markets are the U.S and Canada, which together receive about 85% of total Mexican exports. Peru has recently emerged as a big player in the avocado trade, increasing its production by 55% and increasing export volumes by 56% from 2008 to 2011. Most of Peru’s exports are destined to Europe, landing in the Netherlands and re-exported throughout the EU. Trade with Peru has made the Netherlands one of the largest avocado exporters. The Netherlands has seen export volumes grow by 68%, since 2008. Kenya and South Africa also export to Europe, mainly the UK, France, and the Netherlands. Kenyan avocados dominate the GCC market with 80% and 90% market share in Saudi Arabia and UAE, respectively.

MENA PRODUCERS AND EXPORTERS

MENA export volumes are small relative to global export volumes. Its exporters, led by Israel, account for approximately 5% of global export volume. MENA export volumes are growing at more than 19% annually, since 2008, outpacing global growth in the same time period by nearly 3 times. MENA’s proximity to the growing European market is driving this growth.

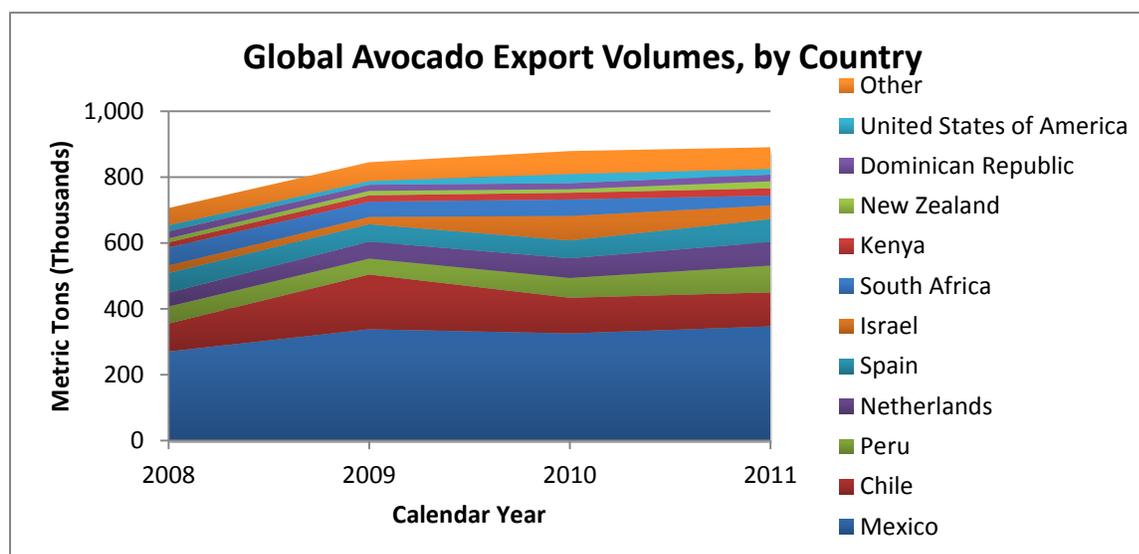
The three largest avocado producers in the MENA region are Israel (approximately 75,000 tons), Morocco (approximately 20,000 tons) and Lebanon (approximately 8,000 tons). Turkey (approximately 1,000 tons), the top regional producer for most fruit crops, has limited avocado production due to its climate conditions. Collectively, these four producers account for approximately 2% of global production volume.

FIGURE 5: MENA AVOCADO PRODUCTION VOLUMES, BY COUNTRY



Source: FAOStat

FIGURE 6: GLOBAL AVOCADO EXPORT VOLUMES, BY COUNTRY



Source: Trademap

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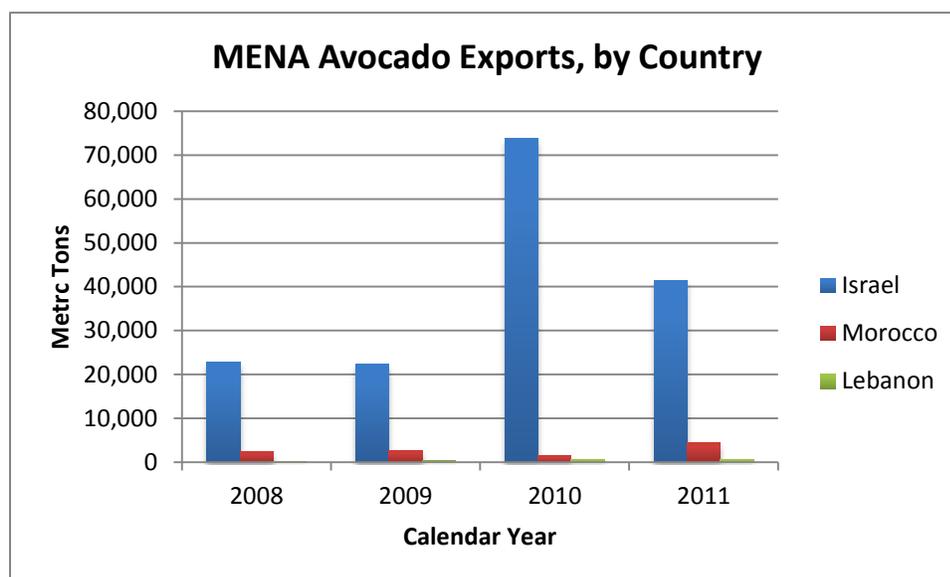
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FIGURE 7: MENA AVOCADO EXPORT VOLUMES, BY COUNTRY



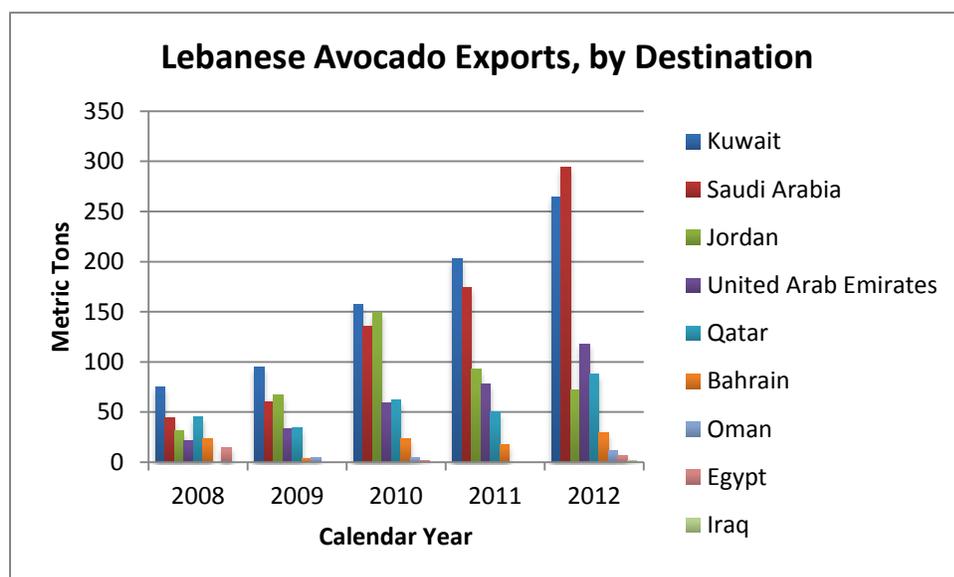
Source: Trademap

Most MENA exports come from Israel, which has emerged as a global exporter and competitor during the last decade. Israel accounts for over 90% of export volume from the MENA region. Israel exports seven varieties of avocados, including the popular Hass avocado. According to an industry website, Avocadosource.com, 60% - 70% of Israeli avocado exports go through a single, specialty producer and exporter, Agrexco, under the Karma brand. 99% of Israeli exports are destined to Europe.

Morocco is MENA's second largest exporter, accounting for 9% of MENA export volume. Moroccan production and export volumes are growing rapidly. Its primary markets are France and Spain. Moroccan exporters received USD 2.06/kg for avocados in 2011, a 20% premium over Israeli avocados.

Lebanese avocado export volumes account for 1% of MENA exports. Though 2011 total export volume of 618 tons is small, Lebanese exports have grown 35% per annum from 2008 to 2011. 2012 witnessed a 43% increase over 2011 export volumes to 886 tons. Lebanon mainly exports its avocados to the GCC, primarily Saudi Arabia and Kuwait. Lebanon holds excellent market share in low consumption countries like Kuwait and Qatar at around 37% each. In Saudi Arabia and UAE, Lebanon's share is just 14% and 2%, respectively. Lebanon's exports to Saudi Arabia and UAE have been growing considerably year-to-year. Currently, Lebanon exports just 10% - 15% of total domestic production.

FIGURE 8: LEBANESE AVOCADO EXPORT VOLUMES, BY COUNTRY



Source: Lebanese Customs

EXPORT MARKET OPPORTUNITIES

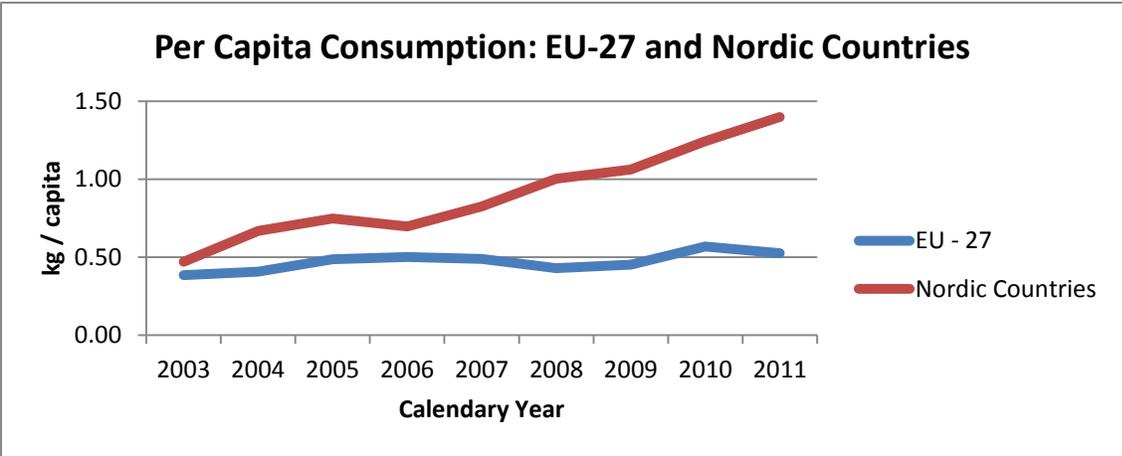
Lebanese avocado export volumes are small but growing. High domestic prices, due to limited production coupled with high domestic demand are a constraint to increasing export volumes. Lack of knowledge among avocado producers of European requirements coupled with tough, organized competition from Israel, South America and Africa is another constraint.

For example, Israel coordinates its exports through Agrexco, which owns high-speed cargo ships that transport avocados to Europe via Marseille. Israel exports to Europe at an average unit price of USD 1.72/kg in 2011. Israel's export volumes have grown 20% per annum since 2008. South Africa and Kenya average export prices in 2011 were even lower than Israel at USD 1.01/kg and USD 1.13/kg, respectively. Argentina, Brazil, Colombia, Peru, Dominican Republic, USA, Kenya, Morocco, South Africa, Israel, Spain, Australia, and New Zealand have been developing their avocado industries since the mid 1970s and are part of an international marketing and promotion body called Avocado Marketing and Promotion Working Group which works to promote avocado consumption throughout Europe.

Avocado consumption in Europe has increased significantly in the last ten years. The increase is most remarkable in the Nordic countries,¹ where per capita consumption rose from 0.4 kg to almost 1.5 kg. Avocado is considered an exotic fruit in many European countries, with consumption hovering around 0.5 kg per capita over the past decade. Currently, Europe is the second largest avocado market in the world, after the US. If growth in the Nordic countries is replicated through the rest of Europe, then it could potentially absorb an additional 500,000 metric tons per annum. Europe offers a high value high consumption market for Lebanese avocados.

¹ FINLAND, DENMARK, NORWAY, AND SWEDEN

FIGURE 9: PER CAPITA CONSUMPTION: EU-27 AND NORDIC COUNTRIES



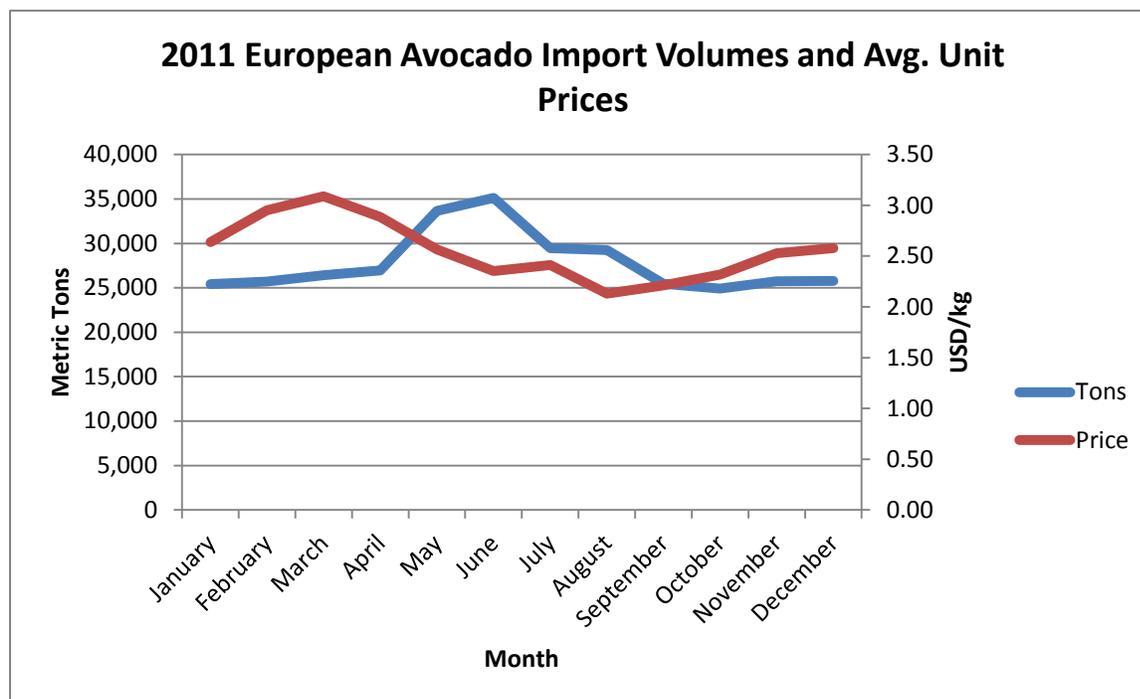
Source: FAOStat; Trademap

TABLE 1: AVOCADO IMPORTS TO NORDIC COUNTRIES, METRIC TONS

Importers	2008	2009	2010	2011
Sweden	11,908	12,461	14,183	16,562
Denmark	7,969	9,244	11,045	11,097
Norway	3,841	4,044	5,154	6,555
Finland	1,077	1,195	1,479	2,041

Source: Trademap

FIGURE 10: 2011 EUROPEAN AVOCADO IMPORT VOLUMES AND AVG. UNIT PRICES

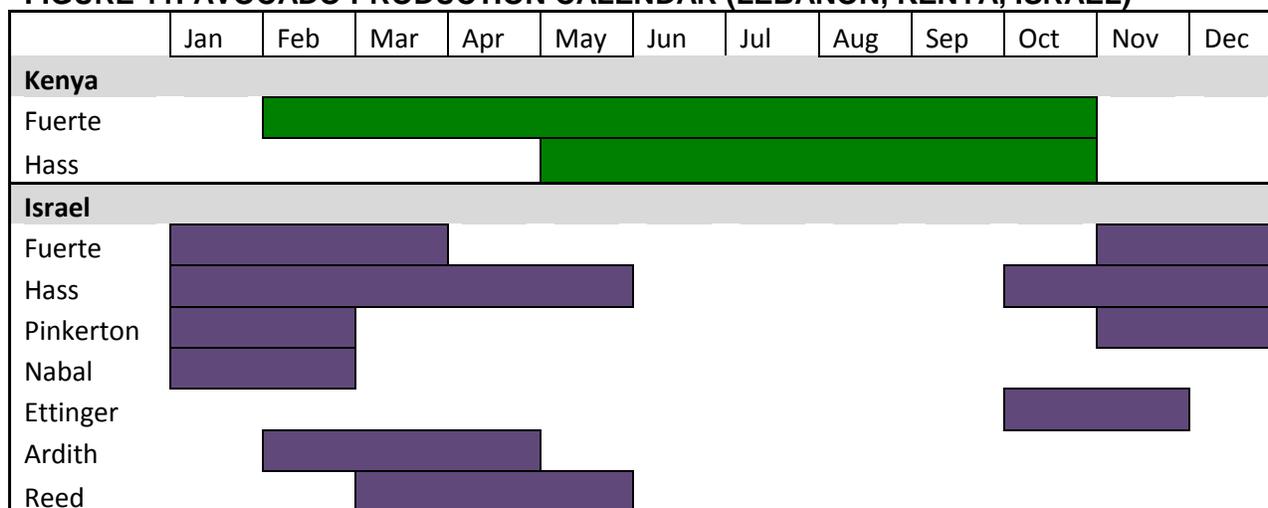


Source: Trademap

The most popular avocado variety is Hass. Its popularity is related to its high oil content and skin color, which darkens as it ripens, thus making it easy for consumers to determine whether it is ripe or not. Fuerte, Pinkerton, Reed and Ettinger are also popular and commercially produced and traded. These varieties are commonly referred to as “Green” varieties because they remain green when ripe. Avocados are graded according to “classes”: Extra, Class I, and Class II.² Extra receives the highest prices, followed by Class I, and Class II.

² Codex International Food Standards; <http://www.codexalimentarius.org/>

FIGURE 11: AVOCADO PRODUCTION CALENDAR (LEBANON, KENYA, ISRAEL)



Source: Avocado World Congress 2010

OPPORTUNITIES IN MENA REGION

The highest per capita consumption in the MENA region comes from producer countries led by Israel, Lebanon and Morocco, and followed by the UAE. Excluding Israel and Lebanon, the MENA region significantly underperforms the European market in consumption, averaging only 0.16 kg per capita³ compared to the European average of 0.5 kg per capita⁴. However, UAE already has a higher per capita consumption than the EU, and the Saudi Arabian market is averaging a 50% annual growth in quantity imported since 2008.

In the GCC, the UAE and Saudi Arabia are relatively large importers where Lebanon has limited market share. Low-priced, non-commercial “green” Kenyan avocados dominate these markets. For Lebanon to capture market share from Kenya, it would have to take advantage of Kenyan supply shortfalls between October and February, or increase demand for the higher quality avocados from Lebanon. Kuwait and Qatar, by comparison, are smaller importers where Lebanon already has significant market share.

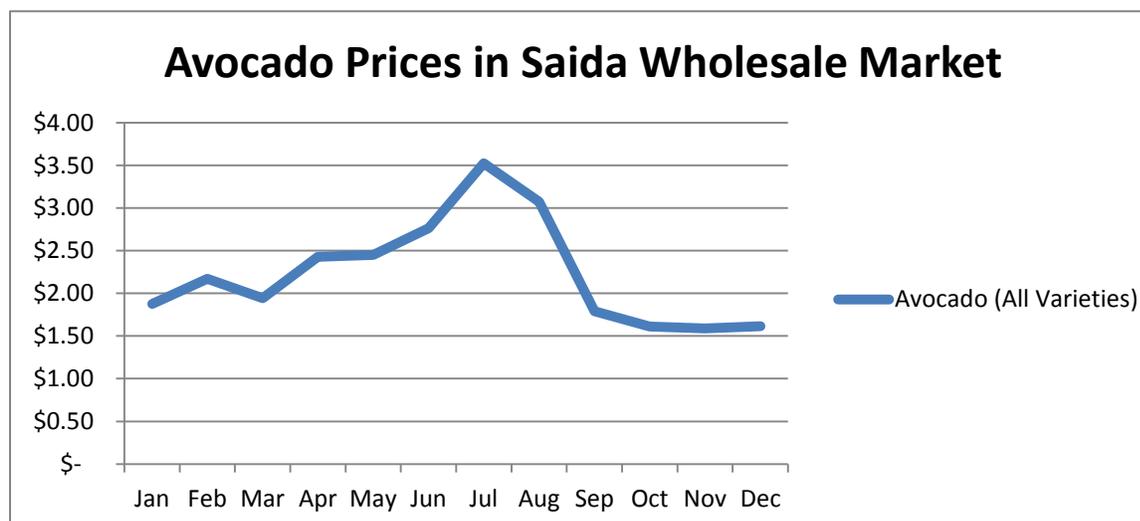
3.2. DOMESTIC MARKET

The Saida wholesale market is the main trading hub for Lebanese avocados, followed by Tyr wholesale market. Few amounts are sold directly to other wholesale markets or exporters. High percentage of avocados delivered to the Saida wholesale market are resold to the Beirut (Sports City) wholesale market and Tripoli wholesale markets. Some of the avocados are sold to Saida’s juice stands, restaurants, retailers and hotels, or to the other wholesale markets in Lebanon. In Beirut, avocados are sold to restaurants, juice-stands, hotels, retailers and exporters, either directly from the wholesale market or through distributors. At the wholesale level, avocados are traded in standard plastic crates containing around 18kg of fruit.

³ FAOStat

⁴ CBI, Ministry of Foreign Affairs, The Netherlands

FIGURE 12: AVERAGE AVOCADO PRICE IN SAIDA WHOLESALE MARKET BY MONTH (ALL GRADES AND VARIETIES)



Source: Lebanese Chamber of Commerce

Avocado prices depend on variety and market timing. The price range depends on market timing, with late season products receiving a premium over early season products. Prices of the commercial “green” varieties⁵ follow the same pattern, though prices are less than Hass.

Lebanese orchards also contain many non-commercial “green” varieties. These wild varieties receive the lowest prices at the wholesale market. The wholesale operator and buyer negotiate the price. However, the ability to control the supply of avocados in the market by keeping the fruit on the tree or farm provides growers some leverage in setting the price.

The unit of sale in the wholesale market is the crate, with price quoted per kilogram. Saida wholesale operators receive a 10% commission on sales price, and charge an additional 2% for unloading product. The grower or daman pays the cost of transport and the end buyer pays for the crate. The crate weight is removed from total product weight when calculating the purchase price of each individual. The buyer pays for the crate and is reimbursed the cost if the buyer returns the crate to the wholesaler.

November through March are the peak production times and the largest in terms of volume traded. Nearly all avocados that arrive to the wholesale market are sold, with traders suggesting that every avocado has its customer.

Avocados are very popular in households and high-end restaurants and hotels, yet the single largest consumer group is the neighborhood juice shops,. Consumption is steady throughout the year as avocado puree is a key ingredient for the fruit-chunk cocktails..

Sushi restaurants, sandwich shops, diners, bakeries as well as traditional Lebanese meza restaurants catering to a broad spectrum of Lebanon’s socio-economic classes use avocado in their recipes. Many restaurants do not put avocado-based dishes, such as Mtabal Avocado, on their menu because of seasonal price fluctuations, but these dishes are made available, depending on availability, to customers who know

⁵ PIKERTON, FUERTE, ETTIGER AND REED.

to ask for them. Restaurants make up the second largest consumer group for avocados in Lebanon. Households make up the third and final significant consumer of avocados in Lebanon.

SUMMARY OF DOMESTIC MARKET OPPORTUNITIES AND CHALLENGES

Avocado consumption in Lebanon is higher than in Europe. Considering that most of this consumption is through the juice stands, the potential to increase household consumption exists for low, medium and high-income consumers.

Avocado oil is emerging as a miracle ingredient in beauty as well as food products. As a culinary product, avocado oil compares to olive oil. It has a similar monounsaturated fat profile, which helps to protect the oil from breakdown during heating. As a cosmetic product, avocado oil contains anti-ageing nutrients, has high concentrations of Vitamins A, D and E and is considered to have the highest skin penetration rate among all cosmetic oils.

- Like olive oil, avocado oil is derived from the fruit's flesh. Accordingly, olive presses may be utilized to produce avocado oil. Cold-pressed 'Hass' avocado oil has been described as having an avocado flavor, with grassy and butter/mushroom-like flavors. Other varieties may produce oils of slightly different flavor profile as has been seen with 'Fuerte,' which has been described as having more mushroom and less avocado flavor

4. PRODUCTION AND PROCESSING

Avocado production was introduced to Lebanon in the late



FIGURE 13: GRADE 3 ETTINGER IN ORCHARD

1960s and early 1970s by Lebanese expatriates residing in Africa. Returning expatriates, many retired businessmen turned agricultural hobbyists, planted early orchards from seeds of fruit they brought home from Africa. In the 1980s, some of the larger landowners began importing seedlings from Brokaw Nursery in California, investing in the commercial potential they saw in avocados. Producers used Brokaw Nursery because it had conducted trials in Lebanon and made specific recommendations for rootstock suitable for Lebanon's soils and climate.

Today, avocado production in Lebanon enjoys a wide geographic distribution along the coastal strip. Avocados grow between altitudes of 0 to 500 meters above sea level. The Zutano rootstock may withstand an elevation up to 1,000 meters, though growers suggest that production costs at this altitude may be prohibitive. Avocado orchards are stretched on the coast from Byblos to Tyr. Avocado has also been planted with success in Lebanon's interior, such as the plain of Maydani in Nabatiyeh situated 20 km from the coast. Recently, growers have started to plant avocados in the Akkar plain. Most avocado orchards are situated in the coastal strip between Saida and Tyr.

The 2000s witnessed a rapid expansion of avocado

orchards⁶ as professional farmers, managing rented orchards in southern Lebanon, sought to capitalize on the high prices of bananas. Many landowners agreed to convert their lands to bananas, which produce fruit the same year they are planted, but required the professional farmers to intercrop avocados within the new banana plantations. This was required in many cases as the landowners saw the long-term potential of avocados. Some of the landowners invested with the wood daman and established orchards using imported seedlings.

The remaining orchards, established by farmers who were in many cases imitating the practice of the wealthier farmers, are planted with avocados grown from seed. These orchards are either directly owned by the growers or rented from landowners who have no interest in agriculture production. Today some orchards are suffering from poor tree growth, inconsistent production, and non-commercial 'green' varieties that consistently sell at lower prices than the commercial 'green' varieties.

Avocado orchard expansion continues today Nursery owners approximate that the sale of avocado seedlings is increasing and expect this trend to continue. This equates to a fast growth in cropped area per year Intercropping with bananas still takes place, alongside conversion of citrus orchards and fallow lands. In 2005, the Hariri Foundation, with USAID funding, launched programs to commercialize the industry through trainings, demonstration farms, and the establishment of a nursery to promote conversion to commercial varieties.

According to FAO, avocado production reached 8,200 tons in 2011. Production yields in Lebanon, at 12.6 tons/hectare among the highest in the region as illustrated in Figure 15. According to growers, no avocado goes to waste and everything is sold. Product is sorted in the field during harvest into 1st (70% of all production), 2nd (25% of all production) and 3rd (5% of all production) grades and packed into standard plastic crates that contain approximately 18 kg of fruit. International grading classifications, Extra, Class I and Class II are not used. Grading is by size and shape with round fruit with no dents or indentations and a matte green color being considered Grade 1..

Assuming an average yield of 12.5 ton/hectare, which provides significant returns for producers, with many claiming that it is the only crop that doesn't lose money. However, avocado orchards occupy some of the most valuable properties in Lebanon, which will create constant pressure on orchard owners to convert orchards into tourist, housing and road developments, as well as deter most investors from purchasing property for agriculture purposes. Increasing avocado production may need to be focused in the Akkar plain, and higher altitude areas where land is less expensive.

⁶ PLANTED AREA INCREASED 55% BETWEEN 2007 AND 2011, FROM 430 TO 670 HECTARES.

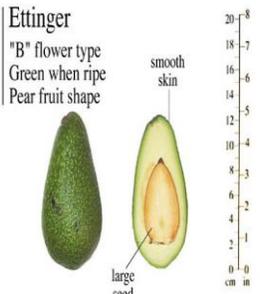
TABLE 2: MENA AVOCADO PRODUCTION DATA 2007 – 2011

Country	element	2007	2008	2009	2010	2011	Tons/HA	Exports (Tons)	Imports (Tons)	Per Capita consumption/ Kg	Farm Gate 2009 USD/Ton
Israel	Area (Ha)	5,100	6,270	6,480	6,565	6,780	11.1	52,888.0	70.0	2.9	\$1,624
	Production (tons)	85,913	53,130	84,968	69,545	75,287					
Lebanon	Area (Ha)	430	450	610	664	650	12.6	618.0	74.0	1.8	\$1,493
	Production (tons)	6,000	6,100	7,200	8,000	8,200					
Morocco	Area (Ha)	1,920	1,972	1,863	2,005	2,071	9.7	4,425.0	6,452.0	0.7	2406
	Production (tons)	16,896	19,253	19,000	20,167	20,186					
Turkey	Area (Ha)	120	120	146	146	153	8.6	12.0	124.0	0.02	1858

Source: FAOSTAT

Lebanese avocado harvest takes place between September and early June, depending on variety. Pinkerton, Fuerte, Reed, and Hass varieties account for the majority of all production. Statistics for the production of individual varieties are not available. The Hass variety is the most popular due to its high value and popularity among consumers. It has several advantages that contribute to its increasing popularity among consumers, including its small seed size, high oil content, extended fruiting season, and its skin which turns from green to black when ripe, enabling consumers to easily identify those which can be eaten immediately. Ettinger, referred to as ‘atunga’ by growers and traders, is gaining popularity due to its large fruit size, up to 0.5 kg per fruit, and high oil content.

FIGURE 14: AVOCADO VARIETIES ADOPTED IN LEBANON

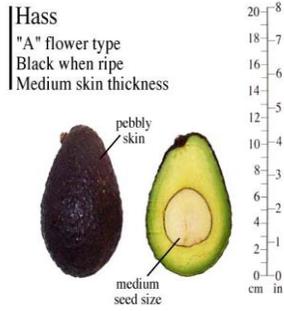
Variety	Fruit	Leaf	Specification
Ettinger			<p>Parentage: Mexican</p> <p>Peels: No</p> <p>Seed Size: Large</p> <p>Skin Texture: Smooth</p> <p>Blossom Type: B</p> <p>Fruit Shape: Narrowly obovate</p>

Skin Color: Unripe: Green, Ripe: Green

Skin Thickness: Thin

Average Fruit Weight oz: 9 to 20

Hass



Parentage: Hybrid

Peels: Yes

Seed Size: Medium

Skin Texture: Pebbly

Blossom Type: A

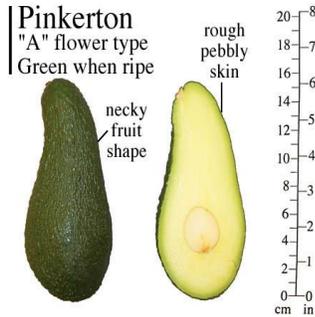
Fruit Shape: Narrowly obovate

Skin Color: Unripe: Green, Ripe: Black

Skin Thickness: Medium

Average Fruit Weight oz: 6 to 14

Pinkerton



Parentage: Hybrid

Peels: Yes

Seed Size: Small

Skin Texture: Rough-pebbly

Blossom Type: A

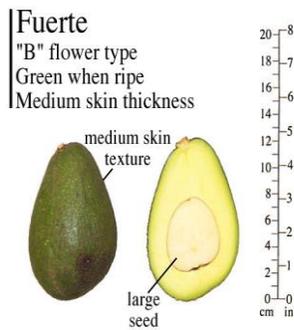
Fruit Shape: Pyriform

Skin Color Unripe: Green, Ripe: Green

Skin Thickness: Medium

Average Fruit Weight oz: 9 to 18

Fuerte



Fuerte



Parentage: Hybrid

Peels: Not easily

Seed Size: Small

Skin Texture: Medium

Blossom Type: B

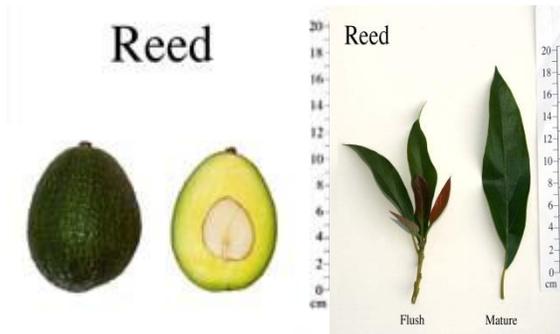
Fruit Shape: Clavate

Skin Color Unripe: Green, Ripe: Green

Skin Thickness: Medium

Average Fruit Weight oz: 10-18

Reed



Parentage: Guatemalan

Peels: Yes

Seed Size: Large

Skin Texture: Medium

Blossom Type: A

Fruit Shape: Spheroid

Skin Color Unripe: Green, Ripe: Green

Skin Thickness: Medium

Average Fruit Weight oz: 17-24

Source: University of California Agriculture and Natural Resources

Avocado orchard management is very straightforward and requires significantly less pesticide and



**FIGURE 15: LARGE ORCHARD
MANAGED BY ‘WOOD’ DAMAN**

fertilizer application than comparable crops such as citrus and bananas. As with most tree crops, the most critical element is sourcing quality rootstock. Routine maintenance including irrigating, pruning, fertilizing, thinning and disease/pest control is also very important to orchard performance. The study team observed that pruning and thinning practices appear to be limited in Lebanon, however fruit quality do not seem to be impacted. The study team observed Hass, Pinkerton and Ettinger avocado fruit on trees in the orchards visited; the fruit looked healthy, large in size with few defects.

Certified seedlings are not locally produced in Lebanon, but growers can purchase locally produced, seed propagated seedlings. In addition, a local nursery has obtained a distribution agreement from Brokaw Nursery and sells imported certified seedlings for \$12 - \$15 per seedling.

Growers claim that avocado trees can remain productive for 100 years as long as the rootstock is from a quality source, disease-free, and the orchard is well maintained.

From time of planting, trees will begin to produce after three years, reach commercial production in 7 years and reach peak production after 12 years. Once peak production is reached, production can maintain at this level for 50 years. From time to time, the limbs need to be removed and a scion grafted, at which point it will take it two years to regenerate and re-achieve peak production.

Growers rely on trial and error and advice from a more experienced grower or nursery owner to determine best practices to maintain their avocado orchards. There is little consistency between production practices in different orchards, with growers using different spacing, fertilization, irrigation and pest control practices.

HARVESTING

Avocado fruits are handpicked in Lebanon, using climbing harvesters (not hydraulic ladders as are used widely abroad), often resulting in tree limb breakage. For most cultivars, the harvested fruit needs to be cropped with a ‘button’ to reduce the risk of stem-end rot attacking the fruit as it ripens. In Lebanon, fruit is picked into large plastic crates that hold approximately 18kg of fruit directly in the field. It is important to store the fruit out of direct sunlight after picking to prevent heating. Orchard managers typically recruit a family, to reside in the orchard and provide most of the labor requirements. Additional labor, are hired on a daily or seasonal basis.

POST-HARVEST

Avocados have long storage life and do not require cold storage. In Lebanon, fruits are harvested and sorted directly in the field according to size and variety. Some varietal mixing does occur between “green” varieties such as Pinkerton and Ettinger, but Hass is generally packed by itself. Fruit is then

stored in an enclosed space or delivered directly to the wholesale market. The wholesale market doesn't perform any type of value add. They simply facilitate the transaction, taking commission.⁷ Exporters buy product either directly from the grower or the wholesale market. It is then sorted and packed in single layer boxes and exported.

The low maintenance cost of avocados has encouraged farmers to shift towards this crop and away from citrus. Avocados do not have high requirements in terms of fertilizers or pesticides, as the falling leaves of avocados constitute a natural fertilizer. Current production practices suggest that intercropping with bananas has proven to be an acceptable model, as farmers are able to realize income from bananas after one year, while waiting for the avocado orchards to come into production. However, bananas have very different water and pesticide requirements, and it is unclear how the increased pesticide and fertilizer use will affect the avocado orchards in the long term. In addition, the water requirements of bananas have most likely contributed to the incidences of root rot among avocado trees. This can be mitigated with the use of drip irrigation.

4.2 PROCESSING

Currently, there is no industrial processing of avocados in Lebanon. However, great potential exists, as avocado oil is very good for cosmetics and cooking. The oil is produced using the same "cold-press" equipment used by modern olive oil producers and is classified as extra virgin or virgin using olive oil standards. One ton of avocados yields up to 250 liters of oil depending on variety. Avocado may contain up to 26% oil content depending on variety, climatic condition and harvest time. International wholesale prices range from \$8 -\$12/liter for industrial grade and \$15-\$25/liter for food grade⁸ avocado oil.

Avocado oil has many similarities to olive oil. It has a similar monounsaturated fat profile, which helps to protect the oil from breakdown during heating and contains similar anti-ageing nutrients as olive oil. Cold-pressed Hass avocado oil has been described as having an avocado flavor, mixed with grassy and butter/mushroom-like flavors. Other varieties may produce different flavor profiles; for example the Fuerte variety has been described as having more mushroom and less avocado flavor. Avocado oil is used as an ingredient in a wide array of beauty care products. The oil has high concentrations of Vitamins A, D and E and is considered to have one of the highest skin penetration rates among all cosmetic oils.

⁷ Wholesalers in Saida also take a 2% unloading fee in addition to the 10% sales commission.

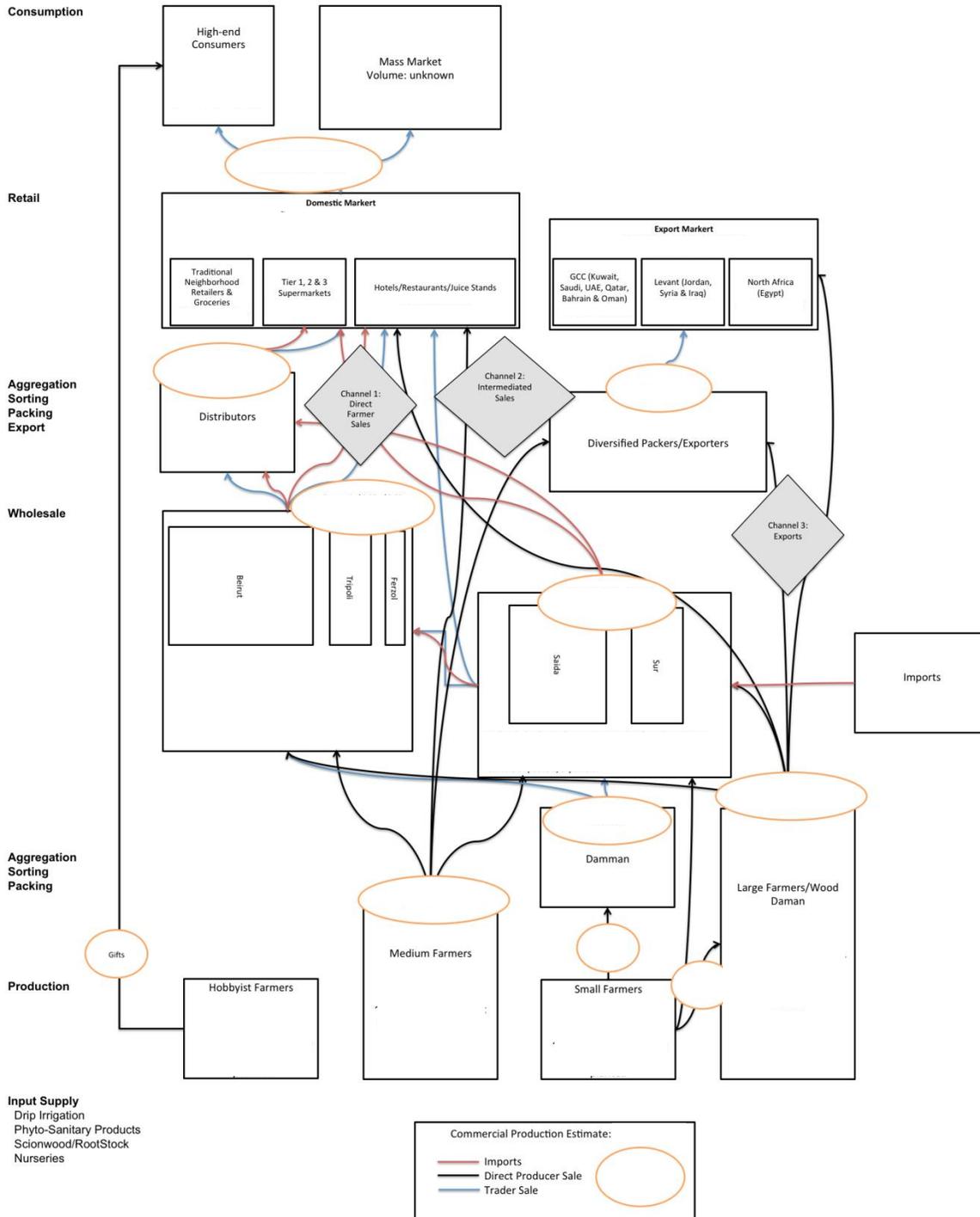
⁸ Internet survey of prices

5. VALUE CHAIN ACTORS

5.1. VALUE CHAIN MAP AND ACTORS

FIGURE 16: VALUE CHAIN MAP

Avocado Value Chain Map
2012 Season



5.2: VALUE CHAIN ACTORS:

VALUE CHAIN CHARACTERISTICS, CHANNELS AND GOVERNANCE:

Relationships between the various stakeholders, described in greater detail below, are more balanced in the avocado value chain than the cherry value chain. The wholesale operator and his buyer set the price, but producers have much more control of supply (therefore price) due to avocado's ability to store on the tree and long shelf life once harvested. Distributors and retailers serving restaurants or end consumers directly are constrained by fixed margins and have limited ability to add value. Restaurants and juice stands are able to generate the greatest value add, and their margins will depend on the branding of the establishment. For instance a sandwich shop offering chicken avocado sandwich on its menu operates on a lower margin than a trendy sushi restaurant that includes avocado in its sushi rolls.

Avocados follow one of three sales channels to the end consumer.

CHANNEL 1: FARMER DIRECT SALES. Transactions in this channel are limited to direct sales transactions between grower and retailer, exporter or end consumer. This sub-segment represents a small portion of avocado consumption . Hobbyist farmers use this channel to target friends, family and business associates with gifts. Small and large farmers use this channel to bypass the middleman and retain the additional margins for themselves.

CHANNEL 2: INTERMEDIATED SALES. This sub-segment represents the largest portion of avocado consumption . Small and large farmers use this channel to reach desired markets. Sales through this channel may require as few as two or as many as five transactions, however it is usually somewhere in between. In the shortest route, a grower sells directly to a wholesaler in Saida who in turn sells to the retailer. Using the longest route, a small grower sells to a larger grower or daman; the daman in turn sells into the Saida wholesale market; the Saida wholesaler in turn sells to a wholesaler in Beirut; The wholesaler in Beirut then sells to a distributor; the distributor sells to the retailer. The longest route may be shortened by circumstance, e.g., a retailer in Saida purchases directly from the Saida wholesaler thereby bypassing wholesalers in Beirut and/or distributors.

CHANNEL 3: EXPORTS. This sub-segment represents a small but growing portion of avocado consumption . Transactions in this channel may be as few as two or as many as three. In the shortest route, a grower sells product directly to the wholesaler in Saida who in turn sells it to an exporter. In the longest route, a grower sells product to the Saida wholesaler; the Saida wholesaler sells product to a wholesaler in another market (e.g., Beirut); and the wholesaler in Beirut sells the product to the exporter. Depending on their location, the exporter will many times buy directly from the Saida wholesale market.

PRODUCERS:

Avocado production in Lebanon is focused along the southern coastal plain. Avocado is not a traditional crop, but one adopted by producers in the last few decades. These producers tend to be progressive and affluent. Most avocado orchards also include a variety of citrus, custard apple and loquat trees. According to the MoA Agriculture Census of 2010, there are 3,700 avocado farmers in Lebanon.

HOBBYIST FARMERS. The majority of these farmers produce for own consumption and to give to friends and family. These hobbyists are affluent, with other non-agricultural sources of income, and take pride in growing tropical plants in their gardens.

SMALL FARMERS. The majority of these farmers sell their product to one of the ‘wood’ daman mentioned below. These tend to be progressive farmers who rely on agriculture as a primary source of income.

MEDIUM FARMERS. The majority of these farmers bypass the daman and send their product directly to the wholesale market. These are progressive farmers who rely on agriculture as a primary source of income.

LARGE FARMERS AND/OR ‘WOOD’ DAMAN.

Many of the large orchards are managed by professional orchardists who serve as ‘wood’ daman. These wood daman provide the orchard owner with a fixed annual rental price, in exchange for complete control over production and sales.

These are professional farmers who rely on agriculture as a primary source of income. They also serve as aggregators to small farmers. The landowners who rent to the ‘wood’ daman are typically wealthy business men, who have an interest in agriculture but do not rely on it as a source of income. In some cases, the landowners will invest in imported seedlings.

AGGREGATION

‘WOOD’ DAMAN are professional farmers who rely on agriculture as a primary source of income. They typically rent large orchards from wealthy families, and supplement their production with that of small farmers.

WHOLESALE TRADE, PACKING, AND EXPORT

URBAN WHOLESALE MARKET OPERATORS. Urban wholesale markets are run by associations of traders who occupy the designated spaces, collect rent for the warehouses, and organize cleaning and security. All traders deal in a variety of fresh fruit and vegetables. A portion of traders in the market are also independent exporters/importers of fresh product who own packing facilities and cold storage outside of the urban wholesale markets. The operations of wholesale markets in Lebanon are the source of some discontent among farmers and damans. Dissatisfaction centers around the lack of transparency in the dominant trade practice of consignment sales, in which no price is contracted at delivery with prices fixed by the trader according to market conditions,. Interviews with the wholesale market traders and the distributors and wholesalers who buy from them indicate that the vast majority of avocados reach their end market through these traders. The Saida and Tyr wholesale markets are the main delivery point for farmers and/or daman however, Beirut (sports city) serves as the main conduit to consumers as the majority of avocados delivered to Saida and Tyr and resold through Beirut.

A handful of the stands in the Saida market account for the majority of avocado sales. Prices at the Saida market vary based not only on supply and demand, but also variety and seasonality. Farmers bring their avocados to the wholesale market using trucks, minivans, or other types of vehicles -. Avocados are always delivered as part of a mixed load. . Farmers bring product in 19KG plastic crates. No pre-packing happens at the wholesale market as the farmers typically perform sorting product in the field.

Traders typically get paid s after delivery of product. The traders have limited options for financing the 30-day payment deficit, and in some cases may charge the borrower interest. Bank financing is available, and higher APR and the banks have burdensome collateral requirements. The traders cannot access

Kafalat or other subsidized credit programs, because those are meant to offset capital investment costs, not operating costs.

DIVERSIFIED PACKERS/EXPORTERS. Most fresh fruit and vegetable exporters belong to the Fresh Fruit and Vegetable Export Syndicate. The number of packers has increased enormously over the past 10 years, as even small-scale traders have entered the export market and set up packing operations.. The full-time traders have established links with buyers in higher end retailers and pursue opportunistic deals as well as longer-term purchase agreements. In some cases, the links are better established and longer-term than others. These diversified exporters typically send mixed loads to their destinations. The mixed loads are sent by airfreight, and may include multiple containers if by land or sea freight. There are typically no minimum order quotas for individual products within the mixed load.

DISTRIBUTION AND RETAIL

DISTRIBUTORS: These stakeholders assemble a variety of fresh produce from the wholesale markets and directly from farmers and deliver them on a regular schedule to retailers or hotels/restaurants who do not want to go to the urban wholesale markets on a daily basis. There are two main types of distributors: independent distributors who market mainly upper-level restaurants and hotels under contractual agreements and “integrated distributors” who generally lease space or pay a commission fee to run the produce department of supermarkets. Most independent supermarkets in Lebanon operate with these types of embedded integrated distributors, versus the chain supermarkets who buy directly and manage their own produce departments.

NEIGHBORHOOD RETAILERS: In a country without a strong tradition of open air markets or farmers’ markets, avocados and other produce are sold by small neighborhood shops. In most cases these retailers make daily trips to the urban wholesale markets to procure produce.

SPECIALIZED PRODUCE RETAILERS: A small but growing trend in Beirut is the emergence of fresh produce retailers that seek to differentiate themselves in terms of product quality and the physical layout of the store with mark-ups over neighborhood. These are often jokingly referred to as “pharmacy” stores—emphasizing that they are clean with almost medical hygienic standards in comparison to the normal down-trodden image of the neighborhood shop. Such retailers make a more concerted effort to source the best produce from the wholesale markets or directly from a regular circle of farmers or damans. This category of retail shop has only emerged in the last 10 years and is a small but growing percentage of the retail outlets.

JUICE STANDS: Juice stands offer avocado puree as a standalone item or as part of a fruit-chunk cocktail. Avocado puree is very popular item in Lebanon and the study team estimates that juice stands account for the highest consumption in Lebanon. In order to produce a thick, rich and creamy puree, juice stands require known varieties with high oil content.

RESTAURANTS AND HOTELS: Restaurants and hotels provide another important market for all qualities of avocados. Avocado is included on the menus of restaurants ranging from sushi to saj stands. Specialized distributors supply most restaurants and hotels, although some will send their own trucks to the wholesale markets.

SUPERMARKETS: The Supermarket segment of the market is rapidly expanding—following a familiar path with that of other middle income countries. The major chain supermarkets, have centralized purchasing of produce either out of the urban wholesale markets. Independent supermarkets tend to work with integrated distributors as produce department contractors.

BUSINESS DEVELOPMENT SERVICES:

NURSERIES: The diversity in the crop size and shape confirms that genetic material used in Lebanon are different and multiple. Avocado seedlings are available in abundance in the nurseries in the south region of Lebanon.. The seedlings are mainly purchased by farmers for orchard production and also by individuals for private gardens. Imported rootstocks from Europe and US and grafted with local scions, both certified virus-free and uncertified are also available, and primarily purchased by landowners and/or wealthier farmers. The price of an imported seedling ranges between USD 15 and 20 per seedling. The most critical element in growing avocado is sourcing quality rootstock, and imported rootstock is usually better quality.

6. BUSINESS ENVIRONMENT FACTORS AFFECTING THE VALUE CHAIN

6.1. ACCESS TO FINANCE

Most avocado producers are self-financed or work on credit obtained from input suppliers and/or wholesale traders. These loans cover the costs of production and harvesting. In most cases the loan includes a mutual agreement for the farmer to sell his product to the wholesaler at market prices. In rare cases the lender will charge interest.

In some cases, landowners who rent to wood daman are financing the establishment of orchards on their properties. This is unique among tree crops in Lebanon and attests to the commercial potential that these typically savvy businessmen/landowners see in avocados.

6.2. EXTENSION SERVICES

Avocado farmers receive little to no extension support. Some larger farmers may hire specialists for advice. Others self-finance study tours to Europe or North America. Smaller farmers have virtually no source of advice on improved techniques and will often rely on neighbors or the local nursery for advice, or in some cases input suppliers. The Hariri Foundation provides extension training to avocado farmers in and around Saïda.

The MOA is in the process of reorganizing and recruiting extension staff who will be mandated to visit fields in 2013.. These agents, if well-trained and managed, are a potentially valuable source of production advice for Lebanese farmers, the benefit of which could be extended with the integration of crop-specific experts, on whom the agents could call to get advice on specific problems.

6.3. BUSINESS CULTURE

The Lebanese business culture has elements that offer important levers to the development of the avocado value chain. The first of these is a wealth of entrepreneurial individuals, coupled with a cultural ethos that emphasizes ties to “the family land” or to the home region. These two factors combine to provide a fertile pool of wealthy individuals who are interested in investing in agricultural activities in ancestral lands—often as part of a network of land holdings within an extended family. In many cases, these family networks may include members with resources or commercial inclinations to engage in packing and export. Many of the large farmers in the Value Chain map are family plots of several hectares that belong to individuals who have significant other sources of revenue that take great pride in developing lands located in their region of origin. These individuals form an important potential anchor for regional fruit

tree development activities. They can also be an important vector for socially-oriented investment from Diaspora Lebanese looking to contribute to their home.

communities. Another, less positive, aspect to the presence of strong family links in Lebanese business culture is the strong tendency of businesses to want to integrate vertically through alliances with related family businesses. This often interferes with or slows the development of inter-firm cooperation.

7. DYNAMIC TRENDS

This section captures major trends in value chain development that may have potential impacts on the possible upgrading strategies.

TREND 1: SIGNIFICANT PRIVATE SECTOR INVESTMENT

There is a trend to uproot citrus and banana plantations to make way for avocados. Most farmers express, whether or not they produce avocados, a desire to expand avocado production to benefit from high demand and high prices in both domestic and export markets.

TREND 2: PRODUCTION DRIVEN BY LARGE, PROFESSIONAL FARMERS

Orchards greater than one hectare make up fifty percent of total area planted. These orchards are managed by the landowners themselves or by professional ‘wood’ daman.

8. VALUE CHAIN OPPORTUNITIES

The potential for increasing demand in both domestic and export markets exists. Lucrative export markets exist in Europe. Demand is growing in the MENA region. Domestically, there is an opportunity to benefit from existing infrastructure to produce high-value avocado oil for cooking and/or industrial uses.

OPPORTUNITY 1: INCREASE MARKET SHARE IN EXPORT MARKETS

Europe is a lucrative market that offers huge potential for Lebanese producers, aggregators and exporters that can meet its demand for high quality product and stringent import requirements.

The UAE and Saudi Arabia are relatively large importers where Lebanon has an opportunity to increase its market share. For Lebanon to capture market share in these countries, it would have to take advantage of Kenyan supply shortfalls between October and February, or increase demand for the higher quality avocados from Lebanon.

Kuwait and Qatar, by comparison, are smaller importers where Lebanon already has significant market share. Per capita consumption in these countries is small and Lebanese producers have an opportunity to increase market share as was done in Europe.

The main constraint to increasing market share in Europe

OPPORTUNITY 2: INCREASE QUANTITY AND QUALITY OF COMMERCIAL VARIETIES OF AVOCADO IN LEBANON

Lebanese production, , is relatively small. There is an opportunity to increase production area, with significant co-investment from the private investors. Furthermore, some of the production area is planted with unknown, non-commercial ‘green’ varieties. There is an opportunity to convert these low-value, non-commercial ‘green’ orchards to commercial ‘green’ varieties and the most lucrative Hass variety.

The major constraint facing orchard expansion is the high cost of land and competition from real estate developers. The constraint facing orchard conversion is the high cost of imported seedlings. There are many thriving avocado trees grown from seed. Growers can graft known varieties onto these trees and attain commercial production levels within two years. Newly planted seedlings require seven years to reach commercial scale production levels.

9. VALUE CHAIN UPGRADING STRATEGY

AXIS 1: INCREASE MARKET SHARE IN EXPORT MARKETS

Support exporters with actionable market intelligence. Create linkages and develop information channels between LIVCD-supported producers, aggregators and exporters.

Determine appropriate target markets

- Study potential markets including European countries and GCC markets.
- Identify existing market channels and trends.
- Identify regulatory requirements and market barriers.
- Identify individual consumer preferences and trends in selected markets.
- Develop market entry strategy.

Determine appropriate varieties for the selected target markets

- In the identified target markets, study consumer demands for different varieties of avocados, wholesale and retail prices, market trends, competing countries and their export windows. Preliminary indication is that Lebanese wholesale prices are very competitive in Europe between January and April.
- Ascertain the potential of these varieties to adapt to the various micro climates of Lebanon and the avocado harvest calendar.

Develop vertical linkages to connect growers with exporters

- Match and introduce growers with exporters.
- Identify efficient and effective means of communication between linked entities.

AXIS 2: INCREASE QUANTITY AND QUALITY OF AVOCADO PRODUCTION IN LEBANON

Leverage Private Sector Investment

- Provide investors with advice on suitability, marketability and profitability of their intended avocado investment.

Promote improved production practices

- Study international best practices to determine most suitable practices for Lebanon.

- Develop extension materials and disseminate them to growers.
- Organize fragmented, rural production clusters to create lengthened marketing season.
- Support investment in irrigation and improved planting material for existing and new orchards.

AXIS 3: INCREASE AVOCADO PROCESSING IN LEBANON

Develop vertical linkages to connect growers with millers

- Match and introduce growers with millers.
- Identify efficient and effective means of communication between linked entities.

Leverage Private Sector Investment

- Enter into PPPs with millers and/or manufacturers to promote avocado use in the health food and cosmetic sectors.

ANNEX 1: SWOT ANALYSIS

Strengths <ul style="list-style-type: none">+ Growing production area, with predominantly large orchards.+ Wealthy landowners willing to invest in improvements.+ Proximity to lucrative markets.+ Agro-climactic zones well suited for expanded production season.	Weaknesses <ul style="list-style-type: none">+ Inefficient production technologies currently in practice.
Opportunities <ul style="list-style-type: none">+ New markets in Europe and Russia.+ Existence of internationally organized marketing board promoting avocado consumption.+ Strong domestic industrial sectors (milling, health foods and cosmetics) capable of creating surge in domestic demand.	Threats <ul style="list-style-type: none">+ Real estate development.

ANNEX 2: IDENTIFICATION OF A BUSINESS MODEL FOR REPLICATION

The LIVCD team identified a business model that will take into consideration this fact and addresses the challenges facing this VC.

The challenge is to find a common ground that farmers can agree upon and feel the need to cooperate. As shown in different part of this assessment, and summarized in the SWOT analyses table, we can conclude that producers are facing several constrains to achieve good productivity ratio, the most obvious is the fragmentation of production surface area, coupled by the weak cooperative model resulting in a lack of an economy of scale, farmers will need to buy their input and services at retail prices, inducing high cost of production.

The only efficient model to be put in place seems to be gathering farmers around a “Center of Service”. All farmers are in need for different kind of services at all VC levels; from good quality seedling, to pesticides and fertilizers, to machineries and equipment, to technical advice, to reliable traders and quality cold storage. These types of services seem to be common ground between all farmers; this common ground will be a large incentive to unify small farmers and make them work together.

Unified small farmers will have the ability to create an economy of scale, powerful negotiation power with traders and with government and policy making levels.

The Center of Service will play the role of a local Reference Center where farmers can seek its support for any constrain or challenge they might face. The reference center mandate will be to:

- Gather all data related to the area of its coverage and map all available resources and players.
- Create/ facilitate and maintain vertical, as well as horizontal, sustainable linkages between all service providers, input suppliers, traders, possessors and farmers.
- Insure access to knowledge, information and technical advice for all actors in the value chain.
- Create linkages with other regional “Center of Service” organizations in the other regions.
- Insure economy of scale (Lower purchase cost) at all VC levels in accessing quality services such as: Machinery, input supply, pruning, studies, consultancies, access to finance, and promotion.
- Insure a high negotiation power for producers at the market level as well as at decision making and government level.

All “Center of Services” organizations will be encouraged to work hand on hand and to form a National network of Cooperation.

The LIVCD Project will support the establishment and/or support of existing “Center of Service” organizations. This Center can be managed by a private sector, a Cooperative, an NGO, a municipality or a combination of 2 or more entities.