

## Update on the Avocado Industry of Michoacán, México

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### Avocado Producing Counties

In the state of Michoacán the avocado belt is a recent volcanic area and it can be observed throughout 7,752 square kilometers which represents 12.9% of the total state area. The main climate is cool humid and sub-humid with average temperature from 8 to 21 °C and annual precipitation from 1,200 to 1,600 mm. A transition (subtropical) zone between the dry tropic and the temperate zone also can be observed (APROAM, 2005).

There are 20 avocado producer counties in Michoacán (Fig. 1) and they add up to 85,909.32 ha (SAGARPA, 2005). Nuevo Zirosto and San Andres Coru localities are sometimes considered as counties but they are within the counties of Uruapan and Ziracuaretiro, respectively. 80.8% of Michoacán avocado producer area is located in the counties of Tancitaro, Uruapan, Peribán, Ario de Rosales, Tacámbaro, Nvo. Parangaricutiro and Salvador Escalante (Table 1). Crop projection for 2005 is about 856,978 metric tons.

### Avocado Producing Protocol

Counties authorized to export avocado to the USA and other countries must follow a working program established by the Mexican Official Norm NOM-066-FITO-2002. An updated version of this norm was published in the Federation Official Newspaper on 21 May-2002 and it states both the phytosanitary and transporting regulations for avocado. The norm applies for domestic and foreign trade and it defines quarantine-pest-free zones such as small seed weevil (*Conotrachelus aguacatae* and *C. perseae*), big seed weevil (*Heilipus lauri*), branch weevil (*Copturus aguacatae*) and moth seed weevil

(*Stenomoma catenifer*).

According to the updated NOM-066-FITO-2002, the following counties were declared seed weevil-free in Michoacán: Uruapan, Peribán de Ramos, Tancitaro, Salvador Escalante, Nuevo Parangaricutiro, Ario de Rosales, and Taretan de Michoacán. In January 2004, Los Reyes and Apatzingán counties were included, as well as Tacambaro in August. Likely, in January 2005 the counties of Acuitzio and Tinguindin were declared seed weevil-free. Both big seed weevil (*Heilipus lauri*) and moth seed weevil (*Stenomoma catenifer*) have never been detected in the state of Michoacán.

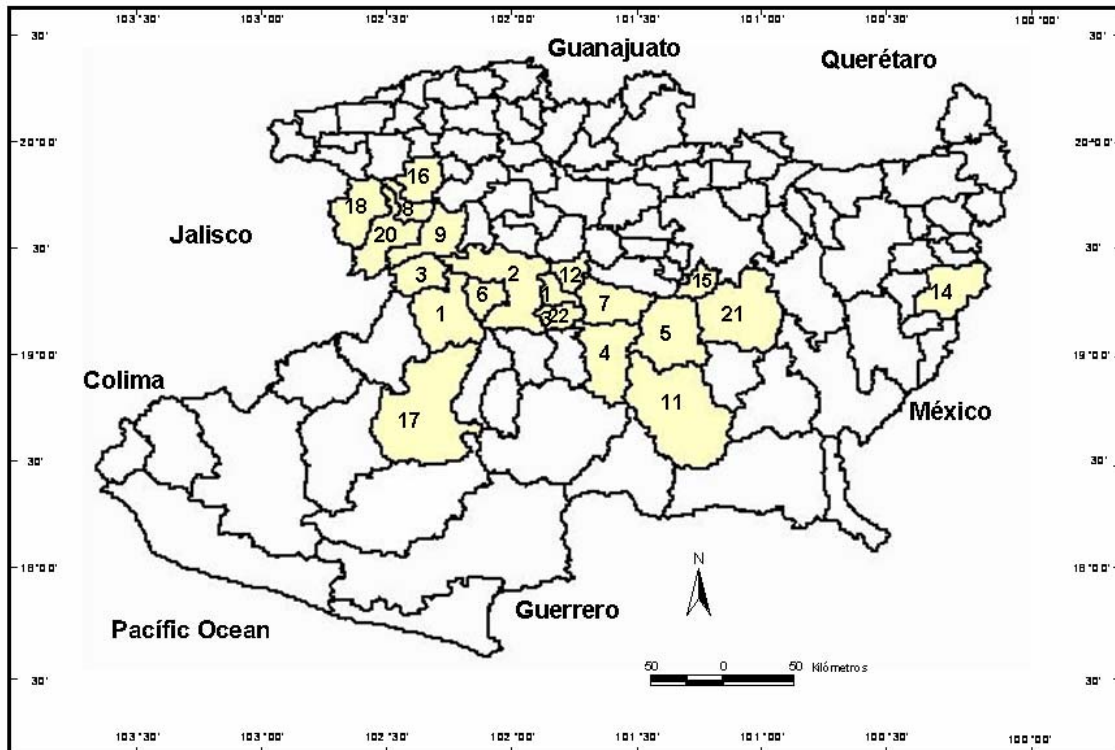


Figure 1. Location of the 20 Avocado Producer Counties in Michoacán. Key for each number appears on Table 1.

### Plant Sanitary State Committee

The Plant Sanitary State Committee of Michoacán (CESV) is a state auxiliary organization of the Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA) to carry out phytosanitary campaigns, and programs/actions related to phytosanitary aspects. Other auxiliary organizations are the Local Plant Sanitary Groups (JLSV), which are 16 in number under the CESV, and there are avocado growers groups that support SAGARPA phytosanitary activities. Each JLSV is formed by all avocado growers of that county.

Technical staff of auxiliary organizations, along with avocado growers, makes sure the phytosanitary norm is being applied by sampling and advising regarding the presence of pests of quarantine interest (*Conotrachelus aguacatae*, *C. perseae* and *Copturus*

*aguacatae*). Also, they supervise the use of authorized insecticides under the working program and the overall cleanliness of orchards.

Table 1. Avocado cultivated area per County in Michoacán (SAGARPA, 2005).

<b>Number in Fig. 1</b>	<b>County</b>	<b>Area (ha)</b>	<b>% from total</b>
1	Tancítaro	15,177.00	17.7
2	Uruapan	14,878.00	17.4
3	Peribán de Ramos	12,839.00	15.0
4	Ario de Rosales	8,000.00	9.3
5	Tacámbaro	7,401.50	8.6
6	Nuevo Parangaricutiro	5,688.00	6.6
7	Salvador Escalante	5,291.00	6.2
8	Tingüindín	3,684.00	4.3
9	Los Reyes	2,849.00	3.3
10	Nuevo Zirosto (belongs to Uruapan)	1,720.00	2.0
11	Turicato	1,455.00	1.7
12	Tingambato	1,415.00	1.7
13	Ziracuaretiro	1,120.00	1.3
14	Zitácuaro	995.00	1.2
15	Acuitzio	690.00	0.8
16	Tangamandapio	575.00	0.7
17	Apatzingán	448.82	0.5
18	Cotija	410.00	0.5
19	San Andrés Corú (belongs to Ziracuaretiro)	318.00	0.4
20	Tocumbo	285.00	0.3
21	Villa Madero	262.00	0.3
22	Taretan de Michoacán	208.00	0.2
Total		85,709.32	100

Follow-up of avocado production and orchard management regulations has been successful. Since 1997, the JLSV and the United States Department of Agriculture (USDA) has performed fruit sampling in orchards, packing houses and on the United States border to detect the presence of quarantine pests (seed weevils). Since then, and until the 2003-04 season, 15 million fruit have been sampled with negative results (Table 2).

Table 2. 'Hass' avocado fruit sampling performed by the Juntas Locales de Sanidad Vegetal (JLSV) of Michoacán and the United States Department of Agriculture (USDA) searching for seed weevils.

Season	Sampled fruit					Total	Results
	Orchards		Sums	Packing houses JLSV + USDA	Border (USDA)		
	By JLSV	By USDA					
1997 / 1998	1,026,000	129,305	1,155,305	416,700	10,440	1,582,445	Negative
1998 / 1999	898,221	223,250	1,121,471	210,375	16,860	1,348,706	Negative
1999 / 2000	982,859	384,575	1,367,434	162,375	20,070	1,549,879	Negative
2000 / 2001	651,514	558,300	1,209,814	171,000	17,280	1,398,094	Negative
2001 / 2002	937,847	678,609	1,616,456	347,475	41,250	2,005,181	Negative
2002 / 2003	1,795,612	954,264	2,749,876	545,591	50,490	3,345,957	Negative
2003 / 2004	1,785,044	1,275,738	3,060,782	816,402	71,310	3,948,494	Negative
<b>Sums</b>	<b>8,077,097</b>	<b>4,204,041</b>	<b>12,281,138</b>	<b>2,669,918</b>	<b>227,700</b>	<b>15,178,756</b>	<b>Negative</b>

Additionally, avocado growers have to follow the Mexican Norm NMX-FF-016-SCFI-2002, which establishes: a) General minimum requirements: fruit should have reached at least 21.5% of pulp dry matter and should be collected from the tree using a hook with a net; fruit peduncle should be cut at level, avoiding contact with ground and transported to the packing house in clean boxes and fabric covered trucks; b) Fruit quality (Supreme, Quality I and Quality II) based on visible skin damage tolerance caused by fruit scab, anthracnose, thrips, hail, scrapes, sunburn, freezing and mechanical damage or caused by larvae; c) Fruit Size: Super extra (>266g), Extra (211-265 g), First (171-210 g), Medium (136-170 g), Commercial (85-135 g) and Marble (<85 g), and d) Tagging and packaging. The rule is now revised to NMX-FF-016-SCFI-2006.

To assure postharvest fruit quality and provide the best quality to the consumer, Michoacán avocado growers have agreed to delay harvesting until the fruit has reached a minimum of 23 % pulp dry matter.

## Organization to Export Avocados

### The APEAM

The major avocado industry association is the Avocado Growers and Exporting Packing Houses Association of Michoacán, A.C. (APEAM), which was constituted on 4 July 1997. APEAM's Board of Directors is made up of seven grower members and seven packer members that represent 1,500 growers and 18 S AGARPA and USDA certified packinghouses. APEAM's goals are: **i)** To position Mexican 'Hass' avocado worldwide, **ii)** To promote APEAM's corporative image, **iii)** To offer a supreme quality product throughout international markets, **iv)** To seize international markets, and **v)** To carry out promoting campaigns.

APEAM is an organization that represents both avocado growers' and packers' interests in foreign markets. Services offered are: **i)** Promotional campaigns in the USA market, **ii)** Interest defendants (lawyers and scientists) hired by the association, **iii)** An organized and steady market, **iv)** Marketing supervisors that manage stocks and monitor fruit price and quality, and **v)** Lobbying team who search to expand the overall

market all year round in the United States.

The United States of America is the main market place for the APEAM. This organization has made a great effort to introduce innovations into the avocado marketing, advertising, advertising impact, etc. During the 2003-04 season a total of 2.5 million dollars were invested in adverting in the USA, representing a 108 % increase compared to the previous season. APEAM keeps a good contact with avocado growers and exporting packers by its web page ([www.apeamac.com](http://www.apeamac.com)). Moreover, earlier exporting statistics can be consulted and it offers the opportunity to have a feedback from people interested in the Mexican avocado.

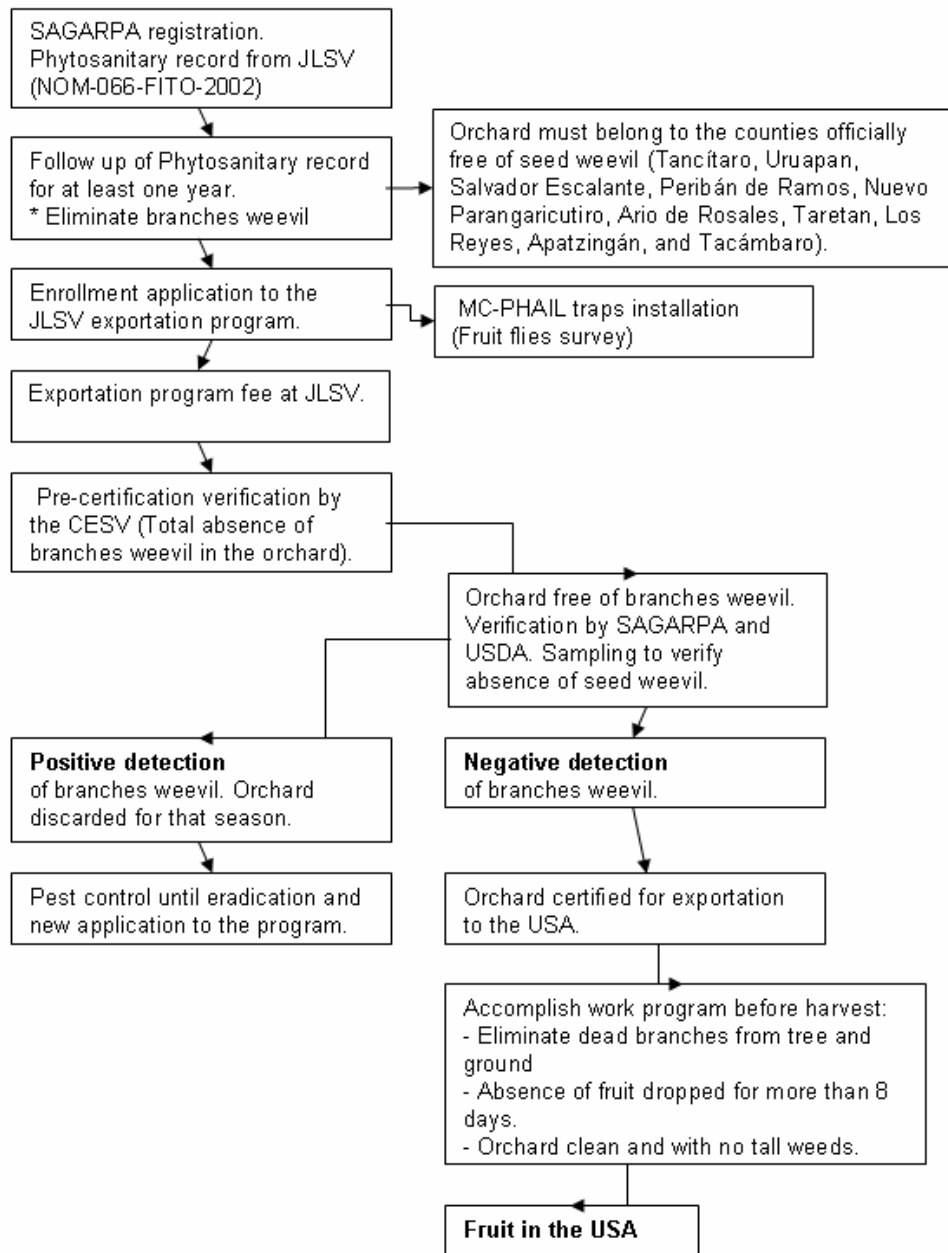


Figure 2. Steps to certify and avocado orchard for the USA exportation program.

**FRAMEWORK.** Every exporting company associated with APEAM has the proper facilities required by the USA exporting program.

**PRODUCTION CAPACITY.** Until the end of the 2003-04 US A exporting season, there was an agreement among avocado growers to harvest only two tons of fruit per each authorized hectare. This has helped to keep a steady market and, therefore, all avocado growers associated with the APEAM have the same exportation accessibility. In order to be accepted in the exporting program to the USA, each orchard needs to be certified by a working program agreed between the SAG ARPA and USDA (Fig 2).

**TOTAL QUALITY AND SECURING.** Since the first exportations to the United States market, Mexico implemented a verification and quality certification program for all exported avocados. International quality norms in effect are the Codex Alimentarius and the quality propositions made by the Organization for Economic Cooperation and Development (OECD), as well as the Mexican norms NOM-128-SCFI-1998 and NMX-FF-016-SCFI-2002.

Table 3. Evolution of the exportations of Mexican 'Hass' avocado to the United States.

Concept	Season						
	97-98	98-99	99-00	00-01	01-02	02-03	03-04
Growers	60	201	388	578	715	1,033	1,385
Orchards	61	252	497	794	995	1,466	2,027
Hectares	<b>1,499</b>	<b>4,285.90</b>	<b>6,757.96</b>	<b>9,861.64</b>	<b>11,897.01</b>	<b>16,430.68</b>	<b>21,597.25</b>
Packing houses	5	14	12	10	10	14	18
Metric tons	<b>6,031.7</b>	<b>9,768.5</b>	<b>11,729.4</b>	<b>10,221.1</b>	<b>24,477.7</b>	<b>29,912.5</b>	<b>42,607.2</b>
Shipments	348	562	669	576	1,375	1,683	2,377

Table 4. Counties of Michoacán that exported 'Hass' avocado to the United States during the 2003-04 season.

County	Area (ha)	Orchards	Growers	Increase (%)
Tancitaro	8,478.19	809	532	19
Uruapan	3,995.17	403	301	33
Salvador Escalante	2,073.77	197	103	43
Nuevo Parangaricutiro	2,258.73	282	196	28
Peribán de Ramos	1,511.87	127	107	13
Ario de Rosales	2,592.02	203	144	110
Taretan	687.50	6	2	2
<b>Total</b>	<b>21,597.25</b>	<b>2,027</b>	<b>1,385</b>	<b>35.4</b>

### APEAM Avocado Exportations

#### Exporting to the United States of America

The APEAM consists of 1,385 avocado growers (35% more than in the 2003-04

season), 18 avocado exporting packinghouses (4 more than last year), 21,598 hectares in production (31% more than last period), 2, 2007 orchards (38% more than last year), Nine counties (two more than last season: Apatzingán and Los Reyes), Seven Local Plant Sanitary Groups and the Plant Sanitary State Committee of Michoacan,

SAGARPA-SENASICA (National Sanitary, Food Safety and Agricultural Commodities Service)-DGSV (Plant Sanitary General Direction) and the USDA. Evolution of mentioned figures is shown in Table 3.

Exportations of 'Hass' avocado to the USA increased from 6,031 tons in the 1997-1998 season to 42,607 tons in the 2003-04 seasons (Table 3). Exportations value for 2003-04 was 93.7 million dollars. Price paid to growers during such period was USD \$1.10 per kilogram.

'Hass' avocado exported to the USA in the 2003-04 season was grown in seven counties. Tancitaro county was outstanding for its area (8,478 ha) and Ario de Rosales increased 110 % its exportation volume (Table 4).

Table 5. Packinghouses from Michoacán that exported 'Hass' avocado to the USA during the 2003-04 season.

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Packing houses  
(in alphabetical order)

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Agricola la Viña  
Agrifrut  
Agroexport  
Aguacates Mevi  
Aguamich  
Avocado Export Co.  
Avoperla  
Calavo de México  
Fresh Directions  
Frutas Finas de Valles  
Frutas Finas Gertrudis  
Global Frut  
Grupo Purépecha  
Grupo West Pak  
Mission de México  
San Lorenzo  
Vifrut

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**PACKINGHOUSES PARTICIPATION.** In the 2003-04 season, a total of 2,377 shipments were exported to the United States, adding up to 42,607.2 tons. This volume was handled by 18 packinghouses based in Michoacán (Table 5). Packinghouses built with American capital, such as Calavo of Mexico, Mission of Mexico, Fresh Directions, and Grupo West Pack, shipped more than 56 % of the Mexican avocados exported to the United States of America.

#### **Exportation to other countries**

In addition to avocado exportations to the U.S.A., in the 2003-04 season, APEAM managed to export more than 60,000 tons of avocado to Japan as well as many countries throughout the Americas and the European Union (Table 6).

**JAPANESE MARKET.** This market became the second most important for México. Its demand has had an amazing increase in the past 10 years from 2,270 tons to about 25,000 tons in the 2003-04 season (Table 6). Mexican avocados are of outstanding quality and the number of exporters is limited. Japan is almost the only Asian market due to the fact that Hong Kong imports are moderate.

**EUROPEAN UNION MARKET.** This market is very important for Mexico. However, the amounts exported since 1991 (8,946 ton) have had significant ups-and-downs. In the 2003-04 season, only 16,420 tons were exported (Table 6)

and the price per box ranged from 4 to 11 Euros. Mexican avocados have had to compete with avocado exports from Israel, Spain, Kenya, Argentina, Peru, Chile, and South Africa.

**CANADIAN MARKET.** Canada is the fourth Mexican avocado importer with more than 12,000 tons of 'Hass' avocados exported to this country during the 2003-04 season

(Table 6). To increase the exportations to Canada, it is necessary to have an strict working plan supported by the APEAM and the Federal Government. The main approach would be to offer incentives to importers and distributors so that they consume Mexican avocado. Such incentives could be advertising campaigns, controlled fruit quality, avocado industry representations in Canada to support any effort focused on success as well as immediate response, if necessary.

Table 6. Avocado exportation volumes from Michoacán to countries other than the USA in the 2003-04 season.

<b>Destination</b>	<b>Volume (ton)</b>
Japan	24,599.583
European Union	16,420.671
Canada	12,051.473
Centro America	7,691.664
Chile	531.114
Others	260.160
<b>Total</b>	<b>61,554.665</b>

Table 7. Distribution of avocado cultivated areas in Michoacán, according to their altitude above the sea level (masl).

<b>Altitude interval (masl)</b>	<b>% from total</b>
> 2400	0.6
2200-2400	7.4
2000-2200	26.9
1800-2000	32.1
1600-1800	26.0
1400-1600	6.3
1200-1400	0.6
< 1200	0.1

## **Availability of 'Hass' Avocado Throughout the Year**

### **Bloom and harvest seasons**

Eighty-five percent of the Michoacán avocado producer area is located between 1,600 and 2,200 meters above sea level (masl) (Table 7). However, productive orchards could be found at altitudes lower than 1,200 masl and higher than 2,400 masl. For practical purposes, the avocado region has been divided up in zones, based on their altitude range. In higher zones (>2000 masl), temperature is lower than in intermediate (1500 to 2000 masl) and low (< 1500 masl) zones.

Altitude where orchards are established is determinant for its phenological behavior and it has a significant influence on the reproductive cycles. Bloom occurs 10 months of the year and there could be up to four flowering flushes in the same tree or orchard: crazy, advanced, normal and late (marceña) (Figure 3). Crazy bloom is the first to occur and it is the most extemporaneous. Observations indicate that its occurrence and/or intensity



are affected by the presence of fruit in the tree (which comes from previous blooms) and by the magnitude of temperature decrease (which promote flowering) in May-June (Salazar-Garcia, 2000). Intensity of subsequent flowering flushes depends on environmental conditions, amount of developing fruit ( $\geq 1/3$  of full size) on the tree and the rate of fruit set by the crazy bloom. Presence or intensity of the next bloom flushes and its respective fruit set will depend on the magnitude of the preceding events.

Figure 3. Bloom and harvest periods of the 'Hass' avocado in Michoacán according to the production zone (altitude above the sea level) where the orchards are established.

Zone	Bloom periods											Harvest periods													
	J	A	S	O	N	D	J	F	M	A		M	J	J	A	S	O	N	D	J	F	M	A	M	J
<b>High (&gt; 2000 m)</b>																									
Crazy		■	■	■											■	■	■								
Advanced				■	■	■	■								■	■	■	■							
Normal							■	■	■										■	■	■				
Late (March)										■	■	■										■	■	■	■
<b>Intermediate (1500 a 2000 m)</b>																									
Crazy	■	■	■																						
Advanced				■	■	■									■	■	■								
Normal							■	■							■	■	■	■							
Late (March)										■	■									■	■	■	■		
<b>Low (&lt; 1500 m)</b>																									
Crazy	■	■																							
Advanced			■	■	■										■	■	■								
Normal						■	■								■	■	■								
Late (March)								■	■								■	■							

The different bloom flushes and the obvious overlapping between different altitude zones make it possible for Michoacán to harvest 'Hass' avocados all year round (Figure 3). However, regional crops can be integrated by fruit set by the different blooms in the following proportions: Crazy = 5-20 %, Advanced = 10-25 %, Normal = 60-80 % and Late (marceña) = 15-30 %. There is a current interest in studying the reproductive physiology of the 'Hass' avocado in Michoacán in order to modify the amount of fruit obtained from each bloom flush.

### Advances in the 2004-05 Exporting Season

By the time this paper was finished, 'Hass' avocado exportations had exceeded the 2003-04 season volume, even though there were still 45 days left before the end of the 2004-05 season (30 June). By May 15, 2005, avocado exportations were 11,000 tons greater than last year (Table 8). This increase was mainly due to the boost of exportations to the USA, whose 2004-05 progress showed 59,596 ton exported and this

is about 17,000 tons more than in the 2003-04 season.

The following points can explain the increase the Mexican avocado exportations worldwide:

- Effort in producing and harvesting a great quality fruit, as well as in the postharvest and packing aspects to make sure that the consumer gets the maximum quality.
- Efficient orchard management and phytosanitary control, which means excellent fruit quality.
- Exceptional ecological conditions to grow 'Hass' avocado.
- Control and organization for exportations.

Table 8. Advances on the exportations of 'Hass' avocado from Michoacán to several countries in the 2004-05 season. Advances to 8 May 2005, except for the USA (15 May 2005).

Country	Volume (ton)	% from total
USA	59,596.729	51.74
Japan	19,916.505	17.29
Canada	11,784.905	10.23
France	9,255.953	8.04
El Salvador	4,376.855	3.80
Sweden	2,929.948	2.54
Honduras	2,092.409	1.82
Guatemala	1,554.414	1.35
Spain	1,180.358	1.02
Holland	755.976	0.66
Germany	617.674	0.54
Costa Rica	562.720	0.49
Hong Kong	245.308	0.21
England	195.953	0.17
Alaska	115.123	0.10
Belgium	0.000	0.00
<b>Total</b>	<b>115,180.829</b>	<b>100</b>

### Challenges of the Michoacán Avocado Industry

Currently, 13.2% of the total avocado yield is exported, making Mexico the largest 'Hass' avocado exporter in the world. However, there are several challenges to overcome in the short term, such as the following:

- Increase the volume of fruit harvested per hectare that is authorized for exportation to the U.S.A. to four tons, which means an annual exportable volume of 100,000 tons. This scenario would bring a better price for both avocado growers and exporting packers.
- Cooperate with avocado growers from other countries that share the USA market to increase the per capita consumption in that country. This had been difficult for

Mexico because its exportations were not present all year. However, starting 31 January 2005, Mexican avocado can be exported throughout the year to almost all USA, except California, Florida and Hawaii.

- Improve yield per hectare and fruit quality by supporting research and technology transfer at all levels.
- Promotion of international collaboration for the development of research programs of mutual interest.
- Keep working on food safety programs and process sanitation, activities already started in earlier seasons.
- Continue promoting and investing to increase avocado consumption in all countries where fruit is marketed.
- Explore new markets with a high potential of avocado consumption China, for example.

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