

California Avocado Growers Visit Michoacán, Mexico

The California Avocado Society (CAS), in cooperation with the Association of Producers and Exporters of Avocados from Mexico (APEAM), organized a tour of Mexican avocado production in Michoacán state from October 3 – 9, 2017. Twenty growers — large and small, north and south — participated in what was a very enlightening trip.

The Michoacán Avocado Industry

We received background information on the Mexican avocado industry in separate presentations from Dr. Ramon Paz-Vega, strategic advisor to APEAM, and Armando López Orduña, director general of APEAM. In 2016, Mexico produced 4.17 billion pounds of avocados, about 38 percent of world production, from 441,500 acres and exported 2.26 billion pounds of fruit — about 65 percent of the world avocado trade.

Michoacán is considered to have an ideal climate for avocado production, with the primary growing area extending in a narrow band about 100 miles east and west of the city of Uruapan. Annual temperatures in this area range from 45 °F to 90 °F, and the area receives about 63 inches of rainfall annually — only 3 percent of groves have irrigation. Throughout this region, there are 365,000 acres of avocados, producing about 3.22 billion pounds of fruit with 2.08 billion pounds for ex-



The tour group and several representatives from Rancho las Pajas following the tour of the ranch.

port. Michoacán fruit can be exported to the United States, China, Chile and Korea.

For comparison, in Jalisco, there are about 44,000 acres of avocados planted, producing 322 million pounds of fruit, of which 145.6 million pounds potentially can be exported.

In Michoacán, avocados are grown at an elevation of 4,400 to 7,900 feet. Under these conditions, the trees bloom three to four times per year, with two of those blooms — the normal and flor loca blooms — producing most of the crop. This blooming habit, coupled with the varying elevation, allows Michoacán to harvest fruit year-round. Harvest of fruit from the normal bloom begins in September at the lower elevations and extends through Febru-

ary at the higher elevations. Harvest of fruit from the flor loca bloom generally begins in June at the lower elevations and extends through September at the higher elevations.

Harvest and Handling of Export Fruit

Harvesting of avocados in Mexico is controlled by the packers. Growers negotiate an on-tree price for their fruit with a packer, and the packer is responsible for the harvesting and hauling of the fruit. On average, growers receive about \$1 to \$2 per kilogram (\$0.45 to \$0.91 per pound) for their fruit. Growers are not necessarily loyal to a packinghouse and will “shop around” prior to each harvest.

The export of avocados from

Michoacán to the U.S. is highly regulated and the rules and regulations are based on a systems approach to mitigate phytosanitary risks. There are 80 United States Department of Agriculture (USDA) inspectors based in Mexico full time to ensure that protocols are being followed. APEAM was established in 1997 – at that time the M stood for Michoacán – to oversee the export program and help growers and packers comply with export requirements.

44 pounds), and each box is labeled to identify the grove and block details. We were told several reasons why field boxes, rather than bins, are used: field boxes can be managed with manual labor, whereas bins require equipment; boxes also allow for fruit to be harvested and recorded by tree (we saw one grove where every tree was labeled with a bar code). Labeled field boxes are loaded on fully enclosed trucks in the grove, and the door of the truck is sealed with a tamper proof seal.

When the truck arrives at the packinghouse it is met by USDA inspectors who check to make sure that the seal is intact and matches the driver's paperwork. The inspectors then open the truck and verify that the boxes inside match the door seal and paperwork. Only after the inspector has signed-off that everything is in order can

the packinghouse crew begin to handle the fruit.

As the boxes are being unloaded, the USDA inspectors randomly remove pieces of fruit to sample for pests, and the field boxes are held in a separate part of the packinghouse until the inspection is complete. These phytosanitary samples can only be handled by USDA inspectors and only the packinghouse manager can interact with the inspectors. The weight of fruit in the phytosanitary sample is deducted from the grower's payment.

Once the samples have been collected, they are run through a machine that chops the fruit into pieces and the inspectors check for pests. If no pests are found, the load is cleared, and it can enter the packing process. If a pest

of regulatory significance is found, the load is rejected (it can be sent to a domestic packinghouse) and the grove is quarantined for two weeks and must be re-inspected before harvest can resume.



A tree with a barcode tag at Rancho las Pajas. Every tree was labeled with a barcode and yields are tracked by tree.

Growth of the avocado export program in Michoacán since 1997

	1997	2017-18
Acres certified	3,652	285,656
Growers	60	>21,000
Packers	5	>48
Exports (pounds)	13.3 million	1.85 billion

For exports to occur, a municipality in which groves are located must first be declared free of pests of regulatory concern. After that, each grower who wants their fruit to go to export must register with the local plant health agency, the Sanidad de Vegetal.

Prior to harvest, each registered grove must be inspected by the local authorities to ensure that the grove is complying with all phytosanitary and quality requirements. These inspections will look at fruit dry matter, the height of the grass in the grove – grass cannot be taller than four inches, and there must not be any fallen fruit on the orchard floor, among other requirements. If a grove passes, it can be harvested.

Fruit in Mexico are harvested into field boxes (about 20 kilograms,

The Groves and Nursery

We visited three different groves and one nursery during our visit. The overwhelming impression from the group was: WOW! The groves, thanks to plentiful rainfall and rich volcanic soils, are very lush. And because of the grass height requirement for export certification, many of the groves had a park-like appearance.

A common theme among all the groves we visited was the use of the 'Carmen' variety (called 'Mendez' locally). They particularly like 'Carmen's' narrower growth habit and that the fruit are more internal and protected within the canopy. One grower we visited was in the process of switching his entire grove to 'Carmen' because in his microclimate the trees bloom once per year and the fruit could be harvested in July when prices are usually highest.

Because of the amount of rainfall in Michoacán and the lack of irrigation, most growers apply dry fertilizer during the rainy season. At least one grower we visited specified the use of slow release fertilizer, which allows him to make fewer applications and ensure that the fertilizer is not leached away. Potassium was mentioned as a critical nutrient element that growers focus on. Overall, the trees we saw appeared very healthy in terms of nutrition. The only deficiency symptom we saw was some minor magnesium deficiency, which is to be expected in a high rainfall climate where soils are heavily leached and pH is low.

In terms of yield, the growers we visited quoted average yields of 12 to 25 metric tons per hectare (10,000 to 22,000 pounds per acre). One grower told us that his record for the grove we were visiting was 31 tons per hectare (almost 28,000 pounds per acre)! Although these numbers sound incredibly high, we did see some large, old trees with two bins or more of fruit per tree, so they are not unrealistic.

Most of the younger trees we saw, in addition to being ‘Carmen’, are being planted closer together than the older large trees — 4 x 6 meter (13 x 19 feet) is common for new plantings. Depending on location, growers are using berms to better manage root-zone moisture. In addition, most growers talked about using mycorrhizae, trichoderma and other beneficial soil microbes to help reduce soil fungal pathogens. At least one grower credited his use of commercial beneficial soil microbes to Global GAP, which now restricts his use of manure in his groves.

The nursery we visited produces about 50,000 to 60,000 trees per year and they sell for about MEX\$50 to MEX\$60 (\$2.65 to \$3.15). All of the trees are grown on seedling ‘Criollo’ rootstocks, a native avocado variety. Total propaga-



Criollo seedlings in the nursery almost ready for grafting.

tion time takes about one year — seeds are planted in May, grafted in November or December, and are ready for sale for planting during the following rainy season (May to October).

This particular nursery is working to have its mother tree blocks certified as avocado sunblotch viroid (ASBVd) free. But the owner explained to us that ASBVd is new to the area and infected trees are generally symptomless. He hypothesized that this is because the climate is ideal, and the trees rarely experience any stress, so they may be able to tolerate the pathogen.

The nursery purchases only whole ‘Criollo’ fruit for their seeds to ensure that they are getting the right variety. There are more than 50 different variants of ‘Criollo’, and they prefer the small fruited variety with a large seed. Seeds are washed, dried, disinfected and peeled prior to planting, but they do not clip the seed as is common in California nurseries.

Despite the popularity of ‘Carmen’ in the groves we visited, the nursery owner told us his production is about 80 percent ‘Hass’. He attributes this to ‘Hass’ being an easier tree to

grow, telling us that ‘Carmen’ needs more water and grows best at elevations below 1800 meters (5,900 feet).

Insects and Diseases

Although we saw a number of different pests, none of them appeared to be very significant. Mites were the most common pest we saw, including Persea mite (sometimes referred to as white mite) and red mite, which is very similar to the brown mite we have here in California. We also saw several caterpillar pests that can damage leaves and fruit, including looper and amorbia. The pest of most significance that we saw was an unknown beetle species that can skeletonize a significant portion of the canopy on young trees.

Many growers we met talked about using *Bacillus thuringiensis* (Bt)



We were told these beetles can skeletonize the leaves of young trees, significantly debilitating them.

and *Beauveria* spp. for insect control. These two biologicals are naturally occurring soil microbes — a bacteria and entomopathogenic fungus, respectively. Bt controls lepidopteran pests and *Beauveria* is a more broad-spectrum control agent. Pesticides mentioned were pyrethroids and abamectin.



Blue copper fungicide residue on an avocado ready for harvest.



Magnesium deficiency symptoms were common due to the heavy rainfall and low soil pH.

We only saw one grove that appeared to have a significant amount of phytophthora damage. The grower explained that the grove is in an exceptionally wet area, so new trees are being planted in berms to help better control the water and increase drainage. With the high rainfall, foliar fungal pathogens are an issue that growers must stay on top of. Copper-based fungicides appeared to be the products of choice based on the blue residue we saw on a lot of fruit.

It was somewhat surprising, although not entirely unexpected, the number of different insects we saw visiting avocado flowers. We did see an occasional honeybee, and most growers said they bring bees in during the main bloom, but we most commonly saw native bee species, wasps and flies visiting the flowers. This abundance of apparently native pollinators also may help explain the high yields that growers claimed to achieve.

Overall, the trip was exceptionally well planned and presented a great overview and cross section of the avocado industry in Michoacán. It was good for California avocado growers to see firsthand the phytosanitary protocols that are in place to help protect our industry. I believe it is safe to say that everyone on the trip learned a lot and has a much better appreciation for our fellow growers south of the border.

CAS's Director Cristina Leon and Executive Administrator Sawsan Knobel did an outstanding job with all the planning and logistics involved in making this trip a success. I know all my fellow tour participants join me in offering them a huge, "THANK YOU!" This trip was new territory for CAS and, given its success, it will probably be the first of many adventures to avocado producing countries. You can learn about future trips by visiting www.californiaavocadosociety.org. 🥑



New 'Carmen' trees being planted at Rancho las Manantiales. The trees are planted on large berms because of issues with trunk canker. We were told these trees were two years old and almost 8 feet tall.