

The Current State of Avocado Cultivation in Mexico

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Introduction

The cultivation of fruit trees in Mexico spans a surface area of 1,200,000 hectares that represents less than 4 percent of the national agricultural surface area. There are more than 32 cultivated fruit tree species, of which ten are the most important crops and represent 87.6 percent of the fruit tree cultivation surface area of Mexico. The more notable species are the orange, mango, and avocado, with 26%, 13%, and 11.5% of the land surface area, respectively. The avocado is becoming an important economic crop for Mexico. Mexico is recognized worldwide as the primary producer of avocado; and since 1985, Mexico has supplied about 45 percent of the international production. During 1990-1993, Mexico managed an average annual production of 740,000 tons, with a calculated production value at about \$1.4 billion (new Mexican pesos).

Generalities of the Crop

Propagation

In Mexico, there is still no use of clonal propagation; most of this activity is done by grafting on criollo stocks of the Mexican race. The method used is known as a side, or veneer, graft. Unfortunately there still are no general standards for the establishment and operation of nurseries; hence the quantity, health, quality, and genetic characteristics of the trees produced are variable.

Weed Control

The climatic conditions govern most of the avocado producers' management of the crop. Weed control occurs mostly during the rainy season because of the weeds' accelerated growth under these conditions. Although different methods of weed control are applied and available in the markets, the herbicides, simazine and paraquat, are predominantly used.

Fertilization

Even though there are laboratories with adequate technology, Mexican producers commonly use commercial products that contain nitrogen, phosphorous, and potassium. The amounts and combinations will vary according to the criteria of each producer or technical advisor; a small number of them apply fertilizers according to a nutritional analysis program.

Irrigation

Fortunately for producers, the quality of water in most production zones is good. The water is free of any salts and minerals that may damage the crop; however, water is becoming a limiting factor in most areas, and at times the supply has been insufficient. In general terms, 80 percent of the avocado production area is developed with irrigation, with drip and microsprinkler systems predominant, and flooding irrigation occurs in areas where water is abundant. In most cases, water originates from springs, creeks, and rivers, and requires pumping equipment.

Pests and Diseases

While there are numerous pests and diseases that attack the avocado, most avocado growers are focusing their attention on the management of pests that limit their export possibilities. These include *Conotrachelus perseae*, *C. aguacate*, *Helipus lauri*, *Coptoros aguacatae* and, *Stenomoma catenifer*. As to fruit diseases, there are anthracnose (*Colletotricum*), fruit rot caused by *Phytophthora* sp. and scab by *Sphascelomapersea*; pests that damage fruit include thrips (*Heliothrips* sp. and *Scirtothrips* sp.), spiders (*Oligonychus* spp.) and larvae of lepidoptera, like *Amorbia* and *Grassialaria*.

It is important to note here the decrease in use of pesticides for the control of these problems and the increase in integrated management programs.

Although *Phytophthora cinnamomi* causes major devastation in many avocado groves in states such as Queretaro and Puebla, it has been present in some places in Michoacan and has been successfully counteracted with the use of integrated management developed in Mexico.

Production Costs

From the aforementioned, it can be deduced that the level of technology used in the field is varied. In some cases, the labor is minimum, and in other cases, producers may depend on the most advanced technology for the crop; hence, the variation in production costs. However, in general terms, the production of a kg of Hass avocados in Mexico costs between \$0.60 to \$0.70 (new pesos), the average field level sale price is \$1.00 (new pesos), and the profit margin is \$0.30/kg (new pesos). Avocado production is profitable only for those producers who are able to obtain yields greater than the established average; however, in

many cases, the produce sales are not sufficient to cover the production costs, which leads to the abandonment of a considerable number of plantings.

Production, Area Cultivated, and Production Volumes of Mexican States

About 16 states grow avocados commercially, involving an area of 124,000 hectares. Michoacan is the primary producing state, at 83 percent of the national total, and currently has 100,000 hectares dedicated to the cultivation of the Hass variety, of which 75 percent is in production and the remaining 25 percent is still in development. Nevertheless, the unit yields are low. At a national level, the average production of avocados is 6.4 tons/hectare and 7.4 tons/hectare in Michoacan (even though some plantations produce yields greater than 25 ton/hectare). According to the data from S.A.R.H. (*Secretaria de Agricultura y Recursos Hidraulicos*), the states of Yucatan, Sinaloa, Baja California Sur, Jalisco, and Veracruz have surpassed Michoacan in average yield per hectare, although not necessarily with the same variety. **Table 1** (see page 64) lists the principal producing states and the area dedicated to this crop; the volume of production is presented graphically in **Figure 1** (see page 65).

The predominantly used avocado variety is the Hass, amounting to 95 percent of all plantings, followed by Fuerte, Bacon, Zutano, Rincon, Choquette, Booth 7, Booth 8, and regional criollo varieties.

As to harvesting times, the larger amounts at national level are harvested from October to January and the lesser amounts from July to September; nevertheless, the avocados are produced commercially in most parts of the country year-round as can be seen in **Figure 2** (see page 66).

This leads to the other reason why Mexico is the primary producer in terms of per capita consumption world-wide, currently at 10 kg. No other country even reaches half of the internal consumption in Mexico, although the popularity of this fruit worldwide is increasing significantly in developed countries.

Socioeconomic Importance

Studies for the state of Michoacan alone show that some 42,500 heads of family depend economically directly upon the production of avocados, while another group of workers, at least 70 percent of that number, are indirectly dependent. These are individuals involved with pesticide application, fertilizers, agricultural machinery, and cultivation, harvest and other tools; and people associated with providing technical assistance in aspects of cultural, industrial, vegetal health, administration, and law, as well as workers in construction, road maintenance, telecommunications, electrification, irrigation systems, suppliers, refrigeration, transportation, workshops, national or export sales, and many other activities.

Commercialization

A) National Level

According to the Servicio Nacional de Información de Mercados (*SNIM—National Service of Information on Markets*), the prices of the internal market are in accordance with the classic rules of supply and demand. From October until February, when the supply is ample, prices are lower than during the months of lower production—except for the central markets of Campeche and Merida where, in addition to the Hass variety, West Indies varieties are also valued. In the other 21 principal distribution centers monitored by SNIM, the Hass variety is mostly dominant. For example, in 1993 at the Provisions Station of Mexico City, a maximum value of \$5.02/kg (new pesos) was reached during the month of August and a minimum value of \$1.53/kg (new pesos) in December, although this greatly changes at the field level where the paid price per kilogram of fruit is considerably less, fluctuating in 1994 at about \$1.0 (new pesos). The trend of the sale prices for the last 12 months is shown in **Figure 3** (see page 67).

It can be said that this fruit is eaten throughout the country, but the principal markets are in Mexico City, Monterrey, and Guadalajara, followed by the states of Bajío, Saltillo, and Baja California, where the crops are mostly made available in three categories: extras, first and small fruit.

B) International Level

Despite its prominence in production and the existence of more than 10 export firms, Mexico is a modest exporter. It only exports a marginal part of its production equivalent to 2% of the annual average between 1991 and 1993. Other countries such as Israel, South Africa, and Chile sell more than half of their production to the export markets. In 1993, the Mexican avocado market supply reached a figure slightly greater than 16,000 tons, with principal destinations to France, United States, Canada, and Japan, which together represent about 98.5 percent of the total exported in that year, making transport by ship the principal means of fruit transportation. The evolution of the avocado production, and the volume of the exports between 1988 and 1993, are presented in **Figure 4** (see page 68), and the principal destinations are listed in **Figure 5** (see page 69).

These data indicate that France is our major export market, with 64 percent of total Mexican exports in 1993. The United States is the second export destination of Mexico; however, it has been impossible to export the avocados for internal consumption because of an old phytosanitary restriction enacted because of borers and fruit flies that has become an insurmountable tariff barrier. Official Mexican statistics show that a good part of the goods exported to the United States (3,122 tons in 1993) are forwarded to Japan, which prefers to acquire Mexican products by way of American intermediaries rather than to deal directly with Mexico.

According to the S.A.R.H. data, the phytosanitary obstacle will soon and gradually be overcome as zones in the Mexican territory are declared "clean". This will permit the sale of the avocado, not only so that it can be sold to other markets via an intermediary, but for consumption in the United States as well. Presently, authorization is given to sell only in Alaska, an insignificant market; but work continues, as can be seen by the advances made in 1994 (*see below*).

Some exportation of avocado paste has been successful. According to the North American statistics, purchases from Mexico have grown from \$3.9 million in the 1989-1990 season to \$13.2 million in 1992-1993 (an increase of 238 percent), making Mexico the principal and almost only supplier in the American Union.

Until now, a common characteristic of the Mexican exports toward their principal markets has been the relatively low price that is an important competitive factor. However, if one compares the 1990-1992 trend of the average values of Mexican exports against the average values of foreign imports, one can see a clear upward trend in the first case against a notable lower trend in the second, as depicted in **Figure 6** (see page 70).

Organization of Producers

As the most important production zone, Uruapan has attempted to tackle this aspect, where with producer associations such as are found in unions it has tried to integrate a scheme of organization that has been shown to be ineffective, incapable of integrating the producers, and inefficient.

There are many organization groups, such as: Sistema Producto Aguacate (*Avocado Production System*), Asociacion de Productores (*Producer Associations*), Asociacion de Empacadores y Exportadores de Aguacate (*Association of Suppliers and Exporters of Avocados*), Asociacion de Asociaciones/Union de Productores (*Union of Producers*), and Patronato del Aguacate (*Avocado Board*), etc. These organizations function at different levels of efficiency. Unfortunately, there is no standard plan for the use of funding resources nor for work programs. For all the time and energy spent in promoting the commercialization of the avocado, there have been few impressive advances, which makes imperative a common effort among commercial producers, industrialists, government, and other interested persons or groups in order to consolidate the structure of existing organizations, transforming them into efficient units that will help overcome the production limitations, and facilitate the commercialization of their products.

Research and Training

Because of the problem previously mentioned, more attention has been given to research that contributes to the development of this important agroindustry. This has led to the establishment of institutions such as the Patronato de Investigacion del Aguacate (Avocado Research Board) in the state of Michoacan that conducts research specifically within that state. Other institutions at a

national level include the Colegio de Postgraduados en Ciencias Agrícolas (*Postgraduate College in Agricultural Sciences*), Universidad Autónoma de Chapingo (*Autonomous University of Chapingo*), Universidad Michoacana de San Nicolás de Hidalgo (*Michoacan University of San Nicolás of Hidalgo*), Universidad de Guanajuato (*University of Guanajuato*), and INIFAP [Instituto Nacional de Investigaciones Forestales y Agropecuarias] (*National Research Institute of Forestry and Agriculture*), among others. These institutions conduct research concerning avocado in areas such as agronomic engineering, postharvest technology, and industrialization and genetic improvement. It's important to mention here the work of the Salvador Sánchez Colín Foundation CICTAMEX, S.A. in the search for materials of low transport cost, as well as an important conservation program of genetic resources for the genera *Persea* and other related species. CICTAMEX, S.A. has a collection of about 200 samples originating from different regions of Mexico, as well as the Central and South Americas, and other species from New Zealand and Israel. It is also important to note that in Michoacan, work is also being done to determine new potential cultivation areas in different states of Mexico. Unfortunately, the current economic crisis affecting the country and the lack of decisive participation from the producers has led to the lack of desired coverage; nevertheless, the results obtained are applicable, and without a doubt can contribute to the improvement of the problems involving production and exportation of the avocado fruit.

In reference to training, there has been a greater awareness; and in the last few years, various measures have been undertaken to improve this aspect: implementing different forums, seminars, and classes. For example, the Sistema Nacional de Aprobación Fitosanitaria (*National System of Phytosanitary Approbation*), dependiente de la Dirección General de Sanidad Vegetal (*a division of S.A.R.H.*) and the Facultad de Agrobiología UMSNH (*Agrobiology Faculty of the University of Michoacan-San Nicolás de Hidalgo*) have designed a course of Phytosanitary Approbation in the Management of Avocado, given annually since 1992, which also includes hands-on training.

Perspectives

Given that the actual profit of this crop has decreased, mostly because of the production costs and the low national sales prices, an important number of producers have sought to enter the international market. As of yet, they have not made significant progress because of the problem characterized by the deficiencies in organization, standards, land ownership, publicity, and propaganda among others; but fortunately the official sector, together with the producers, are aware of this and have put into effect a series of activities that, together with adequate support and consistency, will undoubtedly provide alternatives that contribute to the development of this agroindustry.

Thus, we can cite the project of Sistema Producto Aguacate that includes a diagnostic document on avocado cultivation as well as an analysis of a matrix of the problems and coordination of compromises in order to promote exports, the

S.P.A. has established a work plan for the export of the Hass avocado variety from Mexico to the United States of America. This plan specifies the guidelines for the export of avocado Hass variety from Mexico to the states of Connecticut, Delaware, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin, throughout the year. In this plan, participants include personnel from USDA, APHIS, IS, S.A.R.H., DGSV, and producers, who have been given the task to inspect and certify that orchards meet the necessary requirements for export to the above mentioned states, emphasizing the lack of fruit flies (*Anastrepha ludens*, *A. serpentina*, and *A. striato*) and seed weevils (*Conotrachelus aguacatae*, *C. persae*, *Helipus lauri*, and *Stenomoma catenifer*) and branch borers (*Copturus aguacatae*). In 1994, 2,500 hectares were certified. These are dispersed throughout the municipalities of Uruapan, Periban, Salvador Escalante, and Tancitaro. The continuation of these tasks will assure in time the certification of a larger area.

If these conditions are taken into account, and adequate support and direction is given to those engaged in the production of avocados, the avocado agroindustry will be revived. Analysis of factors such as the volume of production and the imports and exports of principal countries that participate in the production and commercialization of avocados, compared to the possible potential markets determined by the population and gross national product of the most important economic regions, will give us a projection of the potential export market for the avocado, whose volume is projected to be at 690,000 tons in a period of 10 years.

This same study indicates that Israel and the United States do not have the possibilities for greater expansion; hence South Africa, Australia, Chile and Mexico will have to satisfy the demands of the international markets. This places Mexico in an advantageous position in terms of agroecology, geography, and costs, inasmuch as an estimated 1,000,000 hectares are characterized as suitable land for the development of this fruit—corroborated during Leonard Francis's recent visit by his statement that "the Creator of the world created in Mexico various ideal areas for growing avocados." Hence, Mexico only needs to improve some aspects of its production and commercialization process in order to successfully compete with the international market, and at the same time satisfy the costs of the increasing national demand.

Acknowledgments

This report was developed with data provided by the following divisions of S.A.R.H.: Direccion de Sistema-Producto, the Direccion General de Sanidad Vegetal, Direccion de Comercializacion, and Direccion General de Politica Agricola. Other reference materials used include the statistics directories of the S.A.R.H. offices and the Sistema Nacional de Information de Mercados, statistics generated by suppliers like Aguamich and Cupanda from the state of Michoacan,

and publications edited by the Sistema Nacional de Acreditacion Fitosanitaria and the Salvador Sanchez Colin Foundation CICTAMEX, S.A.

(This translation is largely the work of Veronique Rorive, The University of California Institute for Mexico and the United States, University of California, Riverside. Assistance was given by Professor Emeritus George A. Zentmyer and others.)