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Current Status of Avocado Growing in Mexico

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Mexico is the world's largest producer of avocados. In 1986-87, 625,000 metric tons (1.375 million pounds) were produced on 83,000 hectares (205,000 acres). Today, the country faces a series of socio-economic problems that affect the production and merchandising of this fruit.

Technical Aspects

Rootstocks in Mexico are seedlings of the Mexican race, from healthy and vigorous trees which produce outstanding crops. Clonal propagation of rootstocks is not yet practiced. Ninety per cent of the planted acreage is grafted to the Hass variety.

Characteristics of the "Avocado Belt of the Mexican Republic"

Commercial avocado growing occurs in 16 states. Four states produce significant quantities: Michoacán, Sinaloa, Puebla, and the State of Mexico. Puebla's production is limited by poor soil; Sinaloa produces West Indian varieties. Only Michoacán and the State of Mexico have the rich natural resources that form the "Avocado Belt of the Mexican Republic" located on a neo-volcanic axis at altitudes of 1,500 to 2,200 meters (5,000 to 7,000 feet) above mean sea level. Its area is 1,347,000 hectares (3,300,000 acres), and its soils and climate are suitable for the raising of this fruit.

Climate

Accepting the climate definitions of Koopen, the growing of avocados in this "Belt" has developed in the temperate zone with minor variations from "subtropical" to "cold."

In the subtropical areas, avocado trees grow rapidly, produce abundantly, and die at an early age, since they are susceptible to pests and diseases.

In the cold zones—1,900 to 2,200 meters above mean sea level (6,000 to 7,000 feet) — growth is rather slow. Production is rather low, but trees bear late-maturing fruit that brings higher than average prices. About 16,000 hectares (39,500 acres) of avocados are raised at these altitudes within the "Avocado Belt."

In temperate climates, at 1,600 to 1,800 meters (5,000 to 6,000 feet) above sea level, the growing conditions are ideal. There are no frost problems or excess heat; crops of 18 to 20 tons per hectare (16,000 to 18,000 pounds per acre) are achieved.

The soils of the "Avocado Belt of the Republic of Mexico" are principally of alluvial and basaltic volcanic origin. These may be classified as andosoles with high water retention characteristics and low compaction potential. There are also luvisoles, which contain a high proportion of clay. Regosoles are often encountered, and vertisoles and litosoles. The pH, 6.0 to 6.5, is very important in relation to the damage caused by *Phytophthora*

cinnamomi.

Hydrology

Due to development and utilization of available water resources in the "Avocado Belt," the past twenty years have brought a reduction of 50% in the availability of water in the surface streams, rivers, and wells of this region. Thus, it is necessary to utilize irrigation systems which are more efficient.

Irrigation

About 84% of the acreage in the "Avocado Belt of the Mexican Republic" is irrigated: 58,000 hectares, or 143,000 acres. Four methods of irrigation are practiced in the "Avocado Belt." They are flood irrigation, watering by hoses and basins, micro-sprinklers, and dripper-type emitters.

Fertilization

More than 75,000 tons (165 million pounds) of fertilizer are used on the 83,000 cultivated hectares (205,000 acres) of avocados in Mexico. In recent years, there has been increased usage of foliar sprays and soil-applied chelates.

Pests and Diseases

Pests and diseases account for a loss in production of fifteen per cent.

Among the most important pests affecting avocado production in Mexico are red spider mite, *Oligonichus punicae* Hirst; *Paratetranichus coiti* McGregor; white fly, *Tetraleurodes* spp.; dusty moth, *Paraleyrodes perseae;* leaf miner, *Gracilaria perseae;* thrips, *Heliothrips haemorroidalis;* measuring worm, *Sabulodes* spp.; and webbing moth, *Amorbia-Emigratella.*

The most important diseases are: avocado root rot, *Phytophthora cinnamomi* Rands, which is not as important in Mexico as it is in other countries because of low pH; anthracnose, *Colletotrichum gloeosporioides* Penz; fruit virus, *Colletotrichum* spp.; stem and fruit canker, *Colletotrichum gloeosporioides* Penz; *Sphaceloma persea* Jenkins; ring neck, *Nectria galligena; Fusarium* spp., *Fusarium ephisphaeria; Phytophthora bohemeria;* and anthomona, *Xanthomonas diplodia. Xalternaria & Helminthosporium.*

Maladies

It is estimated that production is reduced by another 9.4% by other maladies.

Postharvest Damage

It is estimated that shipments of harvested fruit are reduced by 9.4% because of postharvest diseases and mishandling. Anthracnose (C. *gloeosporioides)* is the most important disease affecting shippability. Of equal importance are problems in handling and cold storage.

PRODUCTION OF THE AVOCADO IN MEXICO

The Area Cultivated and Production

The estimated production of avocados in Mexico in 1986 and 1987 is 625,000 metric

tons (1.375 million pounds) in an area of 83,000 hectares (205,000 acres). The "Avocado Belt of the Mexican Republic"—Michoacán and the State of Mexico — produced 450,070 metric tons (991,540,000 pounds), or 72% of the national total, on 69,525 hectares (172,000 acres). This converts to an average production of 6.47 tons per hectare (about 5,700 pounds per acre) within the "Banana Belt." It should be noted that of this acreage, some 20,000 to 25,000 hectares (about 50,000 to 60,000 acres) are not yet in production.

Production Economics

It has been stated that at the current level, the avocado industry employs some 41,500 persons, and generates an economic value of 138,000 million pesos ($60,000,000).

Organization of Production

In the most important production region, Michoacán, there are 14 local associations which together form a regional union, and a collective rural association with interest in avocados. These associations are comprised of 1,500 producers, and represent 30% of a total of 5,000 producers.

Organizations in a practical sense do not exist in other Mexican states.

It is important to note that lack of organization is one of the reasons that the avocado industry has not developed as fully as possible.

Production Costs

If one assumes an average production efficiency in the "Avocado Belt of the Mexican Republic" of 6.4 tons per hectare (5,700 pounds per acre), then the costs of production are equivalent to the sales value of 3.4 tons per hectare, leaving a gross profit of the equivalent of 3 tons per hectare (2,700 pounds per acre). One must keep in mind that some outstanding groves produce 18 to 20 tons per hectare (16,000 to 18,000 pounds per acre). Others, meanwhile, produce 5 tons per hectare (4,500 pounds per acre), and these orchards are experiencing a current crisis. Increasing costs of production during recent years have resulted in dramatic loss of profits and the failure of many producers, some of whom are looking for alternative crops that might be more profitable.

If one uses the example of agri-chemical usage, one finds that in 1980, the value of a kilogram of avocados would purchase a kilogram of fungicide; today, one needs to raise 8 to 12 kilograms of avocados to buy one kilogram of fungicide. Meanwhile, as the cost of production has risen, the value of money received has decreased. One can see the combined relation in the following table.

TABLE 1
EFFECT OF INFLATION AND PRICES FOR AVOCADOS

Year	Average Price (Pesos)	Exchange Rate (Pesos: Dollars)	Average Price (Dollars)
1982	50.00	61.70	0.81
1983	90.00	123.98	0.73
1984	120.00	171.40	0.70
1985	160.00	256.40	0.62
1986	260.00	900.00	0.28
1987*	400.00	2,300.00	0.17

*December

Exports

The proportion of world avocado production that is located in Mexico is great. In 1985, Mexico produced 45% of the world total.

The rising national level of avocado production from 1981 to 1986 is shown in Table 2.

TABLE 2
RISING PRODUCTION OF AVOCADOS IN MEXICO

Year	Total Production (Pounds)
1981	970,024,000
1982	1,031,752,800
1983	1,156,312,700
1984	1,347,010,600
1985	1,377,875,000
1986	1,377,875,000

In spite of the large Mexican production, Mexico's share of the world market has been minimal, as shown in Table 3.

TABLE 3
MEXICAN AVOCADO EXPORTS

Year	Pounds
1980	1,133,164
1981	1,424,170
1982	423,282
1983	1,250,008
1984	90,388
1985	2,292,784
1986	5,952,420

The annual per capita consumption of avocados within Mexico is 8 kilograms, (17.6 pounds), and is the highest in the world. This is why, historically, Mexico has displayed little interest in the world market. As recently as 1983, Mexico's internal market returned better prices than did export markets.

The demand was so great that we could profit from the domestic market without paying a great deal of attention to quality.

During the last three years, this situation has changed. The reduction of income among the residents of Mexico has left the market relatively flat, with decreased demand.

Another cause of the change in the situation is the great increase in national production of avocados. From 1981 to 1986, there was an increase of 140%; and we expect annual increases of 11% to 13% during each of the next five years. These increases will not be absorbed by the internal market, whose population increases at the rate of only 2.7% annually. The endemic price decreases displayed in Table 1 illustrate the reasons for the seeking of new markets.

As shown in Table 3, Mexico has seriously initiated the effort to penetrate international markets. This effort has focused our attention on problems of fruit quality—especially those caused by cold storage, anthracnose, fruit maturity, and standard of shape and texture.

We expect in the future to develop an adequate infrastructure and organization for the effective and successful introduction of Mexican avocados into foreign markets.

SCIENTIFIC AND TECHNOLOGICAL RESEARCH PERTAINING TO AVOCADO GROWING IN MEXICO

There are many official groups that investigate avocado culture in Mexico. We may cite, for example, INFAP (Institute Nacional de Investigaciones Forestales y Agropecuarias), CONAFRUT (Comision Nacional de Fruticultura), Colegio de Postgraduados (Institucion

de Ensenanza e Investigacion en Ciencias Agricolas), and Universidad Autonoma Chapingo, among others.

These research efforts are for the most part independent of one another, and are often unresponsive to practical requirements of individual production regions.

In the state of Michoacan, it has recently been proposed that courses be offered at various levels that address the practices of avocado production. Moreover, they will have research programs designed to resolve problems in various production areas. These will include studies on soils, nutrition, phytopathology, physiology, postharvest, etc.

In the State of Mexico, the Center of Scientific and Technical Research for Avocados (CICTAMEX) is carrying on a five year plan of activities and is dedicated to the selection of improved varieties. A goal of the program is to form a valuable germ plasm bank under the direction of Ing. Salvador Sanchez Colin, who has been working on that project for 35 years.

As a result of the CICTAMEX work, and 35 years of studies, various candidate varieties have been obtained. These are exemplified by Colin-Mex, Colin V-101, and Colin V-33, the last of these being a rootstock. Under study are three dwarf mutants of Fuerte and two of Rincon, as well as 21 outstanding selections in terms of fruit quality and production.

ACKNOWLEDGEMENTS

In this report, I have used statistical data from the review, "Fruticultura de Michoacán" (Fruit Culture in Michoacán), the official organ of the agricultural and industrial credit union of Michoacán. I have also used information from the symposium regarding culture, production, and commercialization of the avocado which was organized by A.E.F.A. in 1984. Included, also, is information published in Memorias de Actividades del CICTAMEX of 1982-1986.