



Reino de los Países Bajos

Opportunities for Dutch Businesses in the Mexican Protected Horticulture Sector

A report by Transfer LBC



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EXECUTIVE SUMMARY

This report delves into the growing horticulture sector of Mexico and its possible challenges and opportunities for Dutch businesses interested in entering the promising market. The sector is forecasted to offer a bright future for companies willing to invest in and/or base themselves in Mexico. Having the sixth largest protected horticulture surface in the world dedicated to vegetables, berries, ornamental plants, flowers and nurseries, Mexico provides diverse opportunities in technological advancements research, production and processing, logistics and sustainability.

The Netherlands has played an important role in the development of the protected horticulture sector in Mexico from the start. Therefore, it is a trusted country that has actively and largely shared knowledge, technological advancements, and experiences with private companies and government institutions of Mexico. Around the world, Dutch companies are considered experts in this field, and with its long historic relationship with the Mexican horticulture sector, The Netherlands could greatly contribute to the further development of the sector.

Overview

The report starts by introducing Mexico, its geography, history and economy and continues with a brief mention of why Dutch companies should be interested in the sector. Furthermore, it continues with an introduction to the horticultural sector in Mexico and focuses on the development of the sector, its growth potential, the most important regions of the country for the sector, the technologies in use (high or low-tech), employment, exports, as well as the government expenditure. Unfortunately, the Mexican government has decreased its support since 2018, yet it is expected that private investment will grow in the coming years. This is due to the rising exporting opportunities, the costs of labor, the demand for greenhouses, and technological advancements such as automation.

Moreover, the report highlights various important sub-sectors of the Mexican horticulture industry and touches upon the main challenges and risks they face. This includes an overview on the production of the most important vegetables (tomato, bell pepper and cucumber), ornamental plants, berries, and the most exported tropical fruits (avocado, citrus and mango). In these sections, the presence of the United States as Mexico's main trading partner becomes apparent and signals an urgent need of diversification of Mexico's export destinations, especially with the constant threats for the US.

In addition, the report delves into the existing scientific knowledge in the sector as well as the competition and stakeholders present. Further, it explores the sustainability and circularity goals that the country has and blends those with the Dutch Sustainable Development goals in place for the sector. This provides the reader with a sense of direction when wanting to enter the Mexican horticulture sector with a more sustainable impact.

As the report is designed to guide Dutch businesses and government organizations into looking at the opportunities available in the Mexican protected horticulture sector, the report also carries out a brief SWOT comparison in which



the main strengths, weaknesses, opportunities and threats of the sector are highlighted.

The report ends with a glimpse of future projects and changes being made in the sector such as the possible legalization of the marijuana market in the country. Ultimately, the report concludes with recommendations for both Dutch companies and government agencies on how they can best enter the Mexican horticultural sector after identifying the opportunities available for them through this report.



INTRODUCTION

Protected horticulture is currently gaining ground in Mexico, as it is carried out under conditions where growers can control some environmental factors, thereby minimizing the impact of climate change on crops using structures such as greenhouses, shade mesh, and high and low tunnels. It must be emphasized that this specialized system yields produce of excellent quality at any time of year, free of damage resulting from climate factors, let alone from pests and diseases.

This study was commissioned by the Embassy of the Netherlands and written by Transfer LBC. The information presented in this report aims to update previous studies done on this subject and to inform Dutch companies and government institutions of the latest developments in the Mexican horticulture sector.

By interviewing main players -from the public and private sector- this study generated great interest amongst organizations and individuals who were willing to collaborate, find potential partnerships, and invest in new opportunities.

METHODOLOGY

This work is the result of the research project "Opportunities for Dutch Businesses in the Mexican Protected Horticulture Sector". The activities for carrying out this report varied from interviews with producers, associations and federal and state government of both Mexico and The Netherlands. Sending out surveys and organizing a round table with some of the most important players in the Mexican horticulture sector. This work also includes documented information from sources such as the Mexican Ministry of Economy, INEGI, Bank of Mexico and many others listed at the end of this document.

GLOSSARY OF TERMS

- **ALADI:** Latin American Integration Association.
- **AMHPAC:** The Mexican Association of Protected Horticulture.
- **AMLO:** Andrés Manuel López Obrador, Mexican President (since 2018).
- **APEAM:** The Avocados Producer and Exporting Packers Association of Mexico.
- **APEC:** De Asia-Pacific Economic Cooperation.
- **CMF:** Mexican Council of the Flower Industry.
- **CNA:** The National Agriculture Council.
- **CONEVAL:** National Council for Poverty Assessment.
- **EMEX:** Mexico's Mango Exporters Association.
- **FDI:** Foreign Direct Investment.
- **INEGI:** National Institute of Statistics and Geography.
- **NBSO:** Netherlands Business Support Offices.
- **OECD:** The Organisation for Economic Co-operation and Development.
- **SADER:** Secretariat of Agriculture and Rural Development (since 2019).
- **SAGARPA:** Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (up to November 2018).
- **SDGs:** Sustainable Development Goals
- **SE:** The Office for Economic Affairs (Secretariat of Economy) of Mexico.
- **SIAP:** Agrifood and Fisheries Information Service, deconcentrated administrative body of **SAGARPA** (until



december 2018).

- **USITC:** The United States International Trade Commission.
- **USMCA:** United States-Mexico-Canada Trade Agreement.
- **WTO:** World Trade Organization.

INTRODUCING MEXICO

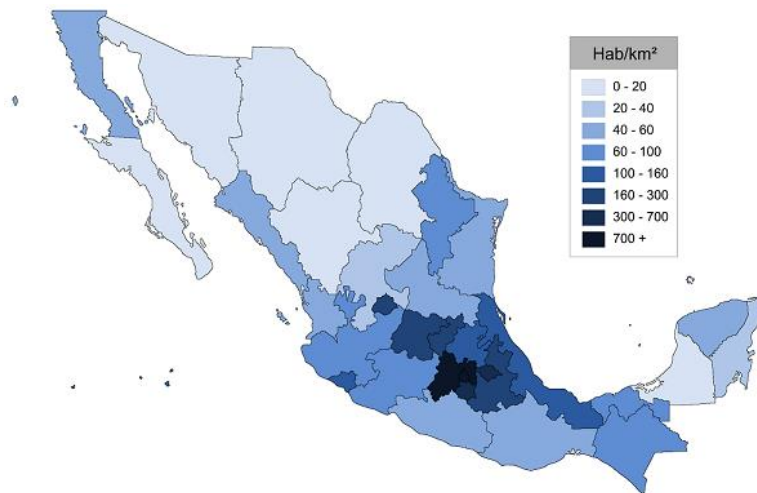
Geography & History

Mexico is the 13th largest country by area worldwide. The country consists of 32 autonomous federal states and is further divided into 2,456 municipalities. The official language in Mexico is Spanish, yet there are 76 other indigenous languages that are commonly spoken amongst its indigenous populations. For three centuries, Mexico was colonized by the Spanish empire, during which Mexico's population mixed with European colonizers. As a result of this period, Mexico is predominantly Spanish speaking, Roman Catholic and largely Westernized. In 1821, with the end of the Mexican Independence War, Mexico was an independent nation with its own legal name (United States of Mexico), framework and Constitution.

Currently, President Andrés Manuel López Obrador (AMLO) of the left-wing party National Regeneration Movement (MORENA) is in power and has been since December 2018. His campaign message was to eliminate corruption in politics, end neoliberalism and save Mexico's oil industry.

People & Demography

According to the Intercensal Survey 2015 conducted by INEGI, there were 119 million 530 thousand 753 inhabitants in Mexico. The next census is scheduled to be held in 2020. According to expected population demographics, 27% of the population is projected to be over 60 years by 2050.



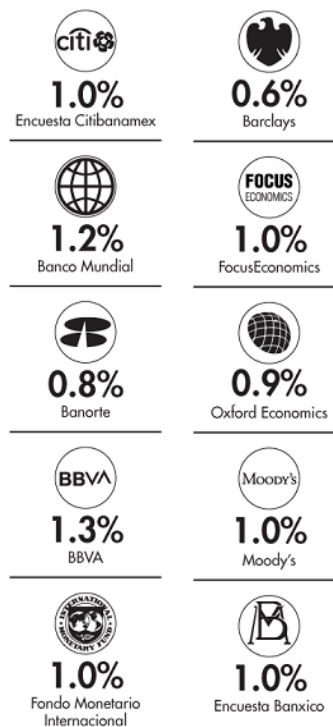
Source: Wikipedia

Approximately 80% of the Mexican population live in urban areas, with the highest density populations living in Mexico City, Mexico State and the state of Veracruz (PAHO, 2017). The Mexico City Metropolitan Area is the largest agglomeration in Latin America, accommodating 20.1 million. Another quarter of the population lives in other big cities (between 1-10 million inhabitants), followed by medium (20%) and small (17%) cities. Only 12 per cent of the population live in cities with fewer than 100 000 inhabitants (World Bank Group, 2016).

Economy

During 2017, the Mexican economy grew to 2.3%, in 2016 to 2.7% and in 2015 to 3.3% according to INEGI. On the other hand, the total production generated by agriculture, livestock, fishing, hunting and logging showed a growth of 2.3% in 2018. According to INEGI the Mexican economy closed 2018 with an annual growth of 2%, the most modest since 2013 (1.6%), and in 2019 the Mexican economy registered its first annual contraction of 0.1% since 2009.

By 2020 the Mexican economy is counting on the implementation of the USMCA. The Ministry of Finance forecasts the Mexican Gross Domestic Product to grow between 1.5 and 2.5%, while Banco de México expects it in a range between 1.3 and 2.3%. While specialists predict a rebound in Gross Domestic Product (GDP) in 2020, they cut their growth forecast in January to 1.0 from 1.10% estimated in the last survey last year. However, this might change due to the COVID-19 crisis.



Estimations for Mexico's GDP in 2020, Source: El Economista

The Central Bank considers that the main obstacle for economic growth is governance, by a score of 51% influence. This was followed by internal economic conditions (insecurity, internal political uncertainty, internal economic situation) with 32%, while external conditions registered 9%; public finances, 6%, and monetary policy 6%. Since September of 2019, surveys do not consider inflation within the possible obstacles to the growth of the Mexican economy, while inflation is expected to end 2020 at a level of 3.50%. However, the COVID-19 crisis will most likely have an impact on this percentage.



Mexico is the second largest economy in Latin America and has the 15th largest GDP in the world. However, despite this high positioning in the world stage, about half of all Mexican citizens live in poverty, making it a highly unequal society. In 2015, the wealthiest 1% of the population accounted for 21% of the national income. According to the results of the study "10 years of poverty measurement in Mexico", conducted by Coneval, although there was an improvement in the indicators of social deprivation and 24 states reduced their poverty levels, the southeast of the country is still the region with the highest percentage of poor inhabitants. There was some progress between 1990 and 2010, when income inequality diminished mostly due to remittances sent from Mexican workers in USA received by their families in Mexico, governmental social programs such as Prospera, and reductions in income inequality. Unfortunately, some of these programs -such as Prospera- have disappeared under the government of AMLO, including the strong support that the agriculture sector had in the past twelve years, as the budget for this sector has been considerably reduced.

TOP REASONS ON WHY MEXICAN HORTICULTURAL SECTOR IS INTERESTING FOR DUTCH COMPANIES

- ✓ **Technological advancements**
 - Many Mexican growers are in need of increasing their production and making their growing process much more efficient. Although there is a strong private investment in protected horticulture, many Mexican companies only use passive to semi-active technology, which limits their control and automation of their crops as well as their export possibilities. Thus, if one is up for the challenge and willing to invest time and money, the Mexican market has important opportunities.
 - The Netherlands has been a front runner of greenhouses and horticulture technology from the beginning, and Dutch companies have been involved in first-class projects in the country, such as the Agropark in Querétaro.
- ✓ **Reputation of European solutions**
 - European products have an excellent reputation in Mexico. There is currently presence of European companies active in Mexico, making stakeholders interested in meeting European solutions.
 - The Netherlands is perceived as a reliable business partner and as a supplier of some of the best technology and services in the field.
- ✓ **Existing Dutch community**
 - Many Dutch companies are already present in the sector and have been for a long time already. In Querétaro alone, there are around 60 Dutch companies in the agriculture sector.
 - Active information and network support to Dutch companies from a very well informed and well-connected Netherlands Embassy in Mexico.
 - Support from Dutch business organizations in Mexico such as Transfer LBC's local office, Holland House Mexico, and the NBSO in Querétaro.
- ✓ **Climate conditions**
 - Even though technological advancements are increasingly important, Mexican crops can be grown in many parts of the country.
- ✓ **The variety of protected horticulture sub sectors that are thriving**
 - This includes the transfer of US flower production to Mexico, the tropical fruits exports, etc.
- ✓ **The free trade agreements in place**
 - According to the SE, the country has:
 - 13 free trade agreements with 52 countries.
 - 32 agreements for the Promotion and Reciprocal Protection of Investments with 33 countries.
 - 9 agreements of limited scope within the framework of the Latin American Integration Association.
 - US relations with Mexico are not at their best, thus there are opportunities for the Netherlands to

strengthen relations.

- ✓ The **markets**, those domestic and from neighboring US and Canada, **keep growing steadily** every year.
- ✓ **Agriculture is in Mexican's roots and labor**
 - There is a great tradition in agricultural field work among Mexican workers and they are willing to receive training in order to work in companies that offer high technology. Also, there are universities -like the ones located in in Saltillo (Universidad Autónoma Agraria Antonio Narro) and in Texcoco (Universidad Autónoma Chapingo) - that have developed studies in horticulture, offering high quality degrees to Mexican and international students.
- ✓ According to the figures reflected in the sector in recent years and to the forecast offered by well- respected firms and institutions such as World Bank, Bank of Mexico, Deloitte and others, **the future for Mexican protected horticulture is bright.**
- ✓ There are **projected activities** in order to grow the production capacity of Mexican production of horticulture and ornamental crops.
- ✓ **Investment opportunities in the Mexican agriculture sector** under different schemes in the horticulture and ornamental subsectors, not only in technology for production but also for processing horticulture products.
- ✓ **There are vast opportunities for Knowledge Transfer** on quality improvement, logistical processes, sustainability, automation, maintenance, professionalization, scale increase, etc.
 - There are concrete plans to improve the logistical aspects of exporting from Mexico to The Netherlands.

THE HORTICULTURE SECTOR IN MEXICO

As a multifaceted country, Mexico represents the ideal conditions for a thriving agricultural sector. Compared to Europe and many other continents, the climate is excellent for the growing of many types of crops, whether it be in the soil, on open fields or even in protected structures. Mexico's rural origins have evolved to turn agriculture into one of the country's most dynamic sectors with great economic, technological, and productivity growth.

The horticultural sector in Mexico is still developing and therefore has the great potential for other countries, such as the Netherlands, to aid in this development and cultivate its riches hand-in-hand with the Mexican people.

History

There are two central elements of what we now call protected agriculture that, in part, originated in Mexico at Lake Xochimilco during the Middle Postclassic period (between 1200 1350 AD): the Chinampas as a precedent for hydroponics and the Tochimals, crop protection structures in pre-Hispanic times.



A chinampa, Source: muerdagoxochimilco blogspot

Mexico is endowed with notable agriculture and farming roots. In the 1950's the first greenhouses were being established in Mexico around Mexico City. These were designated nurseries to produce flowers and plants to the capital. Then came the 80's when production of seedlings began to operate in order to further develop the extensive production of tomato in states like Sinaloa, Sonora and Jalisco. The 1990's saw a true emergence of the horticultural industry, with the support of foreign investors and the innovation of farmers that wished to get more out of their crops.

By the end of the 20th century, there were over 783 hectares of complete cycles of horticulture production established in Jalisco, Sinaloa, the State of Mexico, and Sonora. This major development of the sector was largely to thank to foreign technologies brought in from Spain, France and The Netherlands.

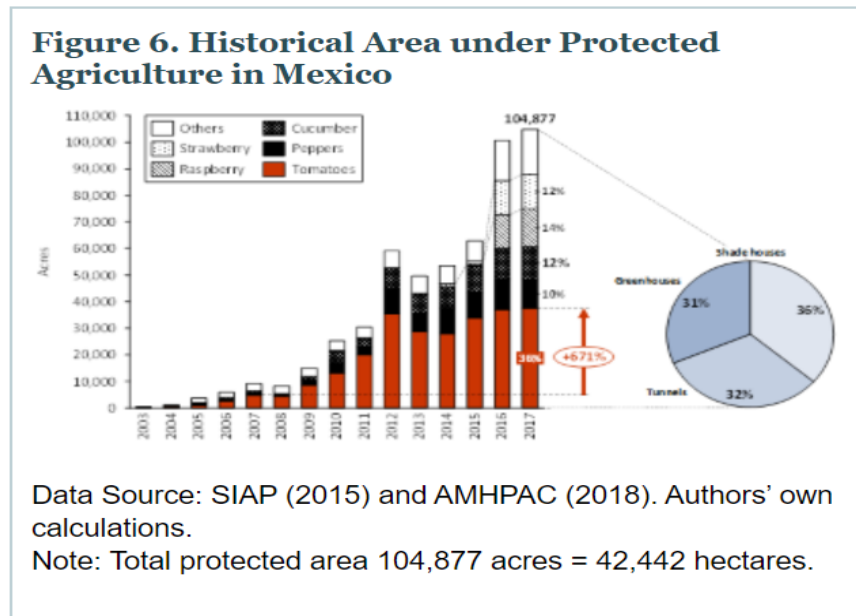
From the turn of the century, until now, the horticultural sector has kept growing and is expected to continue to do

so in the coming decades.

The horticultural sector in general

Mexico has the sixth largest protected horticulture surface in the world dedicated to vegetables, berries, ornamental plants, flowers and nurseries.

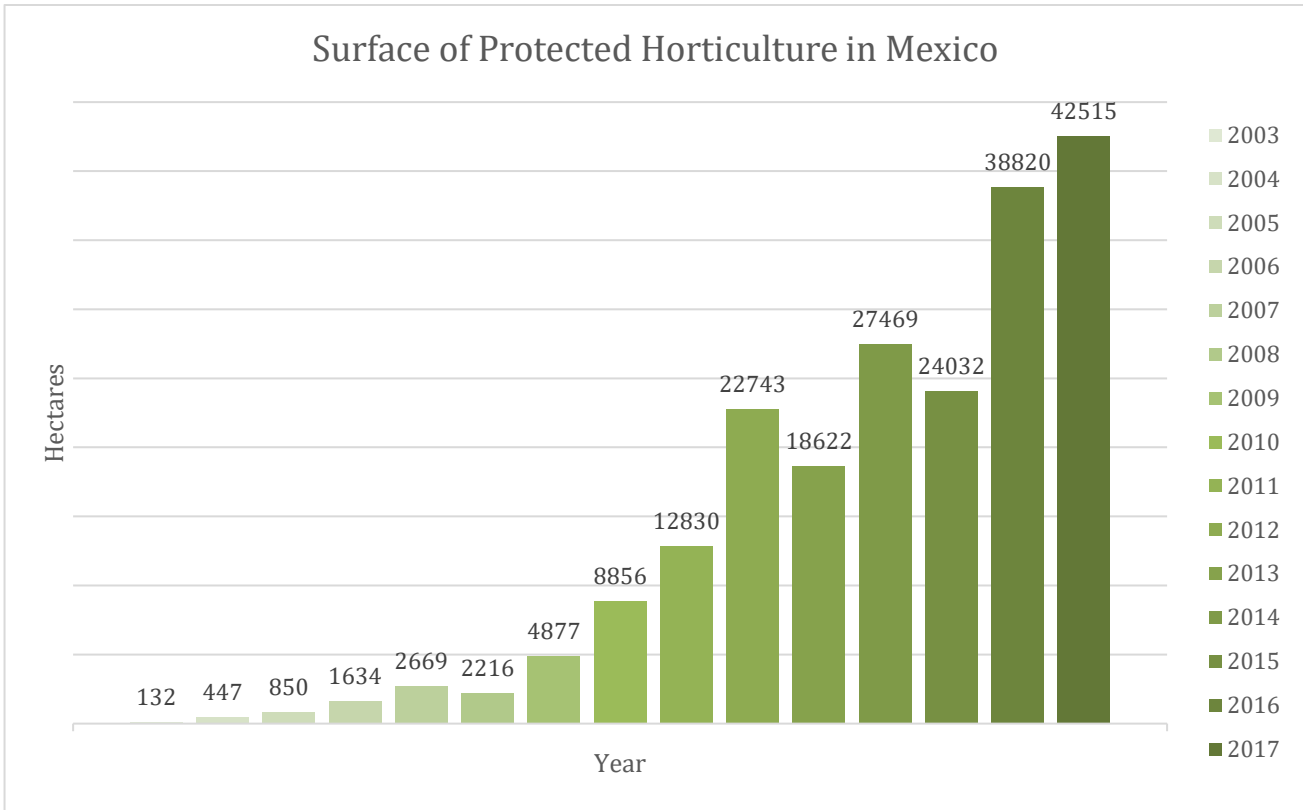
It should be noted that the installed capacity of this ever-growing mega industry exceeds the value of 6.5 billion US dollars when one considers the productive structures, processing plants, packaging and cold rooms in the country. The Mexican protected horticulture is an industry that is currently present in many of the country's 32 states and extends more than 42 thousand hectares of protected area nationwide.



Growth potential

According to Alfredo Díaz Belmontes, general director of AMHPAC, of the most harvested crops in the country, only 15% of the growing surface is protected horticulture, while 85% is on open fields. Thus, there is a real opportunity for Mexico in implementing more protected infrastructure as it is evident that it increases the production yield and value of the crops compared to open field growing, which allows for more export quantities and opportunities. Moreover, protected horticulture has the potential of contributing largely to the growing and harvesting of crops, while requiring less surface to do so.

The expansion of the protected horticulture sector is well on its way, as apparent in the growth it has shown the past two decades. In 2003, only 132 hectares of protected horticulture were planted around the country. However, by 2017, the sector had grown to a total of 42.515 ha, meaning that the growth in the past 14 years had been of 42.383 ha, or about 3.000 ha per year on average.



Source: SIACON – SIAP- SAGARPA

Important regions

Around 57% of protected horticulture surface is located in three main agricultural states: Sinaloa houses 20%, Jalisco roughly 20% and Michoacán 17%. However, the Mexican horticultural sector is developing so rapidly across the country, that greenhouses, shade houses, and other protected infrastructures are expected to continue to appear in increasingly more states in Mexico.

Sinaloa has over 10.000 ha of protected horticulture and according to SIAP, it is the largest producer of vegetables under protected horticulture country wide, producing approximately millions of tons of tomatoes alone per year, with its main crop grown being the Saladette tomato, grown under shade houses. Following Sinaloa, Jalisco also has around 10.000 ha of protected horticulture, of which more than 50% is used to grow raspberries in macro-tunnels. Michoacán has over 7.000 ha and produces approximately 80% of Mexico’s strawberries.

A state that has been increasingly growing in the horticultural sector is Querétaro, with a production of more than 110.000 tons of produce grown under protected agriculture in 2018, on a surface of 437 hectares. Querétaro is known especially for its growth of vegetables, such as tomatoes and peppers, yet there is no significant cultivation of ornamental plants or berries. The state is mostly known for being one of the states with the largest conglomerations of companies and organizations dedicated to the horticulture sector in the country.

The state of Querétaro is looking to grow in the protected agriculture segment and, although it has 437 hectares of protected agriculture and occupies the 18th place at the national level, locally it took the strategic initiative to venture into the design and implementation of the first greenhouse agri-cluster in the country. The cluster gathers 11 companies that jointly operate 180 hectares of protected agriculture, forming the commercial project called Agropark.

The park is a comprehensive center geared towards horticulturists who want to successfully compete in the US and Canadian export markets. Launched in 2006 with private equity and support from FOCIR (Mexico's Rural Sector Capitalization and Investment Fund), the park is expected to grow to 823 ha when completed.

Agropark's Phase One measures 295 hectares, 180 ha of which are greenhouses, and it has created over 2,400 jobs. At present, there are 11 Mexican and international Agricultural companies in the park with a combined annual production of 81,300 tons from which 95% is exported to the United States and Canada. 65% of total production corresponds to tomato varieties and 35% to bell pepper and cucumber.

Agropark is managed by an association in charge of ensuring sufficient services and opportunities for established companies, and its operation is based on the competitive advantages generated by the business relationship of its tenants, as well as its outward connectivity with support companies and direct network participants that facilitate the fluidity of the business scheme.

Among its fundamental principles are achieving competitive conditions that guarantee profitability; responsibly managing natural resources; seeking mutual benefits and economies of scale by belonging to a business ecosystem; to guarantee conditions of occupational safety and plant health that meet the most rigorous international standards, and to ensure basic services and resources necessary for optimal operation.

Some of the success factors of Agropark have been the managerial capacity of its tenants and the insertion of a market opportunity, as well as the participation of private and public entities to finance the projects that operate today.

Notwithstanding the fact that the state of Morelos is not in the top 3 states of protected horticulture, it is inevitably the ornamental plants' leader in Mexico. The state is mostly known for its production of pot plants and is notably known internationally as 'the state of eternal spring', due to its impressive and unique climate. The state of Mexico is similarly considered for its flower production.

Private Investment, and Expenditure and Government support

The last decade has seen a large boost in the horticultural sector due to its increasing expenditure. On average, Mexico has made an annual investment of \$3.9 billion in production supplies and over \$1.4 billion in infrastructure, specifically in protected horticulture, post-harvest services and irrigation. This massive investment is expected to continue growing annually at a rate of 6.5% in the years to come according to Eric Viramontes, horticultural crops

journalist.

Moreover, according to information from SAGARPA, the Mexican government's agricultural support increased from 44.7 billion pesos in 2006 to 64.3 billion pesos in 2016. The aim of the government was to "achieve a competitive economy and generate jobs ... and guarantee equal opportunities and environmental sustainability." and ultimately to modernize Mexico's agricultural sector. The support programs put in place by the government were mainly to provide subsidies to individuals and companies in order to support their production, post-harvest management, marketing and other related activities.

The growth of the government support took off in 2009 with the launch of the Strategic Project (National Strategy) for protected agriculture under the Support Program for Investments in Equipment and Infrastructure under the 2007–2012 National Development Plan. The support was particularly instrumental in the further development of Mexico's fruit and vegetable industry. However, there has been an important reduction of government support since 2017.

Those people contacted for this study -producers and representatives of associations and academic institutions- all agreed that the support that they received from the government has completely stopped. As they said, the government of AMLO is offering support mainly to small producers of corn, beans and milk.

Nevertheless, SADER is still publishing about FIRA, a federal government development entity originating in the Bank of Mexico, saying that it represents an option for the sector to access the financial resources they need to boost the activity, either through commercial banking or through non-banking institutions such as lessors, cooperatives and credit unions.

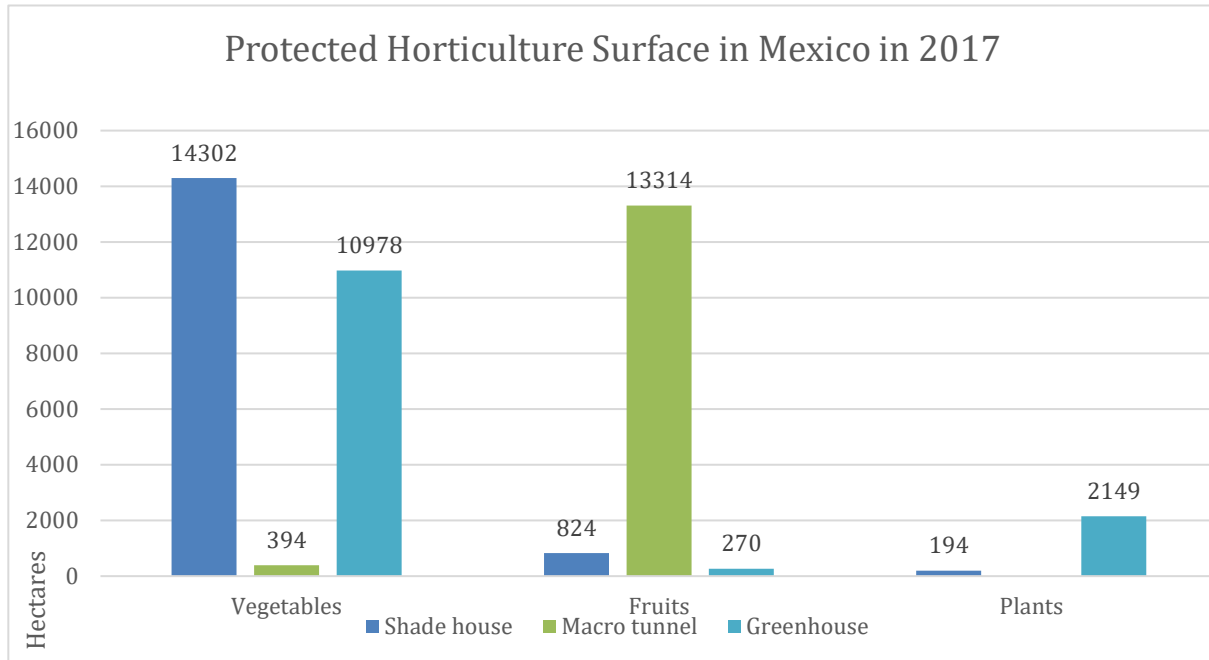
"We have had important changes in the policy of the agricultural sector. The current government has given priority to ensuring that food supplies occur in Mexico, that we are sustainable. Much attention is now given mainly to the cultivation of corn, beans and wheat, which is what we mainly import. So, there is a redefinition of public policies.

If we compare with previous years, the resources destined to the Ministry of Agriculture have decreased because there has been a reorientation of policies, now a lot of resources are going to the programs of the Ministry of Welfare, such as "Sembrando Vida" (Sowing Life) and "Jóvenes Construyendo el Futuro" (Youth Building the Future)."

- SADER, Querétaro Delegation.

Infrastructure & technologies

At the end of 2017, protected cultivation in Mexico was almost exclusively done in shade houses and greenhouses and only a fraction was being done in macro tunnels. Today, the overall horticulture sector has an infrastructure of 42 thousand ha of protected horticulture that is valued over 6.5 billion US dollars.



Protected Surface reported in Mexico in 2017, Source: AMPHAC

When it comes to technology, the protected horticulture level varies from rustic and very passive technology to high tech and sophisticated with the use of computer automation that controls among others, temperature, humidity and irrigation. The following 3 classifications are often used for labeling the production technologies under protected horticulture:

Passive Technology (Low-tech)	Structures that often have low production and are not used all year round. There is no automation and the structures are susceptible to their environment and climate changes that come with it. Most of these structures are covered with plastic or mesh.
Semi-Active Technology (Mid-tech)	Structures that have semi-automated systems, such as heating, ventilation, irrigation, cooling, etc. The growth of crops inside these structures can be done in soil or substrates. Most of these structures are tunnels made from plastic and have separations for different crops.
Active Technology (High-tech)	Structures that have a fully automated and controlled environment. They possess the capacity of controlling irrigation, nutrients, temperature, humidity, and even solar radiation. The sowing of these crops can be in soil, substrates, hydroponic systems, etc. The structures can be made from glass, double paneled plastic and are mostly tall structures.

Due to the lack of funds, many companies in Mexico have resorted to semi-active or passive technologies instead of active technologies. However, due to the rising exporting opportunities and the costs of labor, the demand for greenhouses with more automation has been increasing in the last years, especially in states such as Guanajuato, Querétaro, Jalisco, Aguascalientes and Zacatecas. This is very important for the Mexican protected horticulture development, as better technology provides growers with sustainable all year-round production, better quality products with controlled cultivation, higher food safety standards and increasing opportunities to expand to other types of crops.

Region	States in Region	Number of Associates	% of Associates	Hectares	% of Hectares	Types of Technology Used		
						Active	Semi-Active	Passive
Northwest	Baja California (&Sur), Chihuahua, Durango, Sinaloa, Sonora	35	14%	2.423	26%	26%	20%	54%
Northeast	Coahuila, Nuevo León, San Luis Potosí, Tamaulipas, Zacatecas	60	24%	1.807	19%	15%	53%	32%
Centre	México City, México, Guerrero, Hidalgo, Morelos, Puebla, Tlaxcala, Querétaro, Aguascalientes	40	16%	485	5%	38%	25%	38%
West	Guanajuato, Nayarit, Jalisco, Colima, Michoacán	112	45%	4.658	50%	41%	35%	24%
South	Campeche, Chiapas, Oaxaca, Quintana Roo, Tabasco, Veracruz, Yucatán	4	2%	15	0%	0%	75%	25%
	Total	251		9.388				

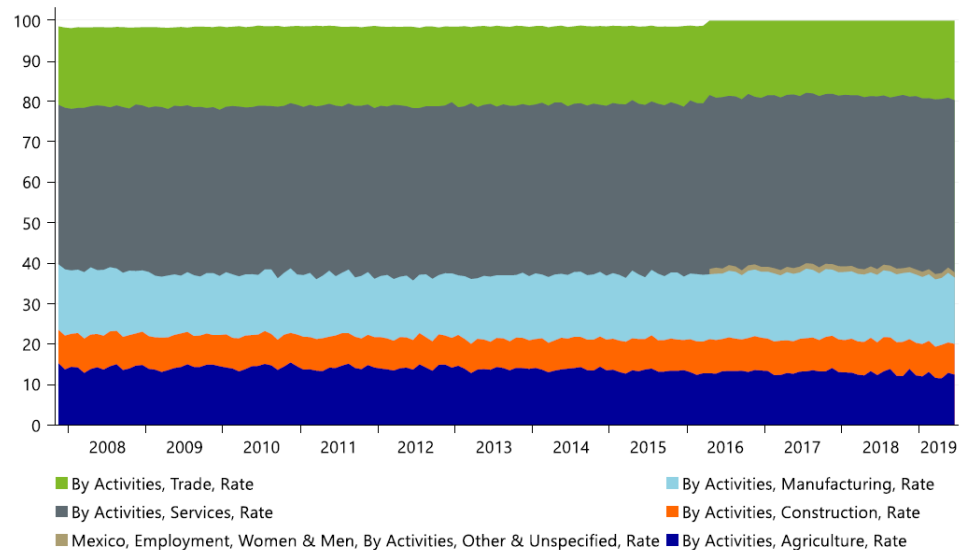
Distribution of types of technology of AMHPAC members in 2019, Source: AMPHAC

Nevertheless, even with the increasing demand of advanced technologies, most of the members of AMHPAC, are still opting to invest in shade houses over greenhouses, making the choice of investing less in technologies and more in the expansion of their growing surfaces. Moreover, according to SADER, in 2018, less than 40% of the total surface of protected horticulture was using some type of technological assistance.

Employment

Mexico’s protected horticulture sector has created more than 450 thousand jobs, of which 166 thousand are permanent and 287 thousand are temporary. In total, the sector directly and indirectly employs approximately 2% of the country’s population. As the sector grows, we also see an increase in professionals, technicians and skilled labor specialized in the industry. Nevertheless, the sector has a high rate of informal employment, and women are more likely to work informally compared to men. Although this is gradually changing under the government of AMLO, the informal employment in the sector is still relatively common practice.

Mexico employment by sector – diversified across sectors 12% of employment is in agriculture (agriculture is 4% of GDP)



Source: RaboBank

Fortunately for workers, the labor relations landscape in Mexico is changing with the introduction of Federal labor reform legislation. With the new government majority in both houses, there seems to be no impediment to the passage of the necessary legislation that was halted in the past. Some legislation will touch on guaranteed negotiations between workers and employers, improvement of productivity, working conditions, and the creation of impartial trade unions. It will take some time to change the institutional architecture that is currently in place, yet there is a solid momentum thus far to do so.

Exports

Mexico has many advantages when it comes to trading, with one of them being the amount of free trade agreements. As of the end of 2019 Mexico has 13 free trade agreements with 46 countries and 32 agreements for the promotion and reciprocal protection of investments in 33 countries. The most exploited trade agreement is that with fellow North American countries, the United States-Mexico-Canada Agreement (USMCA) which started to be negotiated in 2018 to replace NAFTA. The United States is Mexico's main trading partner, especially when it comes to vegetables as 84% of its production is exported to the United States. However, Mexico is in an urgent need of diversification of its export destinations, especially with the constant threats from US.

USMCA has been approved by The United States and Mexico and is pending approval from the Canadian parliament which is planned for April 2020. Nevertheless, competing tomato growers from states like Florida and Georgia continue to pose threats to Mexican growers as they complain about market distortions because of dumping of Mexican tomatoes on the American market and continue to lobby for import duties on Mexican tomatoes that enter the US market. This also happened in 2019, when the United States decided to suspend the Suspension Agreement for tomatoes, and imposed import duties of 17% on Mexican tomatoes. Even though later that year, an agreement was reached in which the minimum prices for specialty tomatoes were increased and quality inspections were set in place at the border for Mexican tomatoes, the continuing threat of dumping measures has created uncertainty for Mexican growers as new import duties could be imposed again in the future.

The current difficulties Mexico is facing with the United States could create great opportunities for The Netherlands to step in the limelight to become a great trading partner. This opportunity has become even more accessible with the reaching of the modernized EU-Mexico Global Agreement in 2018, which is expected to increase diversification into European markets once it is signed by the EU and Mexico (now expected in 2020 or 2021). However, any export restrictions imposed by the United States and/or difficulties the relationship might be facing could also directly impact The Netherlands in a negative way. This is because the Dutch agricultural sector has a direct stake in the Mexican exports to the US and is a major supplier of technology for the protected horticulture market. Furthermore, it is unrealistic to think that the Mexican exports to the US would be replaced by exports to The Netherlands, as the markets are beyond comparison when it comes to size and tomatoes are grown very competitively within Europe.

In the Mexican protected horticulture sector, 60% of the production is destined to exporting, with approximately 70% of that being tomato alone in 2017. The vegetable export alone has reached 4.8 billion dollars in value in 2017.

"Together with Brazil, Mexico is the most interesting market in Latin America, certainly when it comes to the agricultural and horticultural sector. Not only because of the large consumer market, but also the access that the country offers to the United States and Canada. To meet increasing demands and international quality standards, a modernization process is taking place in the country in which Dutch companies can play an important role.

Also, in the field of fruit import it is gradually becoming more interesting to work with Mexico. Remarkably enough, relatively few Dutch companies are able to find their way to this thriving market. For this reason, among other things, there was a trade mission to Mexico scheduled to take place in April of 2020 with Prime Minister Rutte."

- *Guido Landheer Director of European, International and Agro-economic policy at The Ministry of Agriculture, Nature and Food Quality of The Netherlands*

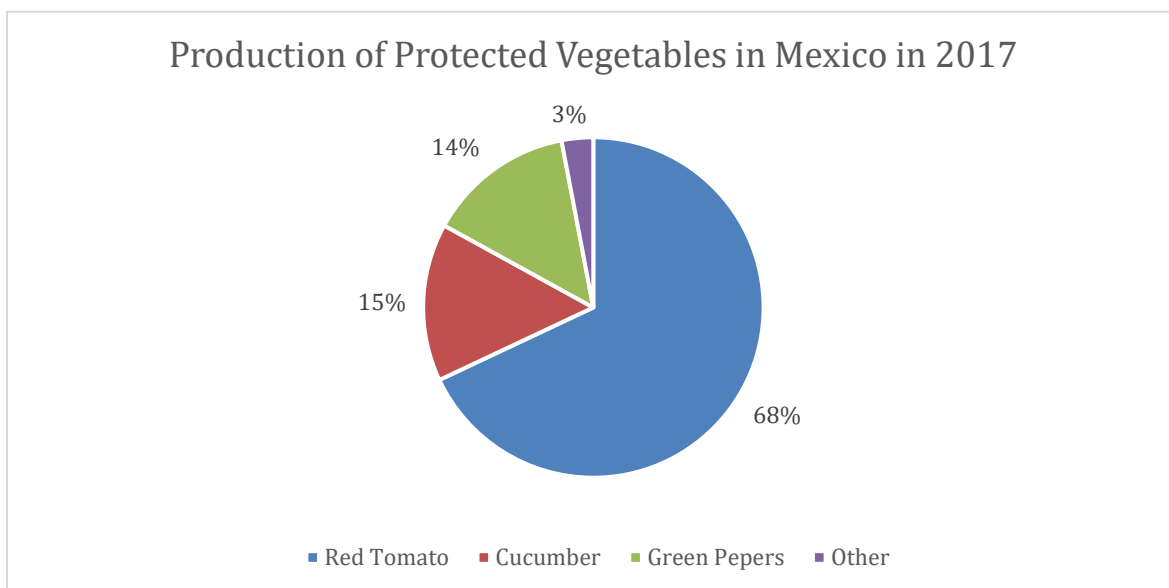
THE MOST IMPORTANT SUB SECTORS OF THE MEXICAN HORTICULTURE SECTOR

The protected horticulture sector in Mexico represents more than 3.2 million tons of produce annually, with a commercial value greater than 3 billion dollars. 56% of the surface is destined to vegetable produce, whereas almost 15 thousand hectares are for fruits and over 3.000 are for flowers.

This chapter concentrates on the most important sub sectors in the horticulture sector in Mexico currently namely the growth and cultivation of vegetables, ornamental plants, berries and tropical fruits.

Vegetables

Of the 42 thousand hectares of protected horticulture, 56% is vegetables. According to SAGARPA, the biggest vegetable crop is tomato, followed by bell pepper and cucumber.



Production of protected vegetables in Mexico in 2017 (hectares), Source: SIAP-SAGARPA

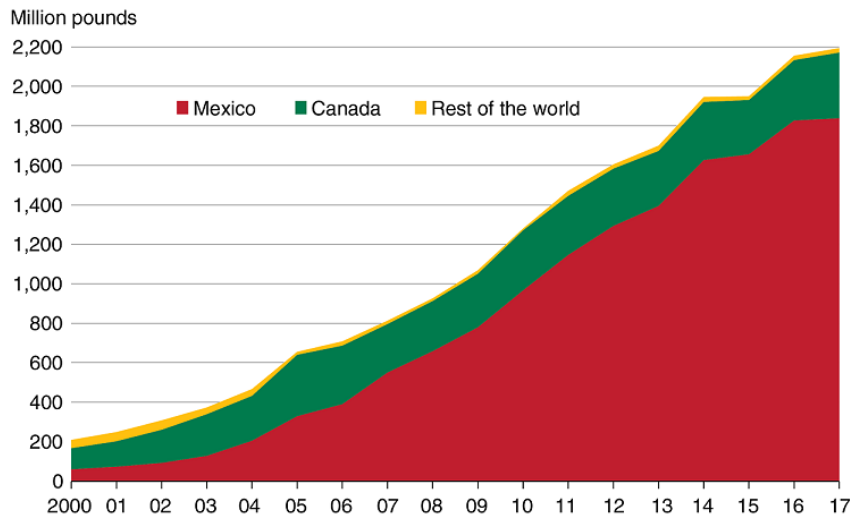
The following sections will delve into the production of each vegetable mentioned above.

Tomato

OVERVIEW

The cultivation of tomato is the fourth in importance for its contribution in the value of primary agricultural production in Mexico. In 2017, it participated with 4.3% of the total, after corn grain (17.1%), avocado (6.8%) and sugarcane (6.5%). According to information from the Agrifood and Fisheries Information Service (SIAP), the production of tomato in Mexico grew at an average annual rate of 3.6% between 2007 and 2017, to reach a record of 3.47 million tons.

Greenhouse-grown fresh-market tomato imports have risen steadily since 2000



Source: USDA, Economic Research Service using U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade data.

The cultivation technology used for this vegetable is different in open field than in protected agriculture (shade mesh and greenhouse). Moreover, the volume of tomato produced in the open field decreased at an annual average rate of 5.1% between 2007 and 2017, while the production obtained in protected agriculture grew at an average annual rate of 23.4%.

According to SIAP data, 35.7% of the area planted with protected agriculture in 2017 in Mexico corresponded to tomato. It was followed in importance by berries: strawberry, raspberry and blueberry (30.8%), cucumber (11.6%), pepper (9.2%) and ornamentals (4.9%).

According to the National Agricultural Planning 2017-2030 prepared by SAGARPA (2017), it is estimated that by 2030 the production of tomato will amount to 7.56 million tons and exports will be about 5.50 million tons, with a value at 2016 prices of 6,641 million dollars. In 2016, 48.1% of national production was exported; This proportion would be 66.7% in 2024 and 72.8% in 2030.

MAIN AREAS OF PRODUCTION

The highest yields in tomato production are obtained in Querétaro, Puebla, Nuevo León and Coahuila. In addition to the advance in greenhouse cultivation, the efficient application of pest and disease control programs contributes to the above.

The cultivation of tomato in protected agriculture is also found in Sinaloa, Baja California and San Luis Potosí, although it has also acquired importance in other entities such as Jalisco, Sonora, Guanajuato, Baja California Sur and Oaxaca

EXPORTS

With a value of 2,079.5 million dollars and a share of 12.8%, tomato was the second most important agricultural product in the value of Mexican agricultural exports in 2018, after avocado. 1.68 million tons were exported, a maximum historical volume and equivalent to 48.7% of the estimated national production of this vegetable.

Between 2008 and 2018, the value of Mexican tomato exports grew at an average annual rate of 5.4%, while the volume did so at an average annual rate of 4.7%.

The United States is the main destination of Mexican tomato exports, with a 99.7% share of the total in 2018; the rest was exported to the markets of Canada, Japan and Costa Rica.

Mexico's main competitors in the international supply of tomatoes are The Netherlands, United States, Guatemala, New Zealand, Spain, Morocco, South Korea, France, Portugal, China, Peru and Honduras.

Bell Pepper

OVERVIEW

Mexico records an area planted greater than 9,200 hectares of bell pepper. The bell pepper in Mexico is a crop of high profitability and is thus exported to various countries around the world, mainly to the United States.

About 50.3% of the area sown is cultivated on open fields, while 49.6% was under protected agriculture that includes production in greenhouses, macro tunnels and under shade.

Only 29 hectares of the 9,260 planted were registered as temporary surfaces in 2016, meaning that they were likely used for other crops as well. Sinaloa is the state with the largest area planted for bell pepper, it had 3,266 hectares in the open field in 2016 that represented 35% of the total hectares registered nationwide.

MAIN AREAS OF PRODUCTION

The states with the largest area of bell peppers registered under greenhouse are Jalisco and Guanajuato. Both contribute 6% of the total area and is all in greenhouses. Each state contributes an equal 3% of the surface.

The yields range from 44.85 tons per hectare in open-air cultivation, to 113 tons per hectare in greenhouse cultivation, in shade mesh the average yields range from 61-88 tons per hectare.

The states with the largest area planted are Sinaloa, Sonora, Guanajuato and Jalisco.

EXPORTS

RANK	COUNTRY	EXPORT VALUE 2018 USD	SHARES EXPORT	IN	1-YEAR GROWTH IN VALUE	3-YEAR GROWTH IN VALUE
1	Unites States	1.5B	86.7%		+16.3%	+24.4%
2	Canada	174.72M	13.1%		+8.0%	+31.8%

Bell Pepper top 2 export destinations, Source: USDA

The main export destinations of Mexican bell pepper are the United States and Canada.

Cucumber

OVERVIEW

In Mexico, the production of cucumber plays a very important role because its consumption generates a high demand in both the national and international markets. Over 700 thousand tons of it are cultivated throughout the year. It should be noted that in Mexico two main categories are grown: cucumber for slicing and cucumber for pickling; the first represents 80% of the total volume exported for fresh consumption, while the second is destined for agribusiness. Thanks to this, the Mexican cucumber has positioned itself among the main vegetables worldwide.

Cucumber can be produced year-round, either under protected agriculture or on open fields, having greater results during the months of February, March and April with a production of 44% of the total nationwide. The year-round growth allows for the generation of more jobs.

MAIN AREAS OF PRODUCTION

The states of Sinaloa, Michoacán, Baja California, Morelos and Veracruz are the main cucumber producers.

Sinaloa is the state that produces and exports most of the cucumber. It is the state's second most important crop after tomato. Of the 817 thousand tons of cucumber that were produced in Mexico during 2017, Sinaloa contributed 360 thousand.

EXPORTS

The country is ranked number 11 in volume as a worldwide producer with just over 16 thousand hectares destined to produce this vegetable. Furthermore, Mexico is also among the top list of exporters, followed by Spain and The Netherlands. The United States is the main consumer of Mexican cucumber, with an import of 83% of the total produced. The rest of the exports are sent to Canada.

Mexico is amongst the three countries that exported the highest dollar value worth of cucumbers during 2018:

- Spain: \$706.1 million dollars (26.4% of total cucumbers exports)
- The Netherlands: \$565.3 million dollars (21.2%)
- Mexico: \$521.4 million dollars (19.5%)

Ornamental Plants and Flowers

Mexico is the third largest producer of ornamental plants world-wide and occupies the third place in surface area for the cultivation of ornamental plants, with a steady conservative growth of 2 to 3% yearly. The ornamental market in Mexico generates over 188 thousand permanent jobs, 50 thousand temporary and more than a million indirect jobs.

In terms of production, in Mexico there are 22 thousand hectares destined for this activity; from these, about 8 thousand hectares take place in greenhouses. Main production is distributed among states such as Morelos, Jalisco, Michoacán, Tabasco and the State of Mexico that occupies the first place in flower production nationwide.

According to CMF, in Mexico most of the production of ornamental plants is carried out with passive and semi-active technology. Many producers use plastic and some use irrigation systems. The ornamental crops that have the highest technological level are rose, gerbera and poinsettia.

Types of plants and flowers

Among the ornamental plants that are grown in Mexico we can find flowers such as gladiola, rose, Liliium carnation, rootless cuttings, as well as other plants such as potted plants and foliage. Most of the production is done outdoors and the rest is done in greenhouses and nurseries.

According to statistics of SAGARPA, these are the production figures corresponding to the period between March 2016 and March 2017 regarding the production of the main ornamental crops in Mexico:

- Rose: 2 million 390 thousand cuttings (each cutting equals 12 dozen or 144 units), this flower occupies the main volume in the cultivation of ornamentals with a participation of 51.9% of the national total and is cultivated in an area of 717 hectares.
- Chrysanthemum: 1 million 464 thousand cuttings, this flower occupies 31.8% of the national total.
- Gerbera: 491 thousand cuttings, this flower currently occupies 10.7% of the national total of ornamental production.
- Gladiola: 256 thousand cuttings, this flower occupies 5.6% of the national total.

Of the total production, it is estimated that 90% goes to the domestic market and only 10% is destined to export markets.

Although it is not among the top five flower exporters, where The Netherlands, Colombia, Ecuador, Ethiopia and Kenya are the leaders, Mexico has enormous potential to grow in the international market. Moreover, according to CMF, Mexico exported a value of 83.9 US million in 2018. Of the total flower production in Mexico, 6 to 8% is exported mainly to the United States, where the most demanded flower was the rose, and the remaining percentage is mainly exported to Canada. Furthermore, the domestic market for ornamental plants and flowers is large for Mexican producers, which is why they are not exporting as much as CMF would like.

“We are reaching to national and foreign companies with experience in the sector and in exports to interest them in exporting Mexican flowers and plants as the sector is vulnerable in case of an economic crisis in the country. We would also be very interested if there could be a cluster or a leading company aiming to this objective.”

- *Federico Martínez, CMF (Mexican Council of the Flower Industry)*

It is important to note that the domestic traditional market is saturated and producers who wish to export often try to aim for domestic non-traditional markets first, such as store chains, and even here, the maximum potential has not been developed yet. The biggest issue being that there are still too few producers.

As for trends, the consumers in the north of the country are the ones who demand new varieties. There are companies in the country that sell vegetative material that they bring from all over the world, and the leading local producers set trends that smaller ones then follow.

State support for flower growers

As mentioned before, SADER indicates that FIRA offers access to financial resources through commercial banking or through non-banking institutions, as well as support for training, advice and consulting, so that producer organizations develop their companies. In addition, it also provides support to strengthen its productive, technological and financial skills through technological improvements and training of human resources, to increase efficiency in its administrative, accounting, marketing and marketing processes.

Risks for the ornamental sector in Mexico:

- The potential collapse of the domestic market in case of an economic crisis in the country. Therefore, it is important for producers to export.
- Lack of support and financing from the government. Federal government which took office in December 2018 changed policies that were in force for the last years, and flowers and plants producers are not receiving the support that was offered before.

Challenges:

- Mexican producers need to invest in technology to increase their domestic and international sales. The producers that serve the traditional market will remain the same. Those who sell to store chains or export will have to invest in technology.
- Producers need to diversify their markets.
- Producers require a joint effort to market their products but there is a lack of team-work culture among producing companies in the sector. As said by CMF, in Mexico there are on average farms of one hectare

(except for the very large ones), but there is no marketing scheme like the Dutch have, where the average size of the producer is equal to or less than that of Mexico, but they have cooperatives and auctions.

- Piracy currently causes incalculable economic losses to the production of ornamental cut and pot flowers, by evading the payment of royalty charges, which protect from unfair competition. Although, there are large companies that on average produce between 10% and 30% without paying the rights, there are cases of companies where 100% of their production is pirated because they do not pay royalties. While in the United States there are around 2,000 registered chrysanthemum varieties, in Mexico there are barely 30, precisely for this reason. This damages those who do pay royalties, a remuneration that barely represents 1 or maximum 5% of the total production cost, since the price of a dozen pirated chrysanthemums is up to 50% cheaper than a dozen of legal ones, which generates an unfair competition.

Orchids

With an annual generation of 2 million orchids, Mexico is the second largest producer in Latin America after Brazil. Moreover, Mexico is the seventh global phalaenopsis orchid producer. The phalaenopsis orchid is the most produced orchid worldwide. It is highly valued because of its ornamental value. Its growth period is also faster when compared to other orchids of its kind.

The State Council of Ornamental Producers of Morelos AC (Cepomac) indicated that Mexico has the potential to become one of the most important exporters in the world. This would require the coordination with partners in the value chain and work programs to implement further production and meet the characteristics that the international market demands.

There are approximately 25,000 species of orchids in the world. 1,260 have been located in Mexico, of which 444 are endemic. The Agri-Food and Fisheries Information Service of the Mexican government points out that most orchid species (Orchidaceae) are found in the tropics and subtropics and are characterized by having a remarkable capacity for adaptation. At the end of 2017 Jalisco and Tamaulipas produced one million 61 thousand plants, with a value exceeding 6.8 million US dollars.

Risks:

- The southeast of Mexico - together with the state of Oaxaca - houses the largest number of orchid plants, however its territory suffers significant deforestation every year.
- Climate change.
- Potential danger of diseases, pests or plant disorders.

Challenges:

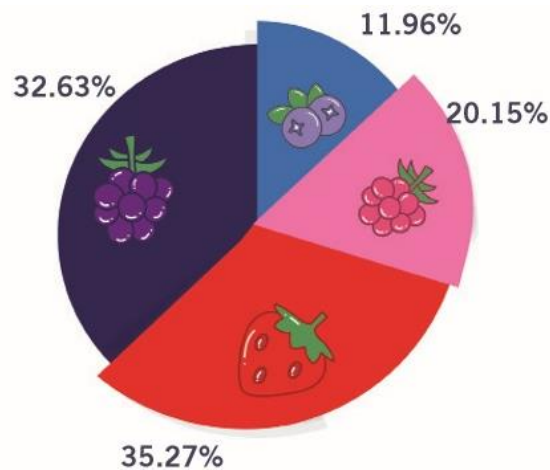
- Authorities must control deforestation, and fight against corruption within the system that allows these deforestation activities.

Berries

OVERVIEW

Strawberry accounts for most hectares with 35.27%, followed by blackberry with 32.63%, raspberry with 20.15% and finally blueberry with 11.96%. Blueberry is the crop that has experienced the greatest growth in recent years.

With a growth of almost 90% in the berries industry during the last six years, Mexico is placed among the top five producers of berries worldwide. To continue this growth, the industry needs to develop technologically and expand its markets. It is a sector that generates around 350 thousand jobs.



Distribution of National Surface per type of berry, Source: ANEBERRIES

“The berries industry generates more jobs than avocado. It is one of the sectors with less informal employment due to the promotion of social responsibility in the sector. Our association also seeks to have our members offer better salaries for workers and professionals to benefit employees and to avoid rotation”.

- Juan José Flores, ANEBERRIES

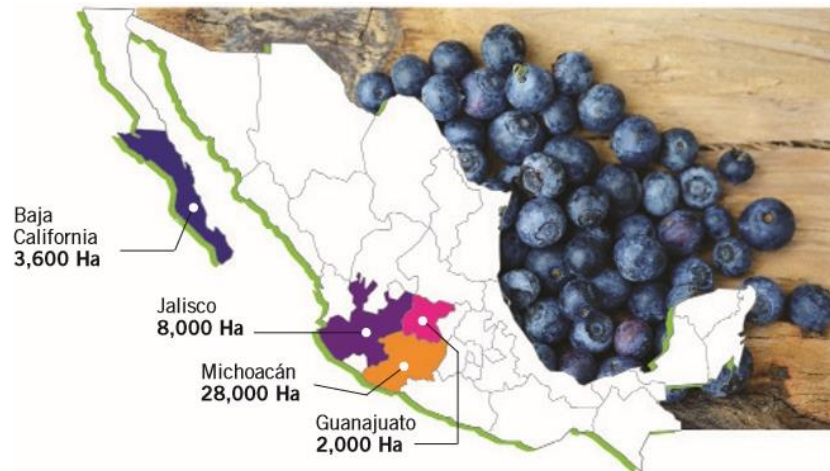
According to the Agricultural Council of Jalisco (CAJ), innovations are used in the production processes so that crops are profitable and to avoid environmental disorder.

Some producers see long- and short-term trends and technologies in the production of berries, such as one that is already common, substrates for blueberries. Approximately 40% of the fields that are being planted this year are blueberry in a substrate and in a pot, thus no longer directly in soil. The main advantage is that it saves on performance and has many benefits in terms of sustainability: less water, better and more concentrated use of resources, and more solid tunnels. According to berry producers, this trend is also being applied for raspberry growth. It is expected that the substrate will continue to grow also in the production of blackberry.

In the end it is about how to obtain a competitive unit cost and the best quality, because everyone competes in the same markets and they want to arrive with the lowest cost and the best quality. This is especially so for the production of Mexican berries as this technology is already being used in Europe.

MAIN AREAS OF PRODUCTION

Currently the cultivation area of berries in Mexico reaches 44 thousand hectares, from which 30 thousand are under protected horticulture. Main producers of berries are the states of Michoacán, Jalisco, Baja California and Guanajuato.



Berries surface in México, Source: Aneberries

EXPORTS

Around 97% of Mexican berry production is destined for the North American market, although it also has a presence in 35 other international markets. Only 1.75% of production is allocated to the European Union. In 2018 Spain received about 11 thousand kilos of blueberries and the same amount in strawberries.

According to ANBERRIES, the production of berries altogether - raspberry, blackberry, blueberry and strawberry - has positioned itself as the third most exported product and generator of foreign exchange in the agri-food sector after beer and avocado, at 2,2 billion US dollar.

Risks:

- According to ANEBERRIES, the organization was created 9 years ago to represent the industry and to improve food safety. Whereas food safety is currently the biggest risk for the industry.
- 30 or 40% of workers arrive from the southern states, mainly Oaxaca, Guerrero, Chiapas. This brings opportunities, but also risks of a cultural nature and migration itself. Many workers arrive to stay, but others migrate to other states or other industries all together.



Challenges:

- Some of the challenges for Mexican producers are high demand for labor, social responsibility, internal migration in the country, foreign trade (its market depends on 97% of the United States) and sustainability. Also, the need of programs for genetic improvement of varieties to produce with less water resources and be more resistant to pests.
- To have better infrastructure: more efficiency with the use of water management (better technologies and use of the resource itself), more efficiency with the use of natural benefits, the climate, to achieve greater production. Water recirculation is a priority issue for ANEBERRIES.
- The industry faces a new challenge as international markets not only want to know that a fruit is safe and that it has safety certifications, but also want to know that in its place of origin the production was carried out under labor standards and international social responsibility. And in that sense, there are more certifications such as SMETA, GlobalGAP (already incorporates it), AHIFORES, and Fairtrade to name a few.
- The reduction of government budgets and programs that encouraged the agricultural sector such as ProMéxico, ASERCA, among others. All this leaves a complex scenario. Therefore, the different organizations of the sector seek to organize and create different schemes to have a budget, to be able to support those services that the government gave, but that no longer exist.
- It is necessary to obtain better prices for logistics and better conditions for handling products.

Tropical fruits

Mexico ranks among top producers of avocado, lemon, guava, mango, orange and papaya.

Michoacán is a clear example of the states where there is a consolidation of fruit growers. Currently, the entity's producers are exporting mango to Canada, the United States, Japan, France, Germany, The Netherlands and Spain. Similarly, banana producers send their product to the United States, Serbia, Italy, England, Spain and Germany.

Mexico has climatic advantages that allow it to produce fruits all year round and with the increase in demand from the United States the sector grows every year.

Mexican agricultural products have managed to expand supply and consistency due to the diverse geographical distribution of production. Agri-food exports depend on several states of distinct climates being able to provide the product during separate windows.

The following sections will focus on avocado, citrus and mango as three of the main tropical fruit crops of the country.

Avocado

OVERVIEW

Historically, Mexico has led the world avocado production, the Dominican Republic being the second largest producer with 8.5% of world production.

The avocado production in Mexico has presented a steady increase. In 2018, with data from the Agrifood and Fisheries Information Service (SIAP), a production of 2.18 million tons was obtained, representing an annual increase of 7.6%.

In the last five years avocado production has grown at an average annual rate of 9.5%. Production projections are on the rise, production of 2.61 and 3.16 million tons is expected in 2024 and 2030, respectively.

MAIN AREAS OF PRODUCTION

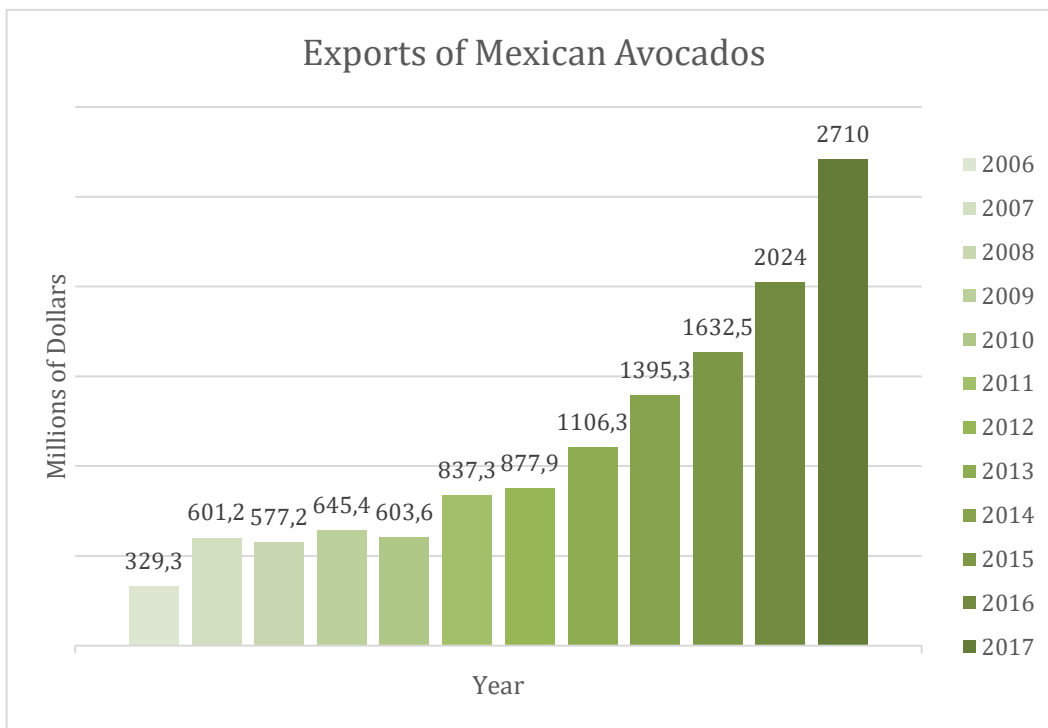
Michoacán is the main avocado producing state. In 2018 it was responsible for 76.7% of the national production, followed by Jalisco and the State of Mexico, with 9.2 and 4.5%, respectively. The harvested area was 206,000 hectares, the main producer participated with 73.8%, while Jalisco and Estado de México, with 9 and 4.3%, in that order.

The increase in national production in the last cycle is due to the increase in the harvested area, which increased by 7.6% at an annual rate; meanwhile, the national average yield was reduced by 1.6%.

EXPORTS

Avocado is one of the most important export food products in Mexico. In 2018, this fruit contributed 6.5% of the value of national agricultural production and ranked third, after corn and sugarcane. In that year, avocado exports occupied the first place in the value of the country's agricultural exports.

The main export destination for the Mexican avocado is the USA, followed by Canada, Japan, Honduras, France and Spain.



Exports of Mexican Avocados, Source: Mexicomagico.org

An Innovative Project

Since 1997, APEAM (The Avocados Producer and Exporting Packers Association of Mexico) has been the only cooperating partner of the USA through the US Department of Agriculture (USDA) for the export of Mexican avocado; but it has also been responsible for promoting the fruit under the AFM brand and maintains an intense promotion strategy in its main market, the US.

Avocados from Mexico (AFM), its marketing arm in the US, has partnered with Trinity Groves to open its first casual gourmet restaurant in Dallas, Texas, called AvoEatery. The restaurant that opened in January of 2020, focuses entirely and exclusively on the Avocados of Mexico. Trinity Groves, which owns and operates the restaurant, encourages the growth of startups, through the culture of innovation. It is known for its incubation program that encourages creating and presenting unique gastronomic concepts to a team of experienced restaurateurs.

Risks:

- The constant threat of agricultural pests and diseases.
- Theft and extortion by criminal groups in the region.
- Potential migration from workers to other activities.
- Environmental issues: High rate of deforestation in the country, threatening wildlife and increasing atmospheric greenhouse gases. Also, a large part of avocado plantations are being cultivated illegally and without control. This irregular expansion of avocado cultivation is a latent problem with serious ecological repercussions. There is no supervision whatsoever, therefore, the establishment of a large part of the avocado plantations is carried out in places that are not suitable for this, since they are forested areas that are key for the collection of water and for other regulatory functions in the landscape that avocado cannot meet. The avocado does not collect as much water as the forest; This requires much more liquid for their growth than trees, which is creating a water deficit.

In addition, there is the problem of established orchards where other factors such as soil degradation occur because producers eliminate the grass leaving it without herb cover, and avocado crops easily erode the land without the possibility of recovering it. Currently there are many serious problems of contamination in the aquifers and in the lakes near the production areas, due to the runoff of nutrients in the lower parts, which causes the generation of lilies, loss of productivity and turbidity that gradually deplete the bodies of water.

Challenges:

- To continue and strengthen food safety through constant activities and communication within the sector.
- Due to the presence of criminal groups in Michoacán, the challenge is to increase safety for producers, workers and transportation services. This should be done by municipal, state and federal authorities and corruption needs to be eradicated in order to succeed on this effort.
- Due to the insecurity problems that this region of the country is experiencing, there is a threat from the United States to suspend the certification of avocado from Michoacán. However, both producers and marketers are optimistic about the future of the product

Citrus

OVERVIEW

According to SAGARPA, Mexico is strongly positioned globally as a citrus producer. It is second place as a lemon producer, fourth place as a grapefruit producer, and fifth place as an orange producer.

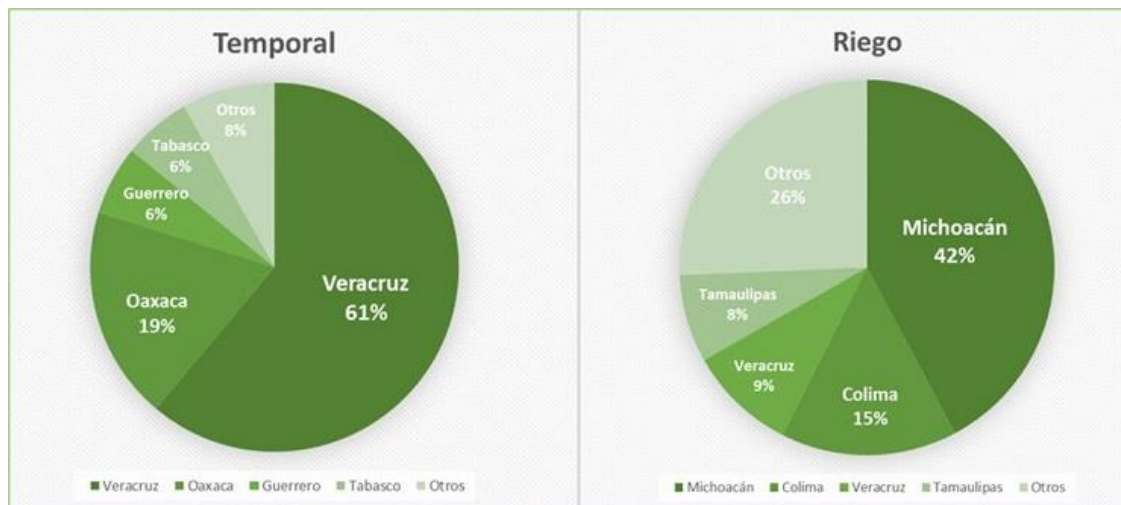
According to SADER, citrus production contributes 2.78% to the national agricultural Gross Domestic Product (GDP) as follows: lemon 1.50%, orange 1.15% and grapefruit 0.13%.

Lemon production in Mexico is represented by three main cultivated varieties:

- Persian or seedless lemon (*Citrus latifolia*)
- Mexican, green or bitter lemon (*Citrus aurantifolia*)
- Yellow, Eureka or Italian lemon (*Citrus lemon*).

MAIN AREAS OF PRODUCTION

Currently, the states with the highest production are Veracruz, Michoacán, Oaxaca and Colima, which together contribute 75% of the national production. However, there is a marked division between the lemon-producing areas in Mexico. On one hand, the Gulf of Mexico, composed of the states of Veracruz, Tabasco and Chiapas, mainly produce Persian lemon for the export market, while on the Pacific coast states such as Colima, Michoacán, Guerrero and Oaxaca are especially dedicated to the production of Mexican lemon to supply the national market. The state with the highest yield of Persian and Italian lemon is Tamaulipas, while for Mexican lemon it is Sonora. The differences in yields are largely due to the technological variations of each place.



Seasonal and irrigation systems, Source: INTAGRI (Institute for Technological Innovation in Agriculture)

The characteristics of the two main production systems used are:

- Seasonal/rain: 72 thousand hectares are distributed throughout the country, representing 39% of the total area planted with lemon, a percentage that has been reduced over the years due to the technification of the farms with irrigation systems. There is a large number of producers that still use low levels of technology. With 82.8% of its surface, Veracruz is the state that produces most under this scheme.
- Irrigation: There are 108 thousand hectares under irrigation that represent 60% of the area planted with lemon. Currently, the state with the largest area sown with lemon with irrigation is Michoacán, where around 99% of the area has some irrigation system. The average yields of the three cultivated varieties vary from 5 t / ha to 15 t / ha.

EXPORTS

Mexican exports of these products are mainly destined for the US, followed by France, The Netherlands, Japan and the United Kingdom, among others.

Nowadays Mexico occupies the second place worldwide in the production of lemon (Persian and Mexican, mainly), where 70% of the total goes to the national market and the rest to the export market, mainly to US. The export market has encouraged the growth of the production area, especially of Persian lemon, while the Mexican lemon market is concentrated in national consumption as consumption per person is 14.3 kg per year. In addition, in a few months of low production, a small amount of this citrus is imported.

In recent years, the crop experiences a slight increase in production, mainly Persian lemon. This production is favored by the export to USA, which represents 91.3% of total exports, and by the opening of new markets such as: Poland, Saudi Arabia, Ukraine, Japan and South Korea.

Risks:

- Pests and diseases of significant importance, such as huanglongbing disease (HLB) or yellow dragon that causes significant losses in its appearance and is a strong threat to farms.
- Climate/weather. Water shortage and droughts are expected in the state of Veracruz in 2020.

Challenges:

- The lack of technology and information, as there is currently a large area without any irrigation system.
- Lack of improvements in obtaining quality fruits. The US market accepts Persian lemon but an improvement in quality would raise the price by having access to more valuable markets such as Asia or Europe where it is considered exotic.
- To consider each of the possibilities of expanding the citrus market so that there is no dependence on a single trading partner such as the USA.
- Selection of land with productive potential. Many areas with potential are not developed properly or are

not fully exploited due to lack of knowledge.

- Integrated management of pests and diseases. The need to install sanitary measures to stop the entry of new pests
- Need of better logistics costs. Difficulties to explore new international markets due to the high cost of transport. Only large and high-quality companies can introduce their product into these markets.

"The goal for Mexico is to work on a faster track for exporting fruits/vegetables to the Netherlands. The time shipments by boat nowadays take will be reduced to 12-14 days. This way, Mexico will be able to compete with leading exporting countries like Peru. Consequently, the export potential of Mexican fruits can then be better exploited. This generates interesting opportunities for Dutch importers of fruits and vegetables!"

Mango

OVERVIEW

The mango industry is the business that moves 500 million dollars a year and where Mexico is positioned in fifth place of production.

Mango production in Mexico is benefited by the climatic advantage over other countries in Central and South America, while the increase in exports is due to the planting of a large variety of mango in the country, with greater demand and acceptance by international markets.

	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP
Ataulfo								
Haden								
Tommy								
Kent								
Keitt								

Mexican mango season per variety, Source: hortalezas.com

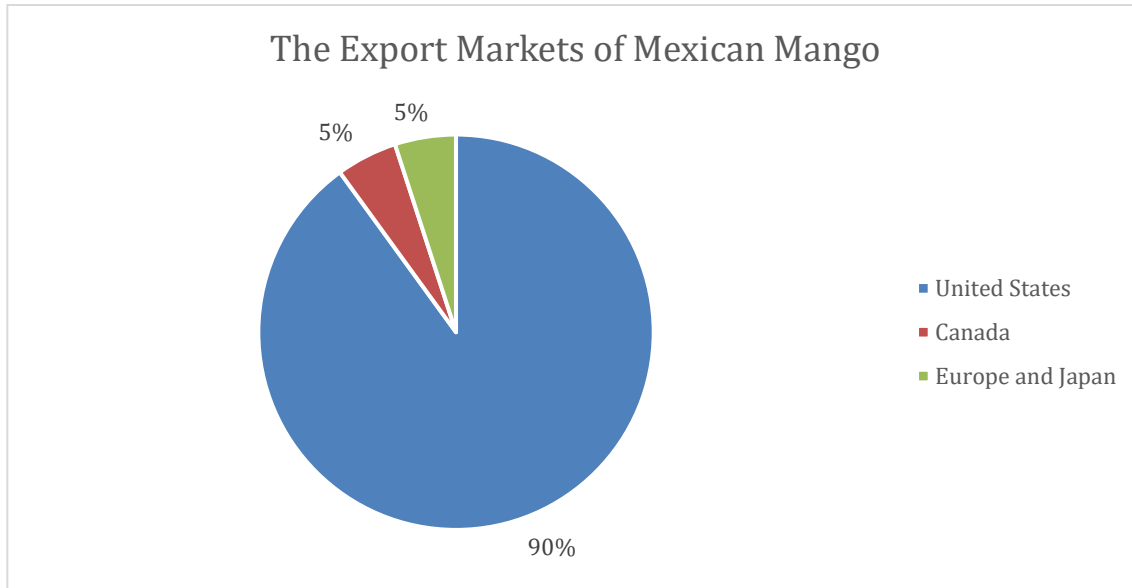
MAIN AREAS OF PRODUCTION

The Mexican tropics is an important territory for mango production. The areas with the highest yield are distributed in Sinaloa, Nayarit, Tamaulipas and Veracruz, and constitute regions of high productive potential. This fruit is harvested mainly between April and July, and on average one and a half million tons are obtained each year. It is a fruit with significant importance in Mexico's agri-food exports.

EXPORTS

Mexico is the largest exporter of mangos to the United States with a long season from February to September. During the previous five campaigns, Mexican imports into the US accounted for 67% of (total) mango shipments into the US.

Mango sales have increased in recent years, positioning it as one of the most commercialized tropical fruits in the world, after banana, pineapple and avocado. Mango exports are mostly sold as fresh fruit and only 2% in pulp or juice. Moreover, Mexican mango is exported to 28 countries, with the United States and Canada standing out, which together acquire 95% of the exports. Recently there has been an increase in demand from mango.



Export markets for Mexican Mango: US, Canada, Europe and Japan, Source: hortalizaciones.com

The import of Mexican mango has as main clients the US and Canada, as they request 66% and 64%, respectively, of the total mango that their domestic market demands, while Japan satisfies almost 50% of its demand with mangoes grown in Mexico.

"We want to increase export volumes to the European Union, for which we want to improve logistics with Europe. In fact, we have a post-harvest protocol for exporting fresh mango to Europe by sea. The research for this protocol was done in collaboration with Wageningen University in the Netherlands and with ITESO in Guadalajara. The research started in 2018 and was concluded in 2019".

- *Francisco Villegas, President at EMEX (Mexico's Mango Exporters Association)*

According to EMEX, it is feasible to have a protocol to export Mexican mango to China. They have taken the necessary steps, expecting to have this approved and in operation within two years. Also, for EMEX it would be very interesting to approach the Middle East market, where they have conducted pilot tests.

Risks:

- Presence of fruit fly and white scale.
- Exports take place predominantly to one market, namely the US.



Challenges:

- To implement a comprehensive technological package for mango production and to aim to process automation from field to packaging.
- To minimize seasonality and develop new varieties.
- Access to market studies of the fresh product, as well as mango by-products in national and international markets.
- Development of a comprehensive promotion plan to increase mango consumption and encourage market diversification.
- To carry out phytosanitary campaigns for the commercial areas against the fruit fly and the white scale.
- Implementation of a pollution risk reduction system oriented to good agricultural practices and good mango manufacturing practices. Consolidation of food security both in the field and in the packaging.
- To develop a quality seal that differentiates Mexican mango from other productions and confirms the high quality and food safety that characterizes this Mexican product.

SCIENTIFIC KNOWLEDGE ON MEXICAN HORTICULTURE

Research and development for the agricultural sector in Mexico is mainly carried out by government institutions and agencies and/or academic organizations.

The research is carried out by institutions and universities with national and international leadership and recognition, which have the task of responding to the demand for knowledge and technological innovation for the benefit of agriculture in Mexico. There are examples of this kind of work with different institutes such as Autonomous University of Chapingo (UACH) and the Superior Agricultural College of the state of Guerrero (CSAEGRO).

Nevertheless, according to the people interviewed for this study, there is a large amount of agricultural studies and research that remains at the academic or scientific level but there is no development, or real application of the conclusions reached by such efforts. Producers or representatives of the sector do not have access to these developments in a practical way.

Interviewees also said that Mexico is already over-diagnosed. Foreign countries, like The Netherlands, have participated in studies for the Mexican agriculture sector, and many situations remain the same in the country. There are no significant changes. Thus, it is necessary to implement concrete actions with concrete objectives.

On the other hand, the need for knowledge in the sector is growing and the technologies currently used are mostly passive. This is an area of opportunity for foreign companies and institutions to work hand in hand with the sector associations, institutions, and growers.

The Netherlands has played an important role in the development of the protected horticulture growth in Mexico, being one of the countries that has actively and largely shared knowledge and experiences with Mexican institutions, both private and government, and companies. Horticonnect is an example of this kind of collaboration, which gathers Dutch companies that offer complimentary services and technological knowledge to Mexican growers for a better use of resources.

COMPETITION IN THE SECTOR

The further development of the horticulture sector in Mexico has generated a dynamic of competition that has strengthened the production of certain crops and weakened the capacities of some others.

Berries, citrus fruits, avocados and lemons have reached average annual double-digit growth rates, well above the value of world production. Mexico has become one of the strongest competitors in these crops. On the other hand, those who monopolize a large part of production (both in volume and value), such as corn, wheat and beans, have an annual growth rate of 2.6%, 2.1% and 2.4%, respectively. However, these growth rates are lower than the global ones, so that in the medium term they could lose competitiveness.

The production value of some crops is very relevant; such is the case with avocados. These crops have a higher productivity than the world average, so it can be considered that the country is well positioned and has space to continue to capture participation in global markets.

Relevant crops such as corn and tomato have increased productivity, but not necessarily due to improvements in production methods, since the area planted has decreased. That is, only in regions that were already productive farmers continue to sow such crops, while those that were not stopped sowing them or replaced them with others. However, it is important to note that the productivity of corn is below the world average, while that of tomato is above.

International companies participate in all stages of production, distribution and consumption of agricultural products in Mexico. They participate in the production of seeds, the production and sale of agrochemicals, the financing, the purchase, storage and sale of agricultural products, in the production and sale of agricultural machinery and implements, in importation and exportation, and in the industrialization of agricultural products.

Based on data from The Office for Economic Affairs (SE), during 2018, total foreign direct investment (FDI) from the Netherlands in Mexico reached 605.2 million dollars, and one of the most attractive sectors for Dutch investors is agri-food.

According to the SE, Querétaro recorded the arrival of 10.8 million US dollars from the Netherlands in 2018 and San Luis Potosí, 8.5 million US dollars.

There are 60 Dutch companies already installed and with interests in the Bajío region, specifically in Querétaro and Guanajuato.

Regarding competition in Mexican protected horticulture for the Dutch companies, the Netherlands has been present in the region for a long time and their reputation is well-known among producers and branch organizations.



According to contacted companies, main competitors are, in that order:

- For climate control: companies from The Netherlands, Spain and Israel.
- For irrigation: Israel and Spain.
- For labor control software: The Netherlands and Israel.

Although in Mexico Dutch technology is most of the time more expensive, it is well known that The Netherlands is one of the best countries in the horticultural sector. It also known that the Dutch technology is superior in quality, level of productivity and efficiency.

In Latin America, The Netherlands already has a reputation for being expensive compared to, for example Spain and Israel. Spanish and Israeli suppliers often provide inferior products for lower prices; therefore, the competition is fierce.

Trust and loyalty play an important role in doing business in Mexico, which means that it might take some time to trust new companies in the sector. Therefore, Dutch companies that want to enter the Mexican market, should make good use of the Dutch network in the country for a smoother entrance.

STAKEHOLDERS IN THE HORTICULTURE MARKET IN MEXICO

Some of the main stakeholders in Mexico include:

Agro Park Querétaro: As mentioned before, it is a comprehensive center geared towards horticulturists who want to successfully compete in the US and Canadian export markets. The 823-hectare park was launched in 2006. Agropark is managed by an association in charge of ensuring sufficiency and opportunity in services for established companies, and its operation is based on the competitive advantages generated by the business relationship of its tenants, as well as its outward connectivity with support companies and direct network participants that facilitate the fluidity of the business scheme.

ANEBERRIES: The National Association of Berries Exporters, represents exporters of fresh Berries from Mexico to facilitate exports, ensure food safety, promote and defend the trade and opening of new markets. It congregates the berries industry in an organized and specialized association and protects the industry interests.

Autonomous Agrarian University “Antonio Narro”: The Antonio Narro Agrarian Autonomous University, or Universidad Autónoma Agraria Antonio Narro in Spanish (UAAAN), is a public university in Mexico dedicated to the Agricultural, Silvicultural, Animal Production, food and Environmental Sciences. A substantial amount of its land is occupied by experimental and demonstrative plots including annual and perennial crops in greenhouses (growing vegetables and ornamentals). The UAAAN has several agricultural experimental fields across Mexico.

AMHPAC: The Mexican Association of Protected Horticulture concentrates vegetable producers from 24 states of the country, particularly of three main crops: tomato, cucumber and bell pepper, and includes farmers who grow under protected structures. The association has around 230 members, of whom 170 are producers and the rest are suppliers of goods and services. The association focuses on improving agricultural planning through the collection and analysis of information, technological innovation and assistance in the search for value-added products, crop diversification, as well as the search and evaluation of new markets.

APEAM: The Avocados Producer and Exporting Packers Association of Mexico, is a private non-profit association made up of avocado growers and exporter packers. It is the only Mexican cooperating partner in the United States recognized by SADER, as well as USDA-APHIS for the export of avocado from Mexico, and is also in charge of promoting the fruit in other countries, always under the brand name of Avocados From Mexico. Among its main activities are linking and promoting the consumption of avocado in the United States, Canada, Japan, China and the world.

The association seeks to maintain the leadership of Avocados From Mexico by offering the national and international markets a top quality product in terms of flavor, safety, traceability, produced in an efficient and sustainable manner.

CAADES: The Confederation of Agriculture Associations of the State of Sinaloa is an organization made up of 11

Agricultural Associations, which represent more than 30 thousand farmers with the aim of protecting and promoting the development of farmers from the state of Sinaloa. It seeks that agriculture be considered as a national strategic sector, influencing public policy decisions so that they allow achieving the sector's profitability, as well as increasing the sector's competitiveness and consolidating cutting-edge services for the producer.

Ceickor University Center: This is a private Mexican company in the agribusiness sector, for the development and transfer of knowledge on best greenhouse production practices. It resulted from the alliance of two companies committed to human development and improving the competitiveness of Mexican agriculture: Instituto Agropecuario Rapel and Koppert México. Its Consulting and Research and Development areas aim to generate and transfer knowledge to transform protected agriculture in Mexico and the world.

Chapingo Autonomous University: The Chapingo Autonomous University is a public institution in charge of teaching and research in agronomic and environmental sciences, focused mainly on the development of rural areas. Its leadership and national and international recognition of its services and the transfer of the scientific and technological innovations it performs, as well as the importance and magnitude of its contributions in scientific and technological research, stand out.

CONAPA: The National Council of Avocado Producers seeks to achieve permanent integration, communication and coordination between the agents in the chain and with the different levels of government to harmonize production with consumption and to generate competitive quality products with the health and safety levels that the market currently demands. It also seeks respect for the environment and to promote the integration of the entire agri-food chain.

CMF: Mexican Council of the Flower Industry gathers flower producers and supports and orients them in their operations in Mexico and abroad, encouraging to diversify products and markets. The Council is the spokesperson with the government to achieve better conditions for its members.

CNA: The National Agriculture Council is one of the 7 top organizations of the Business Coordinating Council (CCE) that focuses on the representation, defense and promotion of agricultural activity. It represents the country's private agri-food sector before the public, private and social sectors.

EMEX: Mexico's Mango Exporters Association is the association that represents the mango of Mexico in the world and supports the Exporting Companies of Mango in the fulfillment of the export protocols. Based on mango programs in Mexico, it supports research, phytosanitary regulations, post-harvest treatment, packaging improvement, marketing, and coordination between Mexican and foreign authorities. Mango packers in Mexico have the support of EMEX to coordinate, facilitate, improve, optimize and innovate their export process, adding quality to their services and product.

FIRA: Trusts Institutions in Relation to Agriculture is an institution dedicated to supporting the development of the country's rural, agricultural, forestry and fishing sectors through financial intermediaries and specialized companies.



FIRA provides credit, guarantees, training, technical assistance and technology transfer so that rural producers and companies can start or grow their productive projects. FIRA facilitates access to credit through credit and discount operations, as well as the granting of credit guarantees to projects related to agriculture, livestock, poultry, agribusiness, fishing and other related activities carried out in rural areas.

INIFAP: The National Institute of Forestry, Agricultural and Livestock Research INIFAP is an Institution of scientific and technological excellence with leadership and national and international recognition for its ability to respond to the demands for knowledge and technological innovations for the benefit of agriculture, livestock and society in general. It focuses on generating scientific knowledge and technologies that contribute to the sustainable development of the country's forestry, agriculture and livestock subsectors.

SADER: The Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food is an entity of the Federal government, whose objectives are to promote the exercise of a support policy that allows for better production, better use of the comparative advantages of the agricultural sector, integrating the activities from the rural environment to the production chains of the rest of the economy, and stimulate the collaboration of producer organizations with their own programs and projects.

SE: The Office for Economic Affairs is one of the state secretariats in charge of the administration, regulation and promotion of industry, commerce and the provision of services. It focuses on developing and implementing comprehensive policies for innovation, diversification and productive and commercial inclusion, as well as stimulating national and foreign investment, boosting the productivity and competitiveness of industrial sectors, which allow their integration into regional and global value chains.

SUSTAINABILTY AND CIRCULARITY

In order for the world to achieve sustainable development, the United Nations has established the Sustainable Development Goals (SDGs). This is a project where 193 countries have established 169 goals to implement in their respective countries to contribute to the world and its peoples. Mexico has set 17 goals in 'The 2030 Agenda for Sustainable Development in Mexico', which mainly focuses on 5 fundamental dimensions: people, prosperity, planet, collective participation and peace. These goals essentially form a roadmap to eradicate poverty, protect the planet, and ensure prosperity for all without compromising resources for future generations.

The 2030 Agenda does not focus on horticulture specifically, however the promotion of sustainable agriculture in Mexico is one of the sub-goals mentioned. The main reason is to promote sustainable agriculture is that poor agricultural practices are being carried out where food is wasted, and the environment is degraded.

The Mexican Horticulture sector can benefit from these goals set in place, yet Dutch businesses can contribute to these SDGs as well. Moreover, Dutch companies wanting to contribute can also add to the sector in other areas that might not have been included in the 2030 Agenda for Mexico. These extra goals can be taken from the Dutch SDGs for the Horticultural sector, principally from the 'Tuinbouwakkoord' of 2019 that was signed by the Dutch Ministry of Agriculture, Nature and Food Quality. Therefore, aiding the Mexican horticulture sector, while executing the same steps as the Dutch companies would do in The Netherlands in the current climate. A balanced mixture of both countries' goals might be the right step forward in order to create familiarity in a foreign market and contribute to developing it at the same time.

Mexico's current initiatives for its SDGs

Mexico has undertaken many initiatives to implement the SDGs with a long-term vision, including but not limited to the following:

- In 2015, the National Institute of Statistics and Geography (INEGI) created the Specialized Technical Committee on the Sustainable Development Goals (CTEODS), which is responsible for coordinating research on indicators that track progress on the implementation of the 2030 Agenda at the national level.
- As of June 2018, 31 of Mexico's 32 states have implementation and follow-up mechanisms (OSIs) for the 2030 Agenda. Some municipal governments have similar mechanisms as well. In Mexico, important progress has been made on the adoption of the 2030 Agenda. The Foreign Affairs Secretariat, for example, has organized four thematic discussions.
- Furthermore, during the development of the National Strategy, five regional dialogues were held with civil society organizations (CSOs) –in Mexico City, Colima, Mazatlán, Monterrey and Tuxtla Gutiérrez– in order to introduce the 2030 Agenda and adopt its perspectives, priorities and concerns.
- The government is in constant dialogue with the private sector, conducted through the Business Coordinating Council (CCE) and its associates. Other communication channels have also been established,

such as the Alliance for Sustainability (AxS), created by the Mexican Agency for International Development Cooperation (AMEXCID). The AxS has established five working committees in strategic areas.

- Working with the Inter-American Development Bank and their Climate Bonds Initiative. The climate bonds initiative is an investor-focused not-for-profit organization whose goal is to promote large-scale investments through green bonds and other debit instruments to accelerate a global transition to a low-carbon and climate resilient economy.

The possible Dutch contribution to the Mexican Horticultural SDG needs

As previously mentioned, Dutch organizations and companies could potentially contribute to the Mexican horticulture sector while at the same time aiding them in their SDG needs. This section will go into a few of the possible contributions that Dutch enterprises and organizations could make in this regard. Please note that the following is based on the data and information found on this topic and are mere suggestions to the companies wanting to invest in or base themselves in Mexico:

Greenhouses: Mexico wants to be able to provide more nutritious and *sufficient food to its population throughout the year*. This entails having a production capability that allows for enough productivity no matter what the season. Thus, as the Dutch are known for being specialist in greenhouses and greenhouse technologies, this can entail a thorough implementation of greenhouses across the country for various types of crops. This way, the crops can be grown all year round in a controlled environment with less labour needed, a higher chance of crops successfully being harvested until ripe and with a controlled and circular irrigation system that could save wasted water.

Waste management: The Netherlands is currently working on making sure *all non-human consumed residual products from food production and food consumption are being reused in the sector*. This could also be a benefit to Mexico, as the waste can be used for animal feed or as fertilizer for vegetable production. Animal feed nowadays mostly consists of residual products and raw materials. Therefore, decreasing the added materials needed means increasing the use of the waste as the raw materials itself. This saves money for the feed industry and takes care of the waste of the horticultural companies.

Natural fertilizers: As mentioned previously, waste from the sector can be used as fertilizers for vegetable production, or even other crops. In the Netherlands, *the use of synthetic fertilizers is set to decrease, and the use of natural ones will become the norm by 2030*. Thus, the Mexican horticulture sector can benefit from Dutch companies implementing the same. Going back to waste materials or manure instead of synthetic fertilizer can not only add to the circularity/sustainability of the sector but possibly also lower costs at the same time.

Innovation: The Dutch are well known for their innovation, especially in the Agriculture and Horticulture sector. This is especially important when it comes to the SDGs of Mexico, as *the country also aims to increase in innovation investment in the long run*. The need for international cooperation in rural infrastructure, technological development and research in order to improve production capacity in the country is now a bigger focus because of the 2030 Agenda. Therefore, Dutch enterprises can offer their expertise and innovation to further develop the horticulture

sector of Mexico in order to contribute to the improvement of the sector into a more sustainable and circular one.

Research: Mexico and the Netherlands have both done various researches on the horticulture sector of Mexico. However, extensive research is yet to be made on the need for increased circularity and the sustainability challenges the country is facing now. *By strengthening the existing research and collaborating on additional studies, Dutch organizations can contribute to the Mexican 2030 Agenda goals and possibly create innovative solutions for the Mexican horticulture sector.* This is especially interesting for Dutch researchers, as the Netherlands is on top of the list of the most influential countries in botanical research according to Top Sector Horticulture & Starting Materials.

Reduce greenhouse gas emissions: The Netherlands has had primarily a lot of discussions on the *reduction of greenhouse gas emissions* in the last years and are currently working on the different ways this could be implemented. The same could be done in Mexico with the increase of protected horticulture structures. According to The Climate Bonds, Protected horticulture has the ability to greatly reduce greenhouse gas emissions per unit of food produced in comparison to open field agriculture and horticulture (2019). Therefore, Dutch companies could be contributing to the sector in growing of more crops, with less emissions, in a controlled environment, for the Mexican people.

Starting Material: The Netherlands is known for being the international trade hub for horticultural products and plant starting material. Therefore, in order for Mexico to *maintain the genetic diversity of seeds and cultivated plants*, it could use the aid of experienced Dutch organizations to learn how to practice good management of diversification of seed and plant banks. The Mexican horticulture sector can develop this part of its sector, while combining the traditional knowledge that has already been used in the last decades. This combination of knowledge could lead to the creation of an internationalization plan to further place Mexico on the international map outside of the North American markets.

Increased Circularity: In order to ensure sustainability in food production systems in Mexico, Dutch companies can aid in *applying resilient agricultural practices* that can increase productivity and production, contribute to the maintenance of ecosystems, strengthen the ability to adapt to climate change, extreme weather events, droughts, floods and other disasters, and progressively improve the quality of soil and land. This is something the Mexican market has been looking to implement in order to increase the circularity in the agricultural and horticultural sector.

Survey highlight: “How can Dutch companies help Mexican companies with their SDGs?”

Providing practical and effective solutions, thus, not only knowledge but things that can be applied including technical support. However, others also agreed that knowledge transfer could be provided by seminars and mission organizations, as well as studies and books on the subject. There was also a clear lack of knowledge on what SDG’s were and one survey participant even said that Mexico has no SDG goals that might be an issue.

SWOT COMPARISON: THE MEXICAN HORTICULTURE SECTOR

This SWOT comparison is intended to establish weaknesses, strengths, opportunities and threats for a better perspective of the sector and the opportunities it can offer Dutch companies looking to enter the market.

Strengths

- **Reputation/Brand image:**
 - The Netherlands is well known as a reliable and respected partner in this business and Dutch companies are very well ranked compared to those from other countries. Also, the Dutch have been present for many years and have supported important efforts carried out by Mexican private and public entities.
- **Knowledge, technology and resources:**
 - The Dutch have a strong agricultural vocation and have developed deep knowledge in protected horticulture, having the most advanced greenhouse facilities world-wide. The Dutch industry offers sustainability-oriented technology via energy saving equipment, biological crop protection, re-usable substrates, eco fertilization components and units and other characteristics that make Dutch solutions especially attractive to those countries that aim to comply with SDG's and to compete in the growing greenhouse and organic products demand. The Dutch also foresee long-term results and advantages both, financially and commercially.
- **Logistics and exports:**
 - The Netherlands have a strong tradition and vast experience in logistics and exports of vegetables, flowers and seeds. The Dutch participate in these activities worldwide generating multi-billion industries.
- **Innovation and team-work culture:**
 - The Netherlands is among the countries with the highest level of innovation in horticulture (and in many other sectors as well). Innovation in the country has been promoted for a long time already by public and private institutions. New ideas, new products and new ways of doing things take place as the result of the commitment and collaboration among stakeholders.
- **Network:**
 - The Dutch are all over the world doing business in diverse activities, horticulture being one of them. The Dutch government has presence in many countries through its embassies and representative offices like the NBSO which together offer orientation and networking to Dutch newcomers.

Weaknesses

- **Logistics:**
 - Logistics infrastructure remains a great challenge. The problem of the logistics infrastructure in Mexico is not the roads, but the lack of interconnectivity between land, sea and rail transport. The average price of transport logistics represents about 30% the value of goods worldwide, but in Mexico it can be up to 50%. It is estimated that this cost could be reduced with 25-35% with adequate infrastructure.
 - Logistics prices for regions such as Middle East and Asia are quite expensive, and this is an obstacle to explore those markets. Also, the presence of criminal groups in Mexican roads and ports represents one of the biggest weaknesses and threats for trade.
- **Innovation and teamwork:**
 - There are some research projects in Mexico, but not many reach the development phase. As said in this study, agriculture in Mexico is over-diagnosed and growers require concrete actions. There are some branch organizations that have succeeded in some efforts gathering growers, but there is still the lack of team-work culture among growers. Work among public and academic entities and growers are required to promote innovation. On the other hand, many growers lack financial resources to implement innovation.
- **Lack of action:**
 - One example of this are the flowers and plants growers, most of them small companies. As there is great demand in the domestic market, they are in their comfort zone and -even if interested- they do not take steps to explore other markets.

Opportunities

- **Knowledge and technology:**
 - Although Dutch branch organizations, universities and research centers have collaborated with Mexico. There is still need for the Dutch knowledge, especially knowledge that is, among others, related to food safety, logistics, genetics, automation, and post-harvest management.
 - Dutch technology has great opportunities in the Mexican market as there is plenty of potential to expand, and there is also the possibility of gaining market share from competitors and in new equipment and products. Although there has been a boom in technification during the last 15 years, the sector is interested an increase in the presence of protected horticulture. With the use of protected horticulture the yield, the value of the crops and labor conditions improve. Currently there exists an important demand for greenhouses in the states of Guanajuato, Querétaro, Aguascalientes and Zacatecas.
 - AMHPAC is looking for companies that would develop products with an added value from fresh produce in Mexico for the domestic and foreign markets. There already is a growing demand for these products which would also solve logistic issues and those related to shelf life of products.
- **Export Cluster:**
 - There is serious interest from CMF for gathering growers in some type of cluster aimed to export activities. They would welcome and offer full orientation to any company/organization that would be willing to carry out this effort.
- **The mango industry growth:**
 - The Mexican mango industry wants to develop a quality seal that differentiates Mexican mango from other productions and that ratifies the high quality and food safety that it characterizes. This would be done together with EMEX, which also seeks to open new markets and consolidate food safety both in the field and packaging.
- **Geography:**
 - Mexico's geographical closeness to USA and Canada represents an important advantage for the export of agricultural products to these two countries that together represent a market of 367 million people.
- **Free Trade Agreements:**
 - Mexico has thirteen Free Trade Agreements with 52 countries, thirty-two Investment Agreements and nine Limited Agreements. The country is also member of WTO, OECD, APEC and ALADI.

According to a study carried out by the renown **Wageningen University Research**, Peter van Ravensbergen indicates that the areas which Dutch companies can contribute to in the Mexican Horticultural sector are:

- Cold Chain Management to prevent high level of losses with vulnerable products
- Infrastructure and equipment to limit transport costs
- Supply Chain management
- Added value to packaging, quality control and other projects
- Innovation, certification and training
- Incorporating sustainability
- Food Safety

In all aspects, Dutch companies could indeed play a leading role in bringing about the change necessary in the sector. This is also something many of our Mexican interviewees confirmed to us.

Survey highlight: “What are market opportunities for Dutch companies that want to do business in Mexico?”

Amongst some of the answers:

- Technological advancements in growing methods, maintenance, automation, ERP systems, artificial intelligence and logistics. Labor shortages can therefore be beneficial for Dutch companies, as the need for automation is more dire than ever.
- Knowledge transfer from Dutch sector specialists to the Mexican, relatively low-tech companies.
- Mexico is a big economy of scale and has a large local market that has a big potential, especially the protected horticulture sector.
- Flower production is becoming more attractive in Mexico. Even US growers are moving their production to Mexico.
- An increase in the amount of cooperatives and organizations of Mexican growers, as well as professionalism in the sector.
- Water treatment facilities, as water in Mexico is often not treated.

Threats

- **Criminality and corruption:**
 - The fight against criminal groups and corruption in order to end theft on Mexican roads and threats to growers as well as importers and exporters.
- **Certifications:**
 - Compliance with international certifications and the consequent need for training. There are not enough trained and experienced technicians who can cope with the demand that is being presented in this industry. Given the expansion of greenhouses in Mexico, at least three thousand specialized technicians are required, so there is a demand that is not satisfied.
- **Environment:**
 - The direct impact from the harsh environments on crops, especially avocados.
- **Packaging and digitalization:**
 - Low level of digitalization and traceability, as well as a lack of smart packaging threatens the logistics of the sector.
- **Government:**
 - The reduction of government budgets and programs that encouraged the agricultural sector, as well as outdated regulations.

Survey highlight: “What challenges have you encountered in the horticulture sector in Mexico?”

Amongst some of the answers:

- Scarcity of labor (and water in some areas)
- Geographical distances make the country very diverse
- Lack of knowledge and availability of technologies which makes the adoption of new technology difficult
- Corruption or too much bureaucracy in kinds of processes such as imports, business deals, keeping businesses, etc.
- Informal and sometimes illegal way of working that often are managed unclearly as no structures are set.
- Cultural differences
- Safety

Weaknesses, strengths, opportunities and threats for a better perspective of the sector and the opportunities it can offer Dutch companies looking to enter the market:

Strengths	Weaknesses
<ul style="list-style-type: none"> • Reputation & brand image • Knowledge, technology and resources • Logistics & exports • Innovation & Teamwork culture • Network 	<ul style="list-style-type: none"> • Logistics • Innovation • Teamwork • Lack of action
Opportunities	Threats
<ul style="list-style-type: none"> • Knowledge & technology • Export cluster • Mango industry growth • Geography • Free Trade Agreements 	<ul style="list-style-type: none"> • Criminality & corruption • Certification • Environment • Packaging & digitalization • Government

THE FUTURE OF HORTICULTURE IN MEXICO

According to the United Nations, by 2050 the world population will reach 9,300 million inhabitants and 85% will live in large cities. In order to guarantee the quality and supply of food to this population it will require a cultivable area of the approximate extension of Brazil. Protected Agriculture is the solution to increase global food production and to guarantee food security.

However, its development has been unbalanced, as there are few actors from Latin America and Mexico that have emerged as the region's leaders in surface area and production volumes. In this sense it is necessary to transmit the technology to the rest of the region so that other states can know all the technological details and their application.

Protected horticulture is one of the fastest growing sectors in Mexico and it is envisioned that in the future it will continue its development and its effort to improve and multiply the greenhouses to counteract the effects of pests on open field and the effects that climate change is having on the whole world, which are negatively affecting yields and crop quality.

Due to the boom in the technification and growth of protected horticulture in Mexico, well-known international events are now taking place in the country, such as GreenTech Americas to be held in Querétaro, and Ornamental Plants and Flowers (OPF). OPF Mexico was held in Mexico City for the first time in 2019, and there will be a second edition in November 2020.

During this study, certain projects and initiatives were identified in order to give a more practical view on the future of horticulture for Dutch companies interested in exploiting their opportunities in Mexico:

Flora Park Querétaro

Flora Park is considered as an advanced project at an international level. This, because of its compliance to the international demands of ornamentals markets world-wide: products of high quality, obtained in a sustainable way, and that comply with legal aspects and certifications.

"Flora Park is inspired by the agricultural clusters that already exist in the world and in Mexico. It is intended to be energy independent and sustainable, and to use captured and recycled waters. In short, it considers all sustainable principles in the recycling of materials, agrochemical management and cutting-edge technology".

- Arturo Cárdenas, Director at Flora Park

The Park is organized in an interdisciplinary manner with the participation of specialized agricultural engineers, landscape architects, local government, and academia.

The project corresponds to the ornamental value chain and to the requirements of the government of the state of Querétaro to link the academy with the industry and the government. Flora Park offers the municipality of Bonfil development possibilities, specifically the town of Amealco. The project is inclusive by offering well-paid jobs to a mostly indigenous population, also avoiding the migration of these communities to large cities or other destinations outside the state.

Extensive training is foreseen, and the signing of an agreement with the Autonomous University of Querétaro is planned before the end of the first half of 2020. Allies -national and international- are also sought for this purpose. The investment for this project is private and it is a family business, with the participation of some investment funds and with the approval of the government of the state of Querétaro.

The work group recently completed the architectural planning phase and the business plan. In a very short time, the works of adaptation of the land and the promotional activities will begin. The total area of the park is estimated to be 360 hectares which will be developed in three phases. During the first phase -that will take approximately five years-, the focus will be on high technification. An area will be destined for open field production or tree production while the technological part is being developed.

Second phase of Agropark Querétaro

Building on the success of Phase One, Agropark is launching Phase Two with a renewed focus on meeting the needs of the worker and investor communities.

The new phase will add 528 hectares, 220 of which will be used for greenhouses. This will increase the Park's total vegetable production by 122% to 205 thousand tons per year. The remaining 362 hectares will be used for warehouses, green spaces, and a residential area, turning Agropark into an Agro-Intelligent Solutions Center.

Once Phase Two is complete, Agropark will offer:

- 5,000 additional jobs
- Greenhouse areas
- Warehouses
- Green spaces
- An employee residential area: A 50-hectare housing area will be developed, which will improve the quality of life for Agropark employees by allowing them to live in close proximity to their workplace.

Production of Cannabis

Mexico plans to possibly open the legal marijuana market - for recreational, medical and commercial purposes - which already leaves millions of profits in the United States and Canada, and that would attract significant foreign investment to the country.

During the current legislature in the Senate of the Republic, about 20 initiatives have been submitted with pending status.

One of these proposals was presented in November 2018 by the Secretary of Interior. Its objective: Regulate the planting, cultivation, harvesting, production, transformation, labeling, packaging, promotion, advertising, sponsorship, transportation, distribution, sale, marketing, carrying and consumption of cannabis and its derivatives, for personal, scientific and commercial purposes.

A possible legalization would open the door to a millionaire activity.

The 2018 World Drug Report, prepared by the United Nations Office on Drugs and Crime (UNODC) highlights that Mexico is the second country with the highest amount of cannabis herb seized worldwide in 2016, according to the latest figures available, with 841 tons (18% of all cannabis herb seized in the world), after the United States, with 978 tons (21%).

The total area of marijuana cultivation in Mexico is estimated to be 114,360 hectares, with Sinaloa as the largest producer, with 36% of the total area, followed by Chihuahua (19.5%), and Durango (16.4%), according to the document 'The map of drug cultivation in Mexico' published by the UAM.

"It is important that we realize that it is an opportunity of great relevance for Mexico and for the world. We are laying the foundations for a decriminalization of human rights, and we are a key country in the drug trafficking network created by an absurd prohibitionist policy".

- Alejandro Madrazo, Economic Research and Teaching Center.

The Federal Commission for the Protection of Health Risks (Cofepris) issued a framework for the Mexican government to form a licensed cannabis market for residents of the country. This is a great opportunity for international companies, as the medical marijuana market has a potential value of 2,000 million dollars (mdd) in the next 10 years, according to KPMG estimates.

According to the interested parties, it will be of great importance to build an industry from scratch and to avoid monopolies, as well as to ensure an integrated regulatory framework.



UPCOMING HORTICULTURE TRADE FAIRS AND EVENTS IN MEXICO

Please note that the following trade fairs and events have been possibly postponed or cancelled due to the COVID-19 pandemic.

- **EXPO AGRICOLA JALISCO 2020**
DATE TO BE SET (rescheduled due to COVID-19)
Cd. Guzmán, Jalisco
Website: expoagricola.org.mx
- **INFOAGRO EXHIBITION MEXICO 2020**
July 1-3, 2020 (this is a rescheduled event due to COVID-19)
Mazatlán, Sinaloa
Website: mexicoinfoagroexhibition.com
- **GREENTECH AMERICAS 2020**
August 25 -27 (this is a rescheduled event due to COVID-19)
Querétaro, Querétaro
Website: greentech.nl/americas
- **EXPO AGROALIMENTARIA GUANAJUATO 2020**
November 10 – 13, 2020
Irapuato, Guanajuato
Website: www.expoagrogto.com
- **ORNAMENTAL PLANTS AND FLOWERS (OPF) MEXICO 2020**
November 17 – 19
Mexico City
Website: opfexpo.com

CONCLUSION

The opportunities are real in the Mexican horticulture sector, due to the constant effort and commitment among the nation's producers and their partners to become more productive, efficient, profitable, sustainable, and responsible. All crop areas are open to innovation, technological development, and a continuing race for competitiveness.

As it is with all endeavors, communication will be key in all future efforts to introduce products and services into Mexico, develop market presence, and obtain the industry's loyalty.

Although -and because of- the percentage of crops and area under the protected horticulture scheme is lower than that under open field, the future of the sub-sector in Mexico looks promising and positive for its various activities.

RECOMMENDATIONS

For Dutch Companies

- Before entering the Mexican market for the first time, companies must be very well informed of all legal, fiscal, administrative and cultural aspects of the country. It would be wise to have a reliable local contact to orient and to guide the company through the process as Mexico can be complex if things are not done through the right channels. Mexico is different from other Latin countries, not only in the way of doing business and in the way government entities must be approached, but also in many cultural aspects. Even within the country itself there are differences in doing business depending on the region.
- It would be wise to contact The Netherlands Embassy in Mexico City as an introduction to the country, since the Embassy counts on complete information regarding the country, the culture, the sector, and the Dutch network in the country. Additionally the NBSO in Queretaro can serve as a direct introduction to the region. Moreover, the branch organizations and knowledge centers in the Netherlands can be a very good source of information due to their experience in Mexico.
- Be cautious. Mexico offers great opportunities in horticulture (and in other sectors as well), and people are good, friendly and hard workers. However, it cannot be denied that there are areas which can be dangerous due to the presence of criminal groups on roads and in towns and cities.
- Use the Mexican challenges, mentioned previously, to your advantage. Many of the challenges in the domestic market can be turned into opportunities to invest and further develop the sector.

For Dutch Government Agencies

Although Dutch government agencies are quite familiar with the Mexican horticulture sector, it is useful to mention these recommendations:

- To promote the projects and plans presented under “The Future of Horticulture in Mexico” among Dutch companies and knowledge centers as they might be interested in actual opportunities that Mexico could offer in the short and medium terms.
- To consider offering seminars, trade missions and B2B sessions for companies and organizations of the Dutch protected horticulture sector wanting to go into the Mexican horticulture market.
- To inform the Dutch stakeholders of advantages, risks and threats of the industry and to encourage them to find the right local partner through reliable sources.
- All contacted branch associations for this study are interested in meeting with their Dutch counterparts to encourage an even greater cooperation between both countries.

Survey highlight: “What are tips on doing business in Mexico?”

Amongst some of the answers:

- Cultural differences might be a struggle at first, but make sure to adapt to the Mexican culture and don't try to make the Mexicans adapt to yours because that is not likely. This also counts for how the business is run, be open to local adaptations.
- Patience and persistence were a common answer
- Having a local partner or contact is also key, as having local presence makes it more accessible and trustworthy for the Mexicans counterparts. If you do not have a partner in the country, make sure to look for the right partner and do good research on who you do business with.
- Investing in long-term relationships proceed business, thus being personal in Mexico is very important. Moreover, indulge time in the field before just trying to apply your methods to the Mexican business market. It is an informal business culture so entering it 'aggressively' is not a good first impression.
- Prepare for the long term and try to achieve short-term wins through the journey.
- Learning the language and culture in order to leave good impressions and communicate as clear as possible. Moreover, establishing personal connections such as visiting customers and staying in contact is key.

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Asociación Nacional de Exportadores de Berries (ANEBERRIES)	www.aneberries.mx
Aweta	www.aweta.us
Cipress Produce	www.cipressproduce.com
Consejo Mexicano de la Flor	<i>No website available</i>
Consejo Nacional Agropecuario (CNA)	www.cna.org.mx
Control Union	www.controlunion.com
Emex AC	www.mangoemex.com
Enza Zaden	www.enzazaden.com.mx
Fancom BV	www.fancom.nl
Frech Produce Centre	www.fpnl.eu
FreshMex	www.freshmex.com.mx
Gakon	www.gakon.nl
Ganfer	www.ganfer.com
Guía Verde México/Flora Park	www.guiaverdemexico.com
Hoogendoorn	www.hoogendoorn.ca
Horticonnect	www.horticonnect.com.mx
Intagri, S.C.	www.intagri.com
Jordex Shipping & Forwarding BV	www.jordex.com

Koppert México	www.koppert.mx
Mexbest	www.mexbest.com
Mexican Association of Protected Horticulture (AMHPAC)	www.amhpac.org
Ministry of Agriculture, Nature and Food Quality of The Netherlands	www.government.nl/ministries/ministry-of-agriculture-nature-and-food-quality
Netherlands Water Partnership	www.netherlandswaterpartnership.com
Patron Agri Systems International	www.patronagrisystems.nl
Plántulas de Tetela	www.plantulasdetetela.com.mx
Priva	www.priva.com
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RijkZwaan	www.rijkszwaanpromex.com.mx
Rota Air & Ocean BV	www.rotra.eu/nl/
Royal Brinkman	www.royalbrinkman.com.mx
Secretaría de Agricultura y Desarrollo Rural, Delegación Querétaro	www.gob.mx/agricultura
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