The Avocado Conundrum

Track: Management Education and Teaching Cases

Key words: Avocado, Agribusiness, International trade, WTO

Abstract

This case illustrates the challenges that the Government of Costa Rica faces of whether and how to manage a trade solution under the WTO framework, due to its decision of suspending the phytosanitaty import certificates of avocados from Mexico. The aim is to stimulate a discussion about international trade and agribusiness. This is a case study suitable for use with graduate students in Masters of Business Administration (MBA), Master of Agribusiness, Executive Master of Business Administration or any other post-graduate program related.

On 22 April 2015, the State Phytosanitary Service (SFE) from the Costa Rican Government released an official resolution, through which it temporally suspended the emission of phytosanitary import certificates for avocados from eight countries—Australia, Spain, Ghana, Guatemala, Israel, Mexico, South Africa, and Venezuela—plus the state of Florida in the United States[1]. The SFE stated its decision was an urgent action to protect the national territory and its local producers from the Avocado Sun Blotch Viroid (ASBVd), a plague affecting the quality and yield of avocado crops in these countries. However, the decision from the SFE was subject to considerable criticism from different national and international stakeholders due to many inconsistencies in the process.

The SFE had a puzzling organizational structure and role within the national regulatory system. First of all, the SFE held an independent legal status and was not attached to the Ministry of Agriculture (MAG). It charged a fee for their services and maintained self-sustainable operations. Moreover, the SFE did not receive funding from the government. Nevertheless, the Director was a political position and responded to the Minister of Agriculture.

The Avocado Fruit

Avocado dated back to approximately 10,000 years in Mesoamerica. Researchers had found the most ancient evidence of the existence of avocado in Coaxcatlán, Puebla (Mexico). It was also cultivated from Rio Grande to Central Peru around the same period. From here, the fruit began to spread to tropical and subtropical climates and later to other parts of the world.

Since ancient times, the avocado had played a critical role in the history, economy, and religion of different ancient cultures, including the Mayans and the Aztecs. It had become one of the most wanted foods across the globe due to its nutritious properties and rich flavor. Moreover, the importance of avocado had increased steeply in a significant number of nations. More than 30 countries around the globe now produce avocados on a large scale, and the industry, in general, had experienced remarkable growth.

Avocado trees could grow in many different types of soils, but coarse and well-drained soils were the most suitable ones. Avocados were not able to resist flooding or poorly drained soils. However, the most critical hindering factor for avocado was the severe cold. The trees easily suffered freeze injuries, including partial damage to the above-ground tissue, the total death of all the tissue above, or the complete death of all portions of the tree.

Avocado was divided into three subspecies: West Indian, Guatemalan, and Mexican. The West Indian race grew in tropical areas and was not resistant to cold temperatures. The fruit matured in 6-7 months, and it varied in size, generally being more

1 Servicio Fitosanitario del Estado. Resolution No. DSFE 03-2015. *World Trade Organization*. 22 Apr. 2015.

than 1 kg. The Guatemalan race had an intermediate tolerance for cold temperatures. The fruit it produced was small to large, and it had an oval shape with thick, leathery skin. Its fruit took between 12 to 15 months to mature. The Mexican race tended to be small and highly resistant to cold weathers. The fruit had a thin skin, and it matured in around six months. Avocado trees bloomed from January to March, and the fruit matured in as few as six months for Mexican types and 18 months for Guatemalan types.

Furthermore, many avocado varieties had been created from a wide range of combinations of species. Different varieties provided trees with various adaptability traits that improved the production of the fruit in various climates and conditions. The main commercial varieties were Hass, Fuerte, Reed, and Pinkerton (see **Exhibit 1)**. From these, the most popular variety worldwide was Hass, which descended primarily from the Guatemalan race. The Hass avocado had a black skin and oval shape, and it weighed between 5 and 12 oz. The largest producer of Hass was Mexico; California, Chile, and Peru also produced Hass avocados. Mexican producers harvested Hass avocados all year, but the main season was from October to May[2].

The Avocado Industry

The avocado industry was highly dynamic and presented various intricacies. The growing of avocado was challenging due to the environmental requirements and restrictions of avocado trees, besides its seasonal nature. The fruit also needed great care and specific conditions concerning handling and logistics. Moreover, the development of diseases posed a critical threat to production. Consequently, avocado growers faced high production and transportation costs. Furthermore, despite the great variety of avocados, they did not always match customers' strict demand for quality and specific characteristics.

In recent years, demand for avocado had experienced a great increase across the globe in part caused by the taste of the fruit, as well as its beneficial nutritional characteristics. The increasing trend of different diets (e.g. gluten-free, vegan, raw, paleo, among others) as well as the rise in popularity of several mainstream restaurants, such as Chipotle and Starbucks, and the inclusion of avocado in their menu had added to the increase in demand. Per-capita consumption in the US had risen from 3.5 pounds in 2006 to 6.9 pounds in 2015[3]. The skyrocketing demand had caused a significant increase in avocado prices, especially in Mexico. By the end of April, the price of avocado was around 530 Mexican pesos ($27.89), more than double than the price a year earlier and the highest price point in 19 years (see **Exhibit 2**).

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2 Avocado: General Crop Description. *Crop Knowledge Master, University of Hawaii*.

3 Avocado Prices Are Skyrocketing. *Bloomberg*. 28 April 2017.

The greatest peak in the consumption of avocado in the US occurred every year during the week of the Super Bowl, which besides avocado, boosted the demand for other foods, such as chicken wings. During the week of the Super Bowl 50 in 2016, Americans consumed 54.3 million units of avocado—15.9% more than the previous year, equivalent to US$ 42.2 million. The second week of greatest consumption of avocado in the US was Cinco de Mayo, with 48.9 million units of avocado[4].

The worldwide production of avocado was 5.1 million tonnes in 2014, an increase of almost 6% from the previous year. Mexico had historically been the biggest producer with 1.5 million tonnes in 2014. Mexico was also the largest exporter of avocados (1.47 million tonnes in 2014), while the United States was the biggest importer. The largest consumer of Mexican Avocados was also the US, which in 2014 imported approximately 78% of Mexican avocado production. **Exhibit 3** presents the top worldwide avocado producers.

In Costa Rica, avocado had transformed into one of the most important staples in the diet of its citizens, and it was consumed during the entire year. Costa Ricans were able to obtain avocado in a wide range of locations, from small street sellers to upscale supermarkets. The fruit was part of national dishes and was also widely available in national and international restaurants across the cost spectrum. The average consumption of avocado in Costa Rica was 15,000 tonnes per year, from which Mexico provided almost 12,000. Furthermore, each Costa Rican citizen consumed on average 17 imported avocados of medium size.

Despite the great demand for avocados, production of the fruit in Costa Rica was virtually negligible. It was challenging to grow avocados in Costa Rica, mainly because of weather conditions, especially rain. Production of avocado in Costa Rica was approximately 2,000 tonnes per year. Moreover, the country hosted approximately 11,293 farms with avocado crops with an extension of 1,108 cultivated hectares and 933 in the age of production. Most of these farms concentrated in the province of San José, more specifically in Los Santos—a rural area where agriculture was the main economic activity. The major crop of the farmers from this area was coffee, but they also grew avocado in association with coffee. Furthermore, more than 76% of the production was destined for self-consumption, and farmers owned more than 65% of seeds used for growing (see **Exhibit 4** and **Exhibit 5**).

Hence, the country had to resort to imports, and Mexico had historically been the largest provider of avocados to Costa Rica. In recent years, imports increased more than 190% from 2008 to 2012 but decreased approximately 60% from 2012 to 2016 (see **Exhibit 6**).

The Avocado Sun Blotch Disease

4 Hass Avocado Board (2016).

The Avocado Sun Blotch was a graft-transmissible disease of physiological and genetic disorder caused by the Avocado Sun Blotch Viroid. The disease had been identified in all the continents and in the majority of avocado-producing countries, and its importance had increased with time due to the introduction of new methods for growing avocado trees.

The viroid affected the twigs leaving a white to yellowish, red or necrotic streaking, accompanied with a shallow indentation along the length of the twig. Moreover, in Hass avocados, the fruit suffered a reddish discoloration. The Sun Blotch viroid also affected the trunk of the tree and left rectangular crackings along the bark and large branches, resembling the skin of an alligator. Additionally, Sun Blotch-infected trees experimented a distorted, sprawling growth pattern (see **Exhibit 7**).

An important characteristic of the viroid was that it could present no symptoms. Besides the fact that the asymptomatic property of the viroid made it harder, if not impossible, to detect the disease, the rate of infection of symptomless carriers was much greater. Seeds from symptomless carriers were almost infected 100% of the time, while only 0-5% of the seeds from trees that presented symptoms were infected.

The ASBVd propagated for the most part through infected nursery trees, and it propagated from infected bud wood or infected rootstock seedlings used for grafting. Moreover, root-to-root grafting could spread the disease[5]. Desjardins et al. had demonstrated experimentally that the viroid could be transmitted through pollen[6]. The authors indicated rates of 1.8% and 3.125% in 1977 and 1978 respectively. Even though the rates were low, they could provide further insights regarding the minimum distance between healthy trees and known or suspected infected trees. The most dangerous method of propagation, however, was the use of infected machinery, such as knives, pruning of tree canopies, and drilling for phosphate injection, in different processes. At the time, there was no evidence of transmission of the disease through insects.

Sun Blotch-infected trees usually yielded fewer fruits, and they grew into a low, flattened shape with the limbs bending towards the ground, which increased injuries from sunburn. Hence, infected trees were less productive than healthy ones[7]. The first studies performed on infected trees found experimentally that the yield of Fuerte Avocado trees infected with Sun Blotch

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5 Marais, L. J. (2007). Avocado Diseases of Major Importance Worldwide and their Management. In *Diseases of Fruits and Vegetables: Diagnosis and Management,* 3, 1-36. Kluwer Academic Publishers.

6 Desjardins, P., Drake, R., Atkins, L., Bergh, B. (1979), Pollen Transmission of Avocado Sunblotch Virus Experimentally Demonstrated. *California Agriculture*, 33(11), 14-15.

7 Wallace, J.M. (1958). The Sun-Blotch Disease of Avocado. *Proceedings of the Rios Grande Valley Horticultural Society*, 12, 69-74.

could be 27.3% lower than healthy trees. Moreover, 52.7% of the fruits produced by infected trees were undersize, while the healthy trees did not produce any undersize fruit[8].

One of the most recent researches on the effects of the Sun Blotch disease also showed a decrease in avocado yield from infected trees[9]. The authors performed the research with trees in Uruapan (grove 1) and Tingambato (grove 2) in the state of Michoacán, Mexico in 2011 and 2012. Grove 1 consisted of four healthy trees, four infected and asymptomatic trees and four symptomatic ones. Grove 2 comprised four healthy trees and four symptomatic ones. The study found that there was a reduction of total Haas fruit weight yield of 76% in symptomatic trees and 15% in asymptomatic trees for grove 1, and a decrease in total yield of 51% in symptomatic trees for grove 2. Moreover, the average weight of 100 Hass avocados was reduced by 13-28%. Furthermore, the polar-equatorial diameter of 100 symptomatic fruits decreased by 8% in both groves, and the polar diameter was 8-10% lower. Finally, the occurrence of symptomatic fruits was 46-62%.

The standard method used internationally for the detection of the ASBVd was the Reverse Transcriptase-Polymerase Chain Reactions (RT-PCR). The technique sought to detect changes in gene expression by creating complementary DNA transcripts from RNA. The method was highly efficient in detecting the viroid and was also used to verify the results of other methods. Nevertheless, it could only process small sample sizes, based on leaves, branches, and fruits of every tree.

One of the most efficient alternatives for detection of the Sun Blotch disease was spectral imagery from satellites. The method explored the different ranges of the electromagnetic spectrum emitted by the plant and detected alterations before they manifested in the plant. ASBVd-infected plants reflected a different radiation pattern than healthy ones. The satellite sensor detected the discrepancies in the radiation patterns and generated spectral signatures to differentiate symptomatic from asymptomatic trees. Beltrán-Peña et al. reported an efficiency of detection of asymptomatic trees of 73.5% and 66.7% for symptomatic trees[10]. The authors asserted that the spectral imagery method was relatively expensive. However, considering an extensive area to test and the human and financial costs required with other methodologies, the satellite imagery was in fact a practical and economical alternative.

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8 Da Graca, J.V., Mason, T.E., and Antel, H.J. (1983). Effect of Avocado Sunblotch Disease on Fruit Yield. *South African Avocado Growers' Association Yearbook 1983*, (6), 86-87.

9 Saucedo-Carabez, et al. (2014). Effect of Avocado Sunblotch Viroid (ASBVd) on Avocado Yield in Michoacán, Mexico. *European Journal of Plant Pathology*, (138), 799-805.

10 Beltrán-Peña et al. (2014). Detección Satelital y Molecular del Viroide de la Mancha de Sol del Aguacate (Avocado Sunblotch Viroid, ASBVd). *Rev. Fitotec. Mex.*, 37(1), 21-29.

Phytosanitary Import Regulatory System

The International Plant Protection Convention (IPPC), a treaty created under the Food and Agriculture Organization of the United Nations (FAO) was the international organization that sought to control the introduction and spread of pests of plant and plant products. The World Trade Organization had recognized the IPPC, under the Sanitary and Phytosanitary Measures (SPS) Agreement, as the only organization authorized to establish international plant health standards. To this goal, the IPPC created the International Standards for Phytosanitary Measures (ISPM).

The standards for phytosanitary import regulatory system were established under the ISPM 20. It dictated that the determination of whether pests should be regulated and the strength of phytosanitary measures against them be performed by evaluating scientific and economic evidence through a Pest Risk Assessment (PRA), under the ISPM 11. The PRA consisted of a science-based and systematic process for implementing phytosanitary measures and deciding if a pest should be managed using legislation. The first condition for a PRA was that the threat must meet the requirements of a quarantine pest. In other words, the pest must not be yet present in the area of question, or present but not widely spread. Also, the pest had to convey a real probability for economic (including environmental) consequences.

The PRA comprised three stages: initiation, risk assessment, and risk management. The initiation identified the specific pest and its means of introduction or spread, and at the same time, it reviewed current policies in place. The pest risk assessment sought to evaluate the probability of introduction and spread of the pest and the magnitude of its potential economic effects. The risk assessment started with a preliminary screening to determine if the pest met the criteria of a quarantine pest (or regulated non-quarantine pest). Later, the PRA must analyze biological and economic information to estimate the potential of introduction and spread of the pest and its economic impact. Finally, the pest risk management sought to evaluate and select options to mitigate the possibility of introduction and spread of the pest. It concluded with a summary of alternatives and recommendations for the preferred ones. The PRA emphasized the adoption of measures that caused the minimum possible direct and collateral damage for the parties involved, in both biological and economic terms. Furthermore, the WTO highlighted that phytosanitary measures ought to be based on a systematic process of obtaining, assessing, and documenting scientific and other information.

The Blockage

In July 2013, Costa Rica hosted the IV Latin American Congress of Avocado. The Congress aimed to present new research, as well as to share experiences on different topics regarding the avocado in Latin America, including growing and trading. The

most relevant discussion dealt with the ASBVd, and leading experts from Mexico, Chile, and the US presented new research on the ASBVd, including updates regarding its effects, detection methods, and presence in the continent.

Since Mexico was the leading source of avocados for Costa Rica, the Ministry of Agriculture viewed the viroid as a critical threat, so in September 2014 it started a sampling protocol of avocado crops and fruit yields to verify the presence of the virus in the national territory. According to the MAG, the samples obtained were subject to molecular tests following the RT-PCR methodology for indexing ASBVd. The Cellular and Molecular Biology Research Center of the University of Costa Rica conducted the tests in December 2014. The results were obtained in April 2015 and concluded that, "none of the of the samples of Costa Rican avocado […] tested positive for ASBVd"[11].

The SFE halted the emission of import certificates on 22 April 2015. However, it notified the World Trade Organization (WTO) of its emergency measures until 5 May 2015[12]. Moreover, in neither of both occasions, had the SFE presented a PRA, and it was until 12 May 2015 that the Costa Rican government sent an expert from the SFE, along with the phytosanitary authorities of the country, to Mexico to collect the necessary information to develop the PRA.

Later, on 5 June 2015, the Director of the SFE had stated in a press release that Costa Rica needed to guard the phytosanitary status of the nation, as the rest of countries had always done it, and take the appropriate measures. He also stated Costa Rica had itself "being the object of restrictions applied by other nations to protect their phytosanitary status". Moreover, he claimed, "Mexico had applied restrictions to Costa Rica blocking the export of fresh pineapple, cocoa, and ornamental plants Schefflera and Croton, among other products"[13].

The PRA was concluded on 10 July 2015, and the SFE released a resolution outlining its results. The document cited several extracts of Costa Rican and International laws regarding the rights and obligations of trading countries, as well as procedures to implement phytosanitary measures. On the technical aspect, the resolution summarized the definition and effects of the ASBVd on avocado trees and fruits and its methods of propagation.

After the brief technical points, the resolution presented a subsection on the economic impact of the plague, claiming that symptomatic and asymptomatic affected trees show a significant reduction in its yield. The document stated that symptomatic

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11 Resolution DSFE-11-2015. *Ministerio de Agricultura y Ganaderia, Servicio Fitosanitario del Estado*. 10 Jul 2015.

12 Notification of Emergency Measures G/SPS/N/CRI/16. *World Trade Organization*. 5 May 2015.

13 Controles fitosanitarios fortalecen acceso a mercados. *Servicio Fitosanitario del Estado*. 5 June 2015.

trees experienced a 75% reduction in its yield, and the average fruit weighed 40% less. Asymptomatic trees reduced their yield by 60%, and the average weighed 10% less. Additionally, according to the results presented, avocados affected with the sun blotch viroid matured in an unusual manner and their content of ethylene and oils was affected.

The section of the resolution containing the ARP concluded stating that there was "a risk to disseminate the pathogen through the import of avocado for consumption, which had the potential to germinate and spread the virus". Furthermore, the resolution affirmed, "the import of plants coming from locations in which the ASBVd was present, significantly increased the risk of transmission of the pathogen".

These results did not cite alternative methods of detection or control of the virus. Moreover, it did not present an actual analysis of the economic consequences the establishment of the plague would have in the country and its local producers. Furthermore, the analysis did not consider how the measures implemented would affect consumers, regarding the quantity, the quality, and the prices of avocados available.

The resolution concluded outlining several phytosanitary measures for the import of avocados from Mexico. First, the freight had to include a phytosanitary certificate stating that the product was free of Conotrachelus aguacatae, Heilipus lauri, and Maconelicocus hirsutus. Second, the fruits ought to come from plants from ONFP-certified orchards as free from the ASBVd. These nurseries also had to be pre-certified by the SFE. Third, the avocado had to be grown in an area free of the ASBVd, previously recognized by the SFE. Finally, all the products had to undergo through the general requirements of fresh products for human consumption, namely be properly identified and packaged and be free of vegetables residues, dirt, slugs and snails. Moreover, all products had to be subject to phytosanitary control at the point of entry.

Later, on 28 January 2016, the SFE held a press conference, where it claimed that the 322 samples of avocado from the San José province—where 93% of avocado production takes place—tested negative for ASBVd, confirming the country was free of the plague[14]. The University of Costa Rica performed the analysis after a phytopathologist suspected the presence of the viroid. The analysis of the samples had a cost of approximately $47 thousand[15].

However, different studies confirmed Costa Rica hosted the sun blotch disease since long ago. Vargas et al. reported the presence of the virus in Costa Rica, Guatemala, and Peru since 1991[16]. Moreover, Semancik (2003) confirmed its presence in many avocado-producing countries such as United States, Costa Rica, Guatemala, Peru, Venezuela, South Africa, Israel, Spain,

14 Gobierno confirma que aguacate de Costa Rica sigue libre de 'mancha de sol'. *El Financiero, Costa Rica*. 28 January 2016.

15 25 million Costa Rican colones at the average exchange rate between September 2014 and April 2015.

and Australia[17]. Furthermore, the European and Mediterranean Plant Protection Organization (EPPO), based on information from 2003, evaluated the presence of the viroid in Costa Rican territory. More recently, the CABI Disease Map (2013) showed the ASBVd had already established in Costa Rica.

In Mexico, De la Torre-Almaraz et al. based on samples taken from the county of Tingambato in the state of Michoacán in 2006-2007 first reported the viroid in 2009[18]. Currently, the EPPO reported the presence of the plague based on data from 2014. However, the EPPO also stated that the virus in Mexico held a restricted distribution status. Moreover, both Peru and the US had the virus in their territories, also holding a restricted distribution status. **Exhibit 8** shows the presence of the ASBVd across the globe.

The Importers' Stand

The President of the Costa Rican Chamber of Exporters and Importers of Perishable Products (CEIPP) claimed that since the import of Mexican avocados was destined for human consumption, the sun blotch disease did not qualify as a quarantine pest for Costa Rica and therefore did not represent any hazard. Nevertheless, he argued that, in the last couple of years, avocado growers had experienced a degree of support from the government they had not experienced before, which had led to many inconsistencies in the sector, including obstructions in international trade.

Moreover, he stated that the government strategically selected the topic and the keynote speaker on the ASBVd in the Latin American Avocado Congress in Costa Rica, which was the root of the conflict. The speaker presented the results of his recent research where he and his coauthors demonstrated that, with a minute sample size of Mexican avocado trees, the disease greatly affected the yield of avocado trees. Erroneously, the Costa Rican phytosanitary authorities misinterpreted his results as an extreme alert to stop importing Mexican avocados. However, his main goal was to demonstrate that Mexico should see the disease as a reality, and it needed to develop a program to eradicate the disease, given the great extension and importance of avocado in its territory.

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16 Vargas, C. O., Querci, M. & Salazar, L. F. (1991). Identificación y estado de diseminación del viroide del manchado solar del palto (Persea americana L.) en el Perú y la existencia de otros viroides en palto. *Fitopatología*, 26, 23–27.

17 Semancik, J. S. (2013). Avocado Viroids: Avocado Sunblotch Viroid. In Hadidi, A., Flores, R., Randles, J. W. & Semancik, J. S. (Eds.), *The Viroids* (pp. 171–177). Australia: CSIRO Publishing.

18 De La Torre-Almaraz et al. (2009). First Report of Avocado sunblotch viroid in Avocado from Michoacán, México. *Plant Disease*, 93(2), 202.

A similar issue to the Costa Rica-Mexico conflict had arisen between Peru and Chile in 2012. It started with a seminar on the ASBVd in Chile, where speakers discussed the precautionary methods regarding the viroid. After this, Chile intended to block the import of Peruvian avocados since the sun blotch disease was present in Peru. However, importers disputed the case and stated that since the imports were meant for human consumption, the viroid did not pose any risk. Moreover, they alleged the dynamics of the import of seeds and fresh fruit differed significantly. For instance, the lifespan of seeds of imports destined to farming was shorter than those intended for human consumption. Also, the requirements for storage and transportation were stricter for fruit destined for human consumption than for agriculture. Consequently, these discrepancies made it harder to introduce the viroid into the country.

Furthermore, the CEIPP stated there were several inconsistencies in the measures taken by the SFE and how it managed the process. First, in the 2012 ASBVd Seminar in Chile, Costa Rica discovered the ASBVd was present in Peru and Mexico. Costa Rica responded by halting the import of avocados from Peru but did not take any measures against Mexico. However, Costa Rica took different actions in 2015, even though the disease remained present in both countries. Second, Costa Rica took extreme, unnecessary measures and did not give Mexico time to react and look for alternative solutions together. Third, the University of Costa Rica, which executed all the analysis of the disease, was not certified to do so. Also, when importers proposed to arrange and pay for the study of the samples in international, certified laboratories, the SFE proscribed the CEIPP to work in government phytosanitary matters. Finally, the CEIPP claimed they had proofs, from certified laboratories that the virus had already settled in the country.

Finally, the CEIPP expressed there were other ways to help avocado producers. For instance, Dominican Republic has traditionally grown native species of avocado. However, they had been developing enhanced varieties of these traditional species, making them oilier and less watery, which improved their flavor remarkably. According to him, the avocado was so ingrained in the Costa Rican diet that consumers had demonstrated they were willing to try new varieties of avocado. Consequently, the government could leverage this behavior and adopt better methods to boost the avocado industry.

The Mexican Government

Initially, Mexico only disputed the blockage before the WTO as a commercial concern on 13 July 2015. The Secretariat of Foreign Relations (SRE) of the Mexican Embassy in Costa Rica affirmed that Costa Rica, and not them, had caused the pressure from the media. Furthermore, they stated that the blockage of imports was not an issue for Mexican growers of avocado since Costa Rica did not represent a significant stake of its exports. However, the blockage was a concern for the Mexican government regarding foreign affairs and international trade since Mexico and Costa Rica had long-lasting, robust

diplomatic relationships since long ago, and Mexico was not willing to jeopardize them because of the minuscule avocado conflict. Furthermore, the issue could set a precedent for future international disputes with other countries, depending on the outcome and how Mexico managed it.

Furthermore, the SRE stated the way Costa Rica had handled the conflict and the measures it had taken were not appropriate. The first problem was the fact that Costa Rica did not follow the protocols established by the WTO, including the procedures for the notification of the measures. Moreover, they questioned the academic and technical merits of the studies and research performed by Costa Rica. The SRE claimed that the Sun Blotch disease was not a quarantine pest and did not represent a hazard for the country. Additionally, the disease was already present in virtually every country that produce avocado. In Mexico, the SRE stated that even though the virus was present in some areas, there was no risk of spreading the disease. Before the blockage, there had never been a case of infection.

The Mexican Government also criticized Costa Rica's measures by highlighting the fact that the disease did not affect humans because the imports were destined for human consumption and not for growing. Since the main propagation vehicle was through seeds, the risk of propagation was limited. To this, the SFE responded that even though, the product was used for human consumption and not for growing, many producers obtained avocado seeds unofficially, more specifically from the dumpster of CENADA (the national wholesale collection and distribution center of fruits and vegetables in Costa Rica). These producers later planted these seeds and grew avocados. Hence, according to the SFE, the risk and potential threat of growers using infected fruits and spreading the disease was high.

Since the beginning, the Mexican phytosanitary authorities had been involved in the research process, providing support to Costa Rica. Soon after the conflict started, the Mexican phytosanitary authorities proposed non-extreme methods to control the disease. More specifically, they proposed the implementation of a symptom-free disease certification. However, contrary to what Costa Rica wanted, it was not possible to adopt a disease-free certification mainly because of its costs.

On 8 March 2017, the Mexican government formally requested through the WTO the initiation of consultation with Costa Rica to reach a solution regarding the blockage of imports of Mexican Avocados. At this point, Costa Rica had ten days to reply to Mexico and thirty days to perform the consultations. In the meantime, both countries were to hold bilateral meetings to solve the issue outside the scope of the WTO. However, the parties never held the meetings, so they now had to look for a solution through the WTO framework.

The blockage of Mexican avocado imports quickly resulted in harmful effects for different stakeholders. Locally-grown Costa Rican avocados were not able to satisfy the quantity and quality of local demand. Costa Rican avocados presented a steep

difference in taste, texture, and shelf-life from Mexican Hass avocados. The shortage triggered the development of a black market for Hass avocados in farmers' markets and other points of sale across the country. The smuggling of the fruit took place through the Southern border of the country.

Furthermore, average prices of avocado across the country had experienced a significant increase after Costa Rica halted the emission of import certificates. From May 2015 to 2016, the average price of avocados in the farmers' market had increased more than 51% (see **Exhibit 9**). Additionally, Costa Rica had to resort to other countries to satisfy demand suppliers of the fruit. The country began to import avocados mainly from Peru and later also from Chile, which were more expensive and had a lower quality than the Mexican ones. According to CENADA, the price of the Chilean Hass was at least 35% higher than the Mexican Hass. The price difference was mainly caused by greater costs in transportation and logistics incurred in bringing the fruit from Chile (see **Exhibit 10**).

Exhibit 1

Main Commercial Varieties of Avocado

HASS

Main Features

Pebbly, thick but pliable skin
Pale Green flesh
Creamy texture
Easy peeling
Great Taste

FUERTE

Main Features

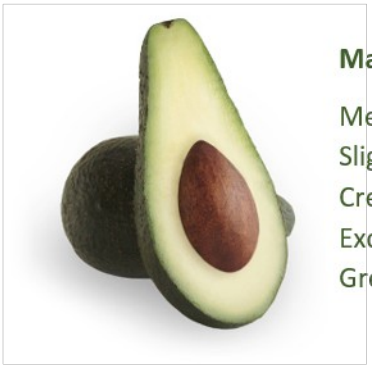
Smooth, thin skin
Pale Green flesh
Creamy texture
Easy peeling
Great Taste

REED

Main Features

Thick green skin
Slight pebbling
Creamy flesh
Easy peeling
Good Taste

PINKERTON



Main Features

Medium thick green skin
Slight pebbling
Creamy, pale green flesh
Excellent peeling
Great Taste

BACON

Main Features

Smooth, thin green skin
Yellow-green flesh
Easy peeling
Light Taste

LAMB HASS

Main Features

Pebbly skin
Green flesh
Creamy, nutty taste
Symmetrical in shape

Source: California Avocado Commission

Exhibit 2

Mexican Hass Avocado Prices, 2016-2017

Source: Bloomberg

Exhibit 3

Top Worldwide Avocado Producers, 2008-2014

	2008	2009	2010	2011	2012	2013	2014
Mexico	1,162,429	1,230,973	1,107,135	1,264,141	1,316,104	1,467,837	1,520,695
Dominican Republic	188,139	184,357	288,684	295,081	290,011	387,546	428,301
Indonesia	244,215	257,642	224,278	275,953	294,200	289,901	307,326
Colombia	183,968	189,029	205,443	215,089	255,195	294,997	288,739
Peru	136,303	157,415	184,370	213,662	268,525	288,387	349,317
United States	105,230	270,813	158,150	205,432	238,495	166,106	179,124
Chile	122,633	232,202	166,382	156,247	160,000	165,000	160,000
Kenya	103,523	145,204	202,294	149,241	166,948	177,799	218,692

Source: Food and Agriculture Organization of the United Nations (FAO)

Exhibit 4

Number of Farms with Avocado Production in Costa Rica by Destination of Production, Origin of Seed, and Irrigation System, 2016.

Production Destination	San José	Alajuela	Cartago	Heredia	Guanacaste	Puntarenas	Limón	Total
Self-consumption	2683	1922	462	344	867	1854	950	9082
Local market	610	190	105	28	90	135	59	1217
Sale inside farm	220	99	57	53	45	116	80	670
Agroindustry	46	16	23	4	6	6	4	105
Outside the country	-	-	-	-	-	-	-	-
Not sold	20	15	3	4	21	17	6	86
No harvested	253	134	56	17	86	171	46	763
Total	3832	2376	706	450	1115	2299	1145	11923

Seed Origin	San José	Alajuela	Cartago	Heredia	Guanacaste	Puntarenas	Limón	Total
Own	2274	1546	435	314	812	1501	918	7800
Bought	1264	556	186	90	198	505	88	2887
Other	294	274	85	46	105	293	139	1236
Total	3832	2376	706	450	1115	2299	1145	11923

Irrigation System	San José	Alajuela	Cartago	Heredia	Guanacaste	Puntarenas	Limón	Total
Aspersion	74	58	25	6	38	93	12	306
Gravity	51	27	15	1	11	22	2	129
Dripping	12	31	6	9	21	27	3	109
Other	37	91	45	62	35	44	7	321
Not used	3658	2169	615	372	1010	2113	1121	11058
Total	3832	2376	706	450	1115	2299	1145	11923

Source: National Institute of Statistics (INEC), Costa Rica

Exhibit 5

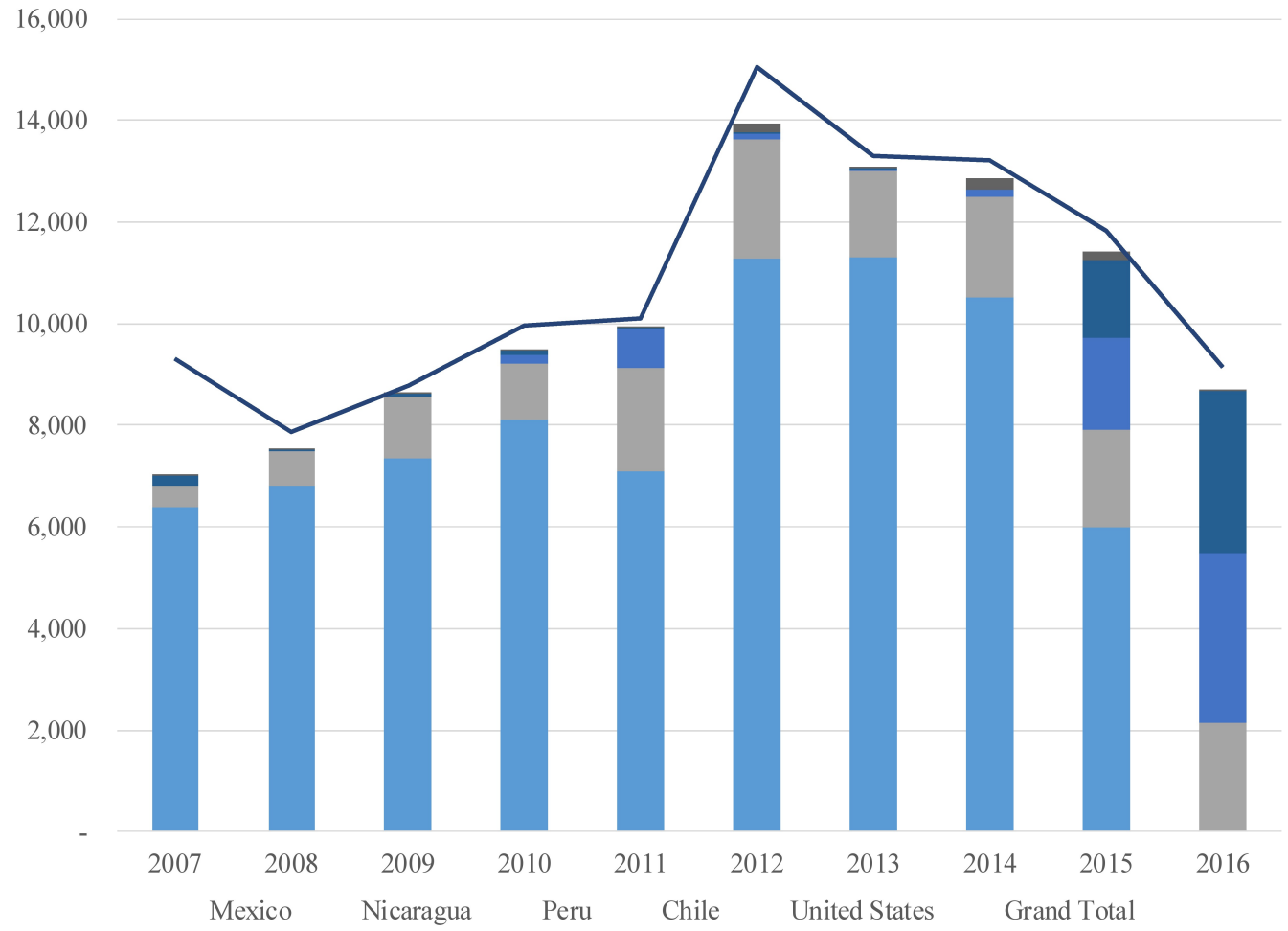
Number of Farms with Avocado Production in Costa Rica and Extension, 2016

Province	Number of Farms	Extension (hectares)		Amount of Scattered Plants
		Cultivated	In Production Age	
San José	3,832	512	412.8	112,298
Alajuela	2,376	191	181.2	18,619
Cartago	706	89	81.2	14,740
Heredia	450	15	14.4	3,591
Guanacaste	1,115	78	69.3	11,662
Puntarenas	2,299	178	135.3	27,499
Limón	1,145	46	39.3	8,772
Total	11,923	1,108	933.5	197,181

Source: National Institute of Statistics (INEC), Costa Rica

Exhibit 6

Top Suppliers of Avocado in Costa Rica, 2007-2016



Source: Procomer, Costa Rica

Exhibit 7

Effects of Avocado Sun Blotch Viroid in Fruits and Leaves

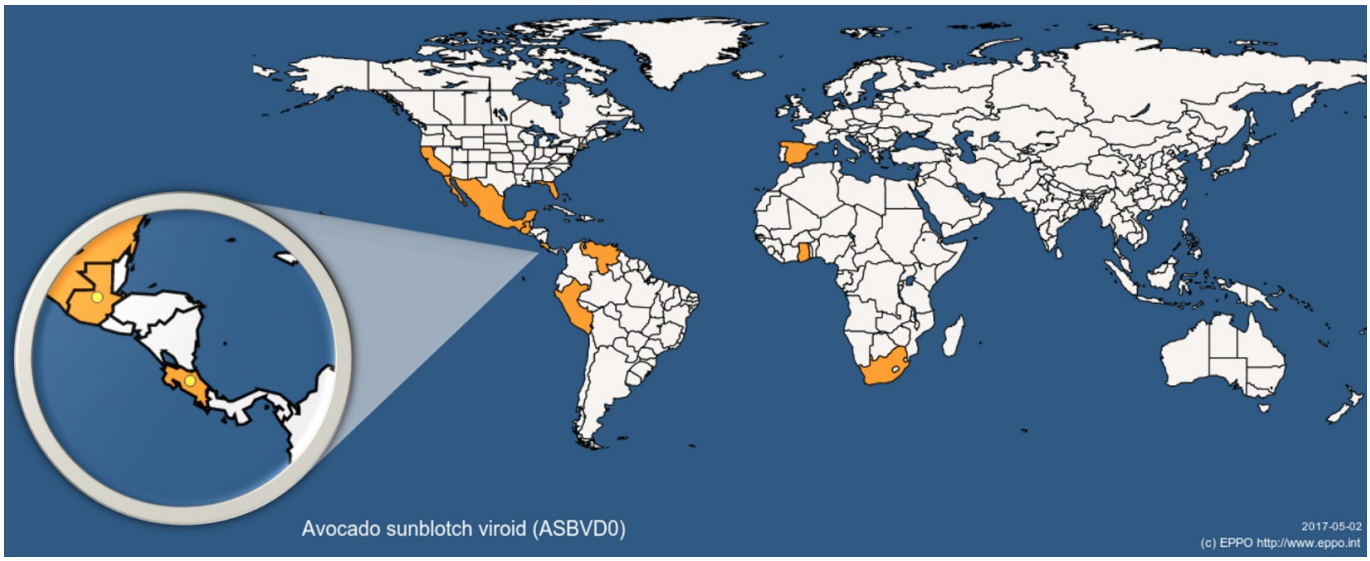
Severity of ASBVd-infected fruits (4-class) scale:
Class 0 (asymptomatic),
Class 1 (0-7% severity),
Class 2 (8-24% severity),
Class 3 (>25% severity).

Symptoms of ASBVd-infected fruits and leaves: (a) yellow streaks on fruit, (b) reddish and necrotic streaks on fruit, (c) tan variegation from central vein, and (d) leaf distortion and chlorosis.

Source: Saucedo-Carabez, et al. (2014). Effect of Avocado Sunblotch Viroid (ASBVd) on Avocado Yield in Michoacán, Mexico. European Journal of Plant Pathology, (138), 799-805.

Exhibit 8

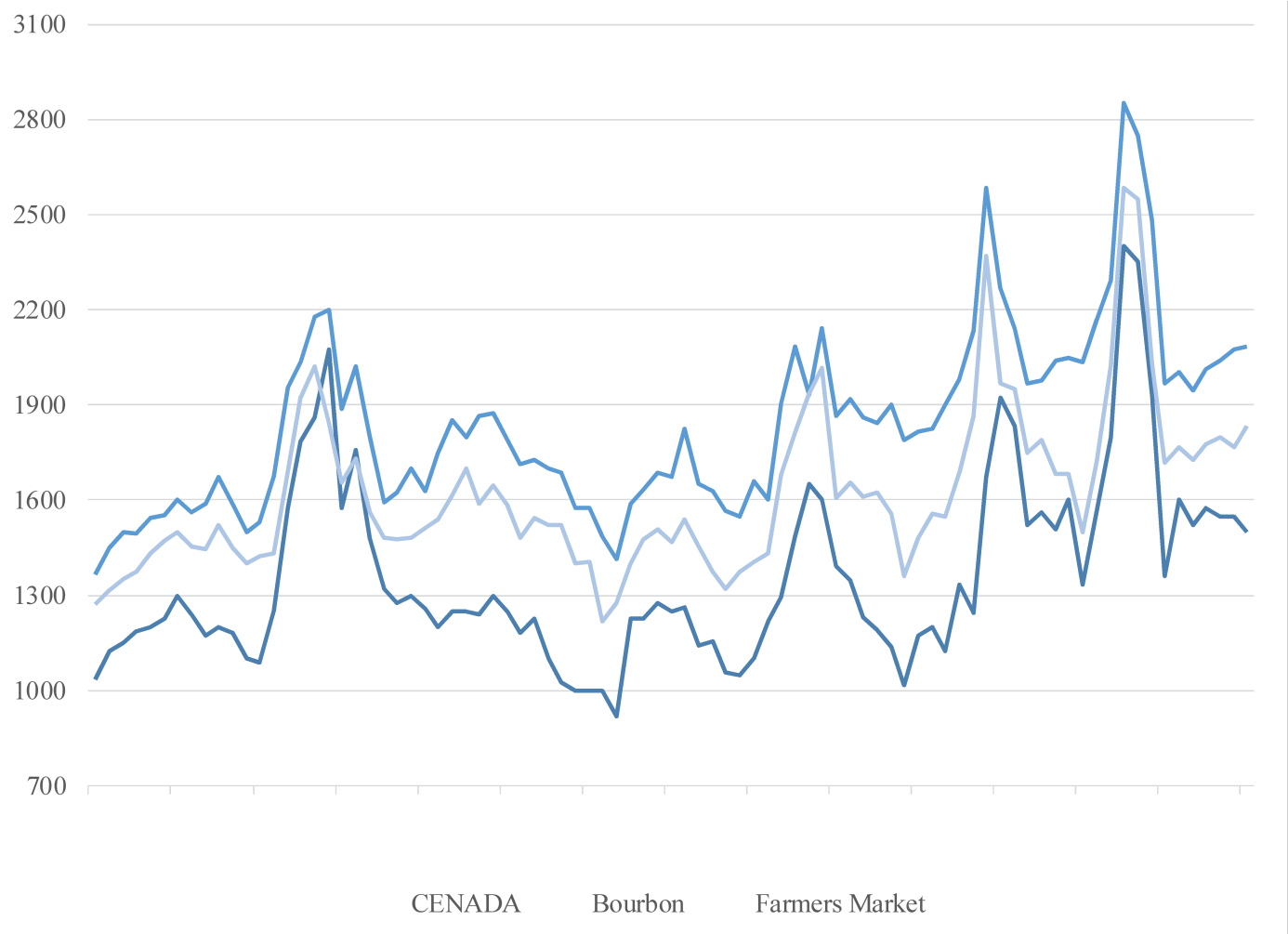
Presence and Distribution of Avocado Sun Blotch Viroid, 2016



Source: European and Mediterranean Plant Protection Organization (EPPO)

Exhibit 9

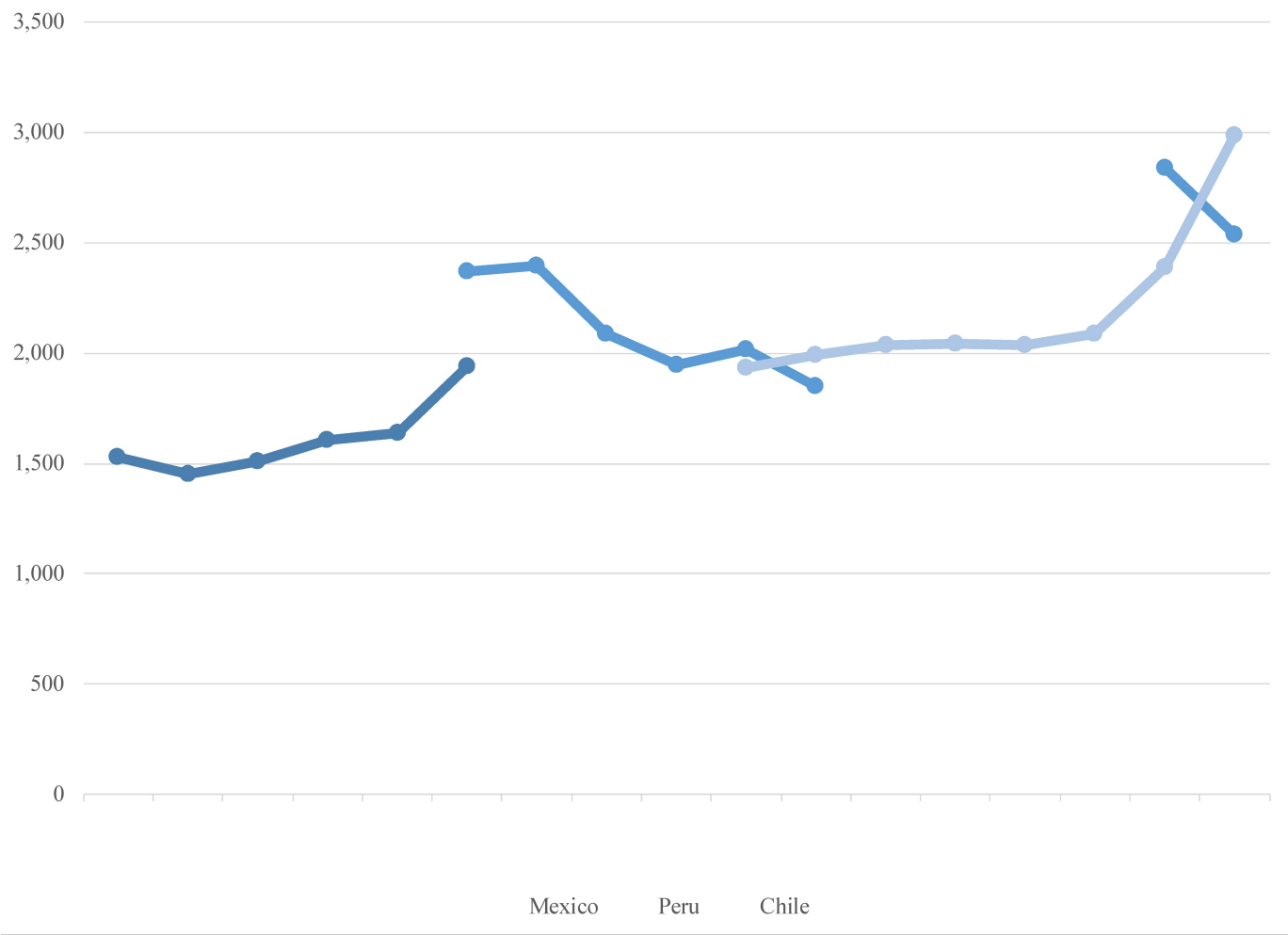
Prices of Avocado in Costa Rica (CRC/Kg)



Source: Agri-Food Information System, Costa Rica

Exhibit 10

Average Avocado Prices in CENADA by Country of Origin



Source: Agri-Food Information System, Costa Rica

The Avocado Conundrum: Teaching Note

Abstract

This teaching note corresponds to the Avocado Conundrum case. The Government of Costa Rica faces the issue of whether and how to manage a trade solution under the WTO framework, due to its decision of suspending the phytosanitaty import certificates of avocados from Mexico. The teaching note provides a synopsis of the case, followed by suggestions of how to use the case, teaching objectives and finally, assignment questions. These assignment questions focus on strategic issues, so an overall look at the industry and market is presented and discussed. This discussion is followed by a closer look at the avocado value chain and its implication on the Costa Rican economy, considering that most of the avocado consumed in Costa Rica are imported, leading to an alteration of the market when a blockage of imports from the main country suppliers occurs. To conclude the analysis, the financial data of this commercial conflict is reviewed with the objective to evaluate the financial implications on the local economy. The teaching note finishes with a short summary of the potential decision of the World Trade Organization on this commercial dispute.

Statement of Relevance

On 22 April 2015, the State Phytosanitary Service (SFE) from the Costa Rican Government released an official resolution, through which it temporally suspended the emission of phytosanitary import certificates for avocados from eight countries—Australia, Spain, Ghana, Guatemala, Israel, Mexico, South Africa, and Venezuela—plus the state of Florida in the United States. The SFE stated its decision was an urgent action to protect the national territory and its local producers from the Avocado Sun Blotch Viroid (ASBVd), a plague affecting the quality and yield of avocado crops in these countries. However, the decision from the SFE was subject to considerable criticism from different national and international stakeholders due to many inconsistencies in the process.

This case takes place as the government of Mexico formally requested through the WTO to reach a solution with Costa Rica regarding the blockage of Mexican avocados. Therefore, WTO would have to proceed to deliberate if Costa Rica is imposing technical rules as trade barriers to import the avocado from Mexico. Meanwhile, Costa Rica had already started importing avocado from Chile and Peru (where the viroid is also established).

Target Market Statement

This case provides information that can be highlighted and used across several academic areas, such as managerial analysis and decision-making, agribusiness, sustainable development, business strategy, international trade or macroeconomics.

The principal target audience for this case is graduate students in a Masters of Business Administration (MBA), Master of Agribusiness, Executive Master of Business Administration or any other post-graduate program related. As well, the case can be used in seminars or workshops on the topic of international trade.

Teaching Objectives

1. To learn about the process of managing an international trade conflict,
2. To illustrate the main issues on the blockage of imports of an agricultural product from the main supplier country,
3. To illustrate the costs of the blockage of Mexican avocado on the local economy,
4. To examine the role of different stakeholders in a commercial conflict,
5. To illustrate the challenges of how to face a trade solution under the WTO framework,

Suggested Assignment Questions

1. Discuss the importance of Mexican avocado in the market.
2. Analyze Costa Rican strategy to manage the blockage of Mexican avocado.
3. Analyze the potential benefits and risks of the suspension of the emission of phytosanitary import certificates for avocados.
4. Analyze the avocado supply chain and its role in the Costa Rican economy. What effect does the blockage of import of avocados have on finances?
5. How should WTO deliberate regarding the Mexican-Costa Rican commercial dispute? What would be your decision in this case?

Discussion and Analysis

1. ***Analyze the importance of Mexican avocado in the market***

The demand for avocado had increased worldwide, in part because the taste of the fruit and its beneficial nutritional characteristics, as well as diets like gluten-free, vegan, raw, paleo, among others are trend. Also, the case mentions several mainstream restaurants like Chipotle and Starbucks included avocado in their menu, which added increase in demand.

According to information in the case, Mexico represented 29.4% (1.5 million tonnes of total 5.1 million tonnes) of the global avocado production in 2014. Being as well the largest exporter of avocado with 28.8% of the world production (1.47 million tonnes), which represent 98% of total Mexican production. By contrast, Dominican Republic, the second largest avocado producer in the world, produced around 8.3% (0.42 million tonnes) of the total global production, which is only 28% of the Mexican production.

United States was the biggest importer of avocado and the largest consumer of Mexican avocado, in 2014 imported 78% of Mexican production (1.17 million tonnes). Per-capita consumption in US increased from 3.5 pounds in 2006 to 6.9 pounds in 2015. The highest peak in consumption of avocado in US every year was during the week of the Super Bowl and the week of Cinco de Mayo.

Mexico was historically the largest exporter of avocado to Costa Rica, providing before the blockage 80% (12,000 tonnes per year) of the Costa Rican yearly demand, but this only represents 0,8% of the Mexican production. In the other hand, local producers only supplied 13% of the demand, because it was challenging to grow avocados in Costa Rica due to weather conditions.

Therefore, it is clear that local producers would not be able to supply the market demand (the average Per-capita consumption in Costa Rica was 6 pounds), not even substitute a highly demanded product like the Mexican Hass avocado. It is important to note that local avocado and even Hass avocado from Peru and Chile had a difference in taste, texture and shelf-life from Mexican Hass avocado.

2. Analyze Costa Rican strategy to manage the blockage of Mexican avocado.

The process of discussion with the participants should be guided in order to determine what has been the position of the Government of Costa Rica and what should do now, regarding the blockage of imports of avocados from México and other countries, because of the Sun Blotch Viroid.

From the information in the case it is clear that the Government of Costa Rica want to protect the national territory and its local producers from the Avocado Sun Blotch Viroid, by suspending temporarily the emission of phytosanitary import certificates for avocados from eight countries, where the virus have been confirmed its presence, mainly the avocado from México, that

represent 80% of total Costa Rican avocado import during 2014. Nevertheless, different studies held in 1991, 2003 and 2013 confirmed that the viroid had already established in Costa Rica.

The Sun Blotch Viroid (ASBVd) issue started getting relevance in Costa Rica in 2013, when the country hosted the IV Latin American Congress of Avocado, and new research on the viroid were presented. Hence in 2014 the Ministry of Agriculture viewed the ASBVd as a critical threat, therefore started a sampling protocol of avocado crops and fruit yields to verify the presence of the virus in the country. According to the Cellular and Molecular Biology Research Center of the University of Costa Rica, who conducted molecular tests using PT-PCR methodology, none of the samples of avocado tested positive for ASBVd.

According to WTO, the International Protection Convention (IPCC) was the only organization authorized to establish international plant health standards. IPCC developed the phytosanitary import regulatory systems under ISPM 20, establishing that a Pest Risk Assessment PRA is necessary to determine if a pest should be regulated and the strength of the phytosanitary measures.

Nevertheless, Costa Rica without having notified WTO, neither developed a PRA assessment on Mexican avocado, the State Phytosanitary Service (SFE) halted the emission of import certificates on April 2015. It was later on May 2015, when the Costa Rican government sent SFE to Mexico to collect data for the PRA. In July 2015, the results of the PRA stated that, there was a risk to disseminate the pathogen (mainly through the avocado seeds) through the import of avocado for consumption, which had the potential to germinate and spread the virus.

From the results of the PRA, the strategy of Costa Rica to prevent ASBVd, from the import of avocado from Mexico, included several phytosanitary measures such as; the freight had to include a phytosanitary certificate, fruits have to come from plants in certified orchards as free of ASBVd, the avocado had to be grown in an area free of ASBVd, among others.

However, nor the Costa Rican government or the SFE conducted an analysis of the economic consequences of the establishment of the pathogen would have in the country and local producers. Besides, the decision made did not consider the effect on consumers, about the quality, the quantity and the prices of avocados in the local market.

Therefore, Costa Rica is using a national technical rule to prevent the import of avocado from Mexico, obstructing international trade to benefit local producers. Taking into consideration that import were meant for human consumption, the viroid did not represent a risk.

On March 2017, the Mexican government formally requested to the WTO a consultation with Costa Rica to reach a solution regarding the blockage of Mexican avocado, but Costa Rica did not reply and parties never held the meetings to solve the issue. Therefore, now they will have to look for a solution under WTO framework.

3. ***Analyze the potential benefits and risks of the suspension of the emission of phytosanitary import certificates for avocados.***

The Costa Rican government and SFE see benefits by suspending the emission of phytosanitary import certificates for avocados, mainly the avocado from Mexico. One of the benefits is the guard of the phytosanitary status of the nation. According to the University of Costa Rica (UCR), who conducted molecular tests (PT-PCR methodology) on Costa Rican avocado, they determined no presence of ASBVd in the samples. And later SFE with a PRA it was detected the viroid on Mexican avocado.

It is important to note that UCR was not certified to execute the analysis of the disease, and the methodology used to test the avocado is highly efficient but it only process small sample sizes. The most efficient alternative is spectral imagery from satellites to test extensive areas, with this method it is possible to detect alterations associated to ASBVd before they manifested on the plant, so more tests should have been done.

Local producers (11,293 farmers) could benefit from this decision by selling more products to a higher price. This point should be discussed, since local producers could only satisfy 13% of the Costa Rican demand (2000 tonnes per year). As well, Costa Rican avocado presented a big difference in taste, texture and shelf life from Mexican Hass avocado.

In the other hand, several risks rise due to the blockage of the Mexican avocado in the Costa Rican market. Local producers were not able to satisfy the quality and quantity of local demand, which increased the consumers discontent with the government decision.

Another risk as a result of the avocado issue, it was the development of a black market for Hass avocado; this avocado was smuggled into the country in the Southern border. Students should discuss this point with other issues that they may suggest (e.g. tax evasion).

The increase in the avocado price was a risk that consumers perceived affected them the most. The average price in the farmers market had increased more than 51% during 2015-2016. Furthermore, the price of the Hass avocado imported from Peru and Chile was at least 35% higher than the price of Mexican Hass.

An international trade conflict with Mexico was a risk that Costa Rica might have not seen coming, now the WTO will have to determinate if Costa Rica is imposing technical barriers on international trade.

The instructor should ask the students for other risks that they have perceived from the case.

4. ***Analyze the avocado supply chain and its role in the Costa Rican economy. What effect does the blockage of import of avocados have on finances?***

The production of avocado in Costa Rica is challenging due to weather conditions, mainly rain, and this is a relevant factor since avocado were not able to resist flooding and poorly drained soils. Because of that, local producers supply only 13% of the Costa Rican avocado consumption. The average Costa Rican avocado market demand was 15,000 tonnes per year.

Regarding the local avocado supply chain, in Costa Rica there are 11,293 farms that produces avocado in an extension of 1,108 cultivated hectares and 933 hectares in the age of production. Producing 11,923 tonnes/year from which 76% (9082 tonnes) is destinated for self-consumption, and only around 17% (2000 tonnes) to supply the Costa Rican market (local market, sale inside the farm and agroindustry).

The region of Los Santos in San José province is an important player, because this region concentrates 32% of total farms, and produces around 44% (876 tonnes) of total local producers supply (2,000 tonnes). It is important to note that the main crop of farmers in this region is coffee, and avocado is grown in association with coffee.

Due to this situation, Costa Rica have had to import around 13,000 tonnes (87%) of yearly average demand. Mexico and Nicaragua were the main suppliers until 2014; being Mexico the largest provider with almost 12,000 tonnes (80%) and Nicaragua supplied around 1,000 tonnes (7%).

From information in the case it was created the Table 1 that summarize the financial implications of the blockage of the import of Mexican avocado in the local economy.

Table 1. Avocado supply and potential income expressed in millions of Costa Rican Colones and US Dollars during 2014, 2015 and 2016.

	Avocado supply (Tonnes)			Potential income (Millions CRC)			Potential income (Millions US$)		
	2,014	2015	2016	2014	2015	2016	2014	2015	2016

Local producers	2,000	2,000	2,000	3,000	3,000	5,400	5.5	5.5	9.8
Mexico	12,000	6,000	-	18,000	9,000	-	32.7	16.4	-
Other countries (Chile, Nicaragua, Peru)	1,000	5,500	8,500	1,500	8,250	22,950	2.7	15.0	41.7
Total Import	13,000	11,500	8,500	19,500	17,250	22,950	35.5	31.4	41.7
Total	15,000	13,500	10,500	22,500	20,250	28,350	40.9	36.8	51.5
Deficit	-	1,500 10%	4,500 30%		2,250	6,750		4.1	12.3

Yearly average demand = 15,000 tonnes. Average price 2014-2015 = CRC 1,500. Average price 2016 = CRC 2,700 Exchange rate = CRC 550 per US$ dollar.

Having in mind that demand do not increase or decrease when price changes, what changes when price falls (rises) and consumers purchase more (less) of a good, other things remain the same (income, price of related goods, the expected price of the good in the future, and the taste of consumers), is the quantity demanded (increase or decrease) (Maurice and Smithson, 1985).

In 2015, when the blockage of Mexican avocado occurred (June 2015), the import from Mexico decreased considerably to 6,000 tonnes (around 50% less than previous years). Hence, the total import that year declined to 11,500 tonnes, which led to a deficit of around 1,500 tonnes (10% of average demand). This year, to respond to demand, Costa Rica had to start importing from Chile and Peru.

During 2016, without the Mexican avocado in the market, the imported avocado lower to 8,500 tonnes, even though there was an increase on the import of avocado from Chile and Peru. That year the deficit would have reached around 4,500 tonnes (30% of average demand).

The average price of imported Mexican Hass avocado in Costa Rica during the first semester of 2015 was CRC 1,500 per kg (before the blockage). One year later, the average price of avocado in Costa Rica was around CRC 2,700 per kg, the increase in price was CRC 1200 per kg. As stated before, while supply diminished and price rises, the demand did not changed as product of the blockage, what changed was the quantity demanded.

If it were assumed that the price would have remained constant during the whole 2015, like the average price in the first semester of 2015 (CRC 1500 per kg), the total demand of Costa Rica (15,000 tonnes per year) would have represented CRC 22,500 millions (US$ 40.9 millions) in potential income.

So, considering the deficit of 1,500 tonnes at the end of 2015, it would have been CRC 2,250 millions (over US$ 4 millions) in potential income. The deficit of 2016 would have represented CRC 6,750 millions (over US$ 12 millions).

At the price of CRC 2,700 per kg in 2016, the 10,500 tonnes of avocado in the market that year represented CRC 28,350 millions (US$ 51.5 millions) in potential income. That is an increase of CRC 5,850 millions (US$ 10.6 millions), but with 4,500 tonnes of avocado less in the market (considering the average demand of 15,000 tonnes per year).

Local producers obtained big part of the benefits with the increase in price; with 2,000 tonnes of avocado at a price of CRC 1,500 per kg, they would have perceived CRC 3,000 millions (US$ 5.5 millions), but, due to the increase in price (CRC 2,700 per kg) their income would have reached CRC 5,400 millions (US$ 9.8 millions), obtaining an increase of 44% in their income (CRC 2,400 millions = US$ 4.4 millions).

Meanwhile, mainly the consumers assumed the increase in price, lower in quality and quantity of avocado.

5. ***How should WTO deliberate regarding the Mexican-Costa Rican commercial dispute? What would be your decision in this case?***

The World Trade Organization WTO, as the main organization that resolves trade disputes (WTO, 2017); have to deliberate the commercial conflict between Mexico and Costa Rica. Mexico had formally requested a solution regarding the blockage of import of Mexican avocado, arguing that Costa Rica had violated the commercial agreement signed in the free trade agreement that both countries have signed.

Since Costa Rica is restricting the import of Mexican avocado (for human consumption) using a national technical barrier, the phytosanitary measures on Sun Blotch Viroid, alleging that the country is free of the SBVd, even when CR did not use the formal protocol to conduct a Pest Risk Assessment (a competence of the International Plant Protection Convention IPCC). Besides, the disease has been reported in Costa Rica in several researches in 1991, 2003 and 2013.

Therefore, after WTO would have conducted the dispute settlement procedure process, WTO should tell Costa Rica that is protecting its local avocado producers with a blockage of import of avocado from Mexico, and is violating a commercial agreement between Costa Rica and México. Hence, Costa Rica should correct his decision and adopt the corresponding measures to reestablish the trade of avocado from Mexico.

Students should discuss in detail this point and contribute with other case solutions.

References

Maurice C. And Smithson C. 1985. 2nd edition. Chapter 2. Richard D Irwin, Inc. Homewood, Illinois, US. ISBN: 0-256-02997-0.

WTO. 2017. Understanding the WTO: Settling disputes. Consulted on October 2017. Available on line on: [https://www.wto.org/english/thewto_e/whatis_e/tif_e/disp1_e.htm]