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Competitiveness of Mexican vanilla (*Vanilla* spp.) in the international market

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ABSTRACT
Objective: To analyze the competitiveness of Mexican vanilla in the international market.
Design/Methodology/Approach: The relative trade balance (RTB) and the revealed comparative advantage index (RCAI) were calculated to analyze the competitiveness of the Mexican vanilla in the international market. Both crushed and whole vanilla beans were evaluated.
Results: Around 1% of the total vanilla area is harvested in Mexico, representing 6% of the world production volume. The Mexican market is competitive in the international whole vanilla beans market, but not in the case of crushed or ground vanilla.
Study Limitations/Implications: The SIAVI portal was discontinued. Therefore, the international vanilla trade data could only be retrieved for the period ending on November 2021.
Findings/Conclusions: The Mexican market has potential for the development of vanilla production. However, current production is practically absorbed by the local market.

Keywords: relative trade balance, revealed comparative advantage index, production analysis.

INTRODUCTION

Vanilla (*Vanilla* spp.) is part of the Mexican plant heritage: 9 of the 15 species of Mesoamerican vanillas are found in the country and *V. × tahitensis* is the second most produced hybrid in the world (UV, 2018; SAGARPA, 2017). Totonacapan is the main vanilla production region in Mexico. It consists of 20 municipalities of the state of Veracruz and 19 municipalities of the state of Puebla (Luis *et al.*, 2020). According to the Agricultural and Fisheries Information Service (SIAP), more than a thousand hectares of vanilla were harvested in Mexico in 2021, with an average yield of 0.58 tons per hectare. These results imply that 610 tons of this orchid were produced. Since, the average rural price was $95.5 thousand pesos per ton, the value of vanilla production was approximately $58.2 million pesos (SIAP, 2023). Comparing the domestic and international production volumes, the Mexican market had a 15.19% participation in the year in question, since the worldwide production amounted to a 6,888 tons volume (FAOSTAT, 2023).

In 2021, the main importing countries of vanilla were the USA, France, and Germany, with 1,806.8, 1,080.9, and 710.6 t, respectively. Meanwhile, Madagascar was the main exporter with 2,534.3 t of vanilla (FAOSTAT, 2023). The objective of this research was to analyze the competitiveness of Mexican vanilla in the international market, with the purpose of determining if it has a comparative advantage regarding the rest of the world.

MATERIALS AND METHODS

A cross-sectional analysis was developed to determine the participation of the Mexican market in the global vanilla production; data from a single year were collected to describe the variables and analyze their incidence and interrelation at a given time (Hernández, Fernández and Baptista, 2010). The share of planted area and volume of vanilla production in Mexico were estimated with relation to the international market. The data were taken every five years, from 1980 until 2020; the Sistema de Información Agroalimentaria de Consulta (SIACON) and the statistical database of the Food and Agriculture Organization of the United Nations (FAOSTAT) were consulted to obtain the Mexican and global data, respectively. The percentage estimate was obtained using the following formula:

$$r_\% = \left(\frac{v_n}{v_m}\right)100$$

Where: $r_\%$ is the participation percentage of the Mexican market in the world market; v_n is the value of the variable in the domestic market; and v_m is the value of the variable in the international market. On the one hand, if the value of $r_\%$ tends to zero, the implication is that the domestic market is not significant in the international market; on the other hand, if the indicator approaches 100, the national market plays an important role in the world.

The variables figures researched for the longitudinal or evolutionary analysis of the Mexican vanilla market from 2012 to 2021 (SIACON) were: planted and harvested area, yield, production volume, average rural price, and value of the production of the crop. The growth rate of each variable (*i.e.*, the accumulated increase or decrease in each one in the last ten years) was estimated using the following formula (Rivera *et al.*, 2020; Pérez *et al.*, 2010):

$$r_{t,0} = \left(\frac{x_t - x_0}{x_0}\right)100$$

$r_{t,0}$ is the growth rate (percentage) of each variable from 2012 to 2021; x_t is the value of each variable in 2012; x_0 is the value of each variable in 2021.

To analyze the Mexican market competitiveness in relation to the international market, the volume and value variables of vanilla exports and imports were obtained. The 09051001 "whole vanilla beans" and 09052001 "crushed or ground vanilla" tariff fractions were

used for the same purpose (SIAVI, 2023). Finally, the competitiveness of Mexican vanilla was analyzed from 2013 to 2021 for each of the fractions, using the concepts and formulas detailed below.

The relative trade balance (RTB) indicator was calculated to measure the relationship between the exports and imports of a product from a country with regards to the international market or a specific market. The indicator is interpreted as an index of competitive advantage that determines if the country is a net exporter or importer of the product (Luquez *et al.*, 2022; García, 1995). It was estimated using the following formula:

$$RTB_{ij} = \frac{X_{ij} - M_{ij}}{\left|X_{ij} + M_{ij}\right|}$$

Where: RTB_{ij} is the relative trade balance of Mexico in relation to vanilla; X_{ij} is the volume of vanilla that Mexico exports to the international market; and M_{ij} is the volume of vanilla that Mexico imports from the international market. If the RTB index is between zero and one, the country is a net exporter of the product and has a competitive advantage; however, if the value is between minus one and zero, the country is a net importer of the product and lacks a competitive advantage.

The revealed comparative advantage index (RCAI) was used to confirm if Mexico has a competitive advantage in the international vanilla market, based on trade specialization taking a reference point (Ramírez-Padrón *et al.*, 2018; Balassa, 1965). The index was calculated for the international market using the following formula (ECLAC, 2008):

$$RCAI = \frac{x_{iw} - m_{iw}}{\left|x_{iw} + m_{iw}\right|}$$

Where: *RCAI* is the revealed comparative advantages index; x_{iw} is the value of vanilla exports from Mexico to the international market; and m_{iw} is the value of vanilla imports from the international market into Mexico. If the RCAI value is negative, the country is not competitive in the analyzed market; meanwhile, if the index is positive, the country has a competitive advantage in such market.

RESULTS AND DISCUSSION

Vanilla is a crop that has a designation of origin. However, the share of the domestic vanilla market in relation to the global harvested area (HA) has historically been very low (>5%). Regarding production (P), Mexico has had a maximum participation of 13% in the international vanilla market (Figure 1). Mexico is an important producer of this crop.

From 2012 to 2021, the area planted and harvested in the country has had a negative trend; however, the implementation of public policies for the promotion of vanilla
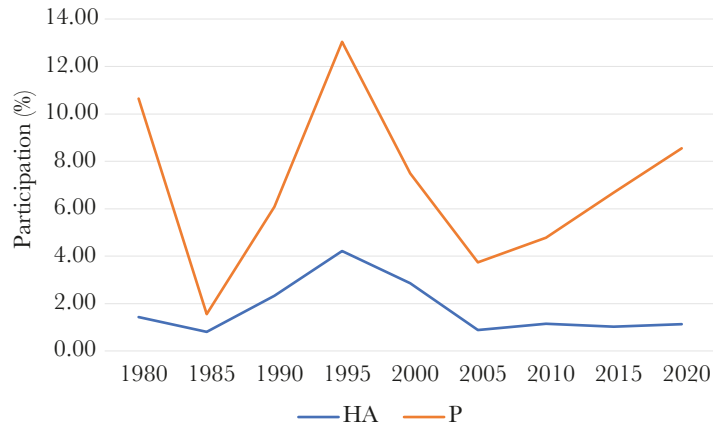
Figure 1. Participation of Mexican vanilla in the world. Source: Figure developed by the authors based on data from SIACON and FAOSTAT.

production —such as its incorporation into the Proyecto Nacional de Plantas Nativas para la Alimentación y la Agricultura (SADER, 2020)— has improved these variables.

During the analysis period, the yield per hectare of this orchid increased from 0.35 tons (2012) to 0.58 tons per hectare (2021); meanwhile, the volume of domestic vanilla production increased from 390 to 610 tons (Figure 2). The variation in the production level of vanilla is related to its yield, therefore, Mexico has conditions to promote intensive production in controlled environments, as an option for the development of the activity.

The average rural price of vanilla has recorded an upward trend, increasing from $53,000 pesos per ton (2012) to $95,500 pesos per ton (2021). The value of vanilla production in Mexico increased in the analyzed period, reaching more than $58 million pesos. Vanilla cultivation has the economic potential to promote the development of the Totonacapan region.

The RTB analysis shows that Mexico is competitive in the international whole vanilla beans market. Figure 3 shows that the value of this comparative advantage indicator was
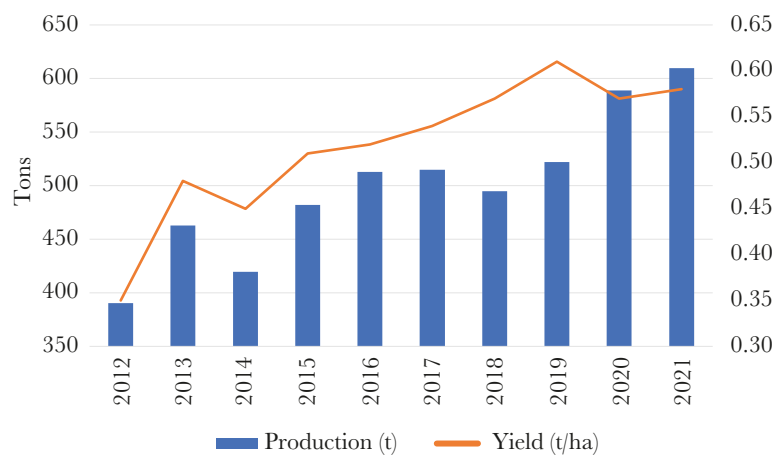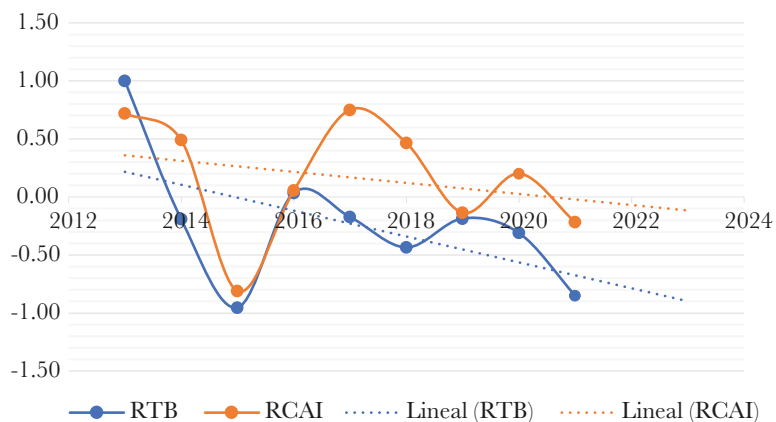

Figure 2. Yield and volume of Mexican vanilla production. Source: Figure developed by the authors with data from SIACON.
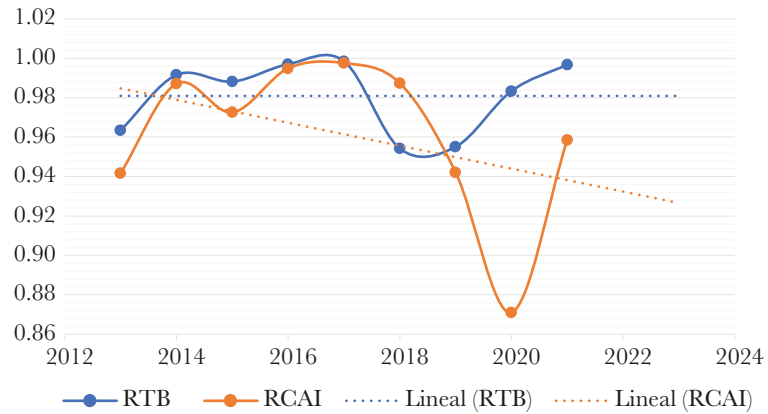
Figure 3. Competitiveness rates for whole vanilla beans in Mexico. Source: Figure developed by the authors with data from SIAVI.

close to one during the analysis period, while the linear projection of that variable shows that the trend is constant (*i.e.*, close to one). However, if this indicator is compared with the RCAI (although this indicator is also positive and close to one), a downward trend is recorded in the analysis period —*i.e.*, the competitiveness of the value of the Mexican whole vanilla beans market has decreased due to the low price that exporters have obtained in recent years. The specialization and promotion of the activity in the region with a designation of origin would enhance the position of Mexico in the international trade of this orchid, generating foreign currency for the country and greater income for the producers and marketers of this crop.

In the case of crushed or ground vanilla, the RTB recorded overall negative values during the analysis period, implying that Mexico is not competitive in the international market; meanwhile, the linear projection of the variable showed a negative trend (Figure 4). However, the RCAI of the exports and imports of this type of vanilla records positive values, which implies that the value of the Mexican market is competitive in relation to this product, despite the likewise downward trend.

Figure 4. Competitiveness rates for whole vanilla beans in Mexico. Source: Figure developed by the authors with data from SIAVI.

Consequently, the Mexican market is competitive in the vanilla market as a result of the quality of its product, while the agro-industry uses the lower quality pods to produce essences and other byproducts.

CONCLUSIONS

The yield achieved by vanilla in Mexican soil has a comparative advantage. The increase in vanilla production in recent years is related to the incorporation of the crop into the Proyecto Nacional de Plantas Nativas para la Alimentación y la Agricultura. Mexico has the potential to increase the production of this crop with promotion policies that enable the producers to develop the activity.

The Mexican market has a comparative advantage regarding the international market for whole vanilla beans. However, the export volume amounted to less than 30 tons in most of the years of the analysis period. Therefore, the current production is practically absorbed by local market. In conclusion, to increase vanilla production, an additional plan is required to encourage internal consumption and to position Mexican vanilla in foreign markets.

REFERENCES

UV. (2018). Importancia y uso de la Vainilla en México. Centro de Investigaciones Tropicales. Universidad Veracruzana. Consultado el 04 de junio de 2023, disponible en línea en https://www.uv.mx/citro/banner/importancia-y-uso-de-la-vainilla-en-mexico/

SAGARPA. (2017). La vainilla de México al mundo. Secretaría de Agricultura y Desarrollo Rural. Consultado el 04 de junio de 2023, disponible en línea en https://www.gob.mx/agricultura/es/articulos/la-vainilla-de-mexico-al-mundo

Luis-Rojas, S., Ramírez-Valverde, B., Díaz-Bautista, M., Pizano-Calderón, J. & Rodríguez-López, C. (2020). La producción de vainilla (*Vanilla planifolia*) en México: análisis y pronóstico. *Revista mexicana de ciencias agrícolas, 11*(1), 175-187. Epub 02 de marzo de 2021. https://doi.org/10.29312/remexca.v11i1.2065

SIAP. (2023). Anuario Estadístico de la Producción Agrícola. Servicio de Información Agroalimentaria y Pesquera. Consultado el 20 de mayo de 2023, disponible en línea en https://nube.siap.gob.mx/cierreagricola

FAOSTAT. (2023). Crops. Database of the Food and Agricultural Organization of the United Nations. Consultado el 20 de mayo de 2023, disponible en línea en http://www.fao.org/faostat/en/#data/QC

Hernández, S. R., Fernández, C. C. y Baptista, L. M. P. (2010). "Metodología de la investigación". Quinta edición. McGraw-Hill/Interamericana Editores, S.A. de C.V., México.

Rivera-López, S., Perales-Salvador, A., Del Valle-Sánchez, M., & Caamal-Cauich, I. (2020). Panorama de la producción y comercialización de naranja en México. *Agro Productividad, 13*(7). https://doi.org/10.32854/agrop.vi.1614

Pérez, R., Caso, C., Río, M. J., & López, A. J. (2010). Introducción a la Estadística Económica. Oviedo: Departamento de Economía Aplicada, Campus del Cristo. Universidad de Oviedo. España.

SIAVI. (2019). Estadísticas anuales. Sistema de Información Arancelaria Vía Internet. Consultado el 20 de mayo de 2023, disponible en línea en http://www.economia-snci.gob.mx/

Luquez Gaitan, C. E., Hernández Mendoza, N., & Gómez Gómez, A. A. (2022). Análisis de la competitividad comercial de aguacate entre México y la Unión Europea de 2001 a 2018. *Revista Mexicana De Ciencias Agrícolas, 13*(3), 567–575. https://doi.org/10.29312/remexca.v13i3.2679

García, R. (1995). Metodología para elaborar perfiles de competitividad del sector agroalimentario. Documento de Trabajo del Instituto Interamericano de Cooperación para la Agricultura. Proyecto multinacional. Apoyo al Comercio y a la Integración en el Área Andina. Caracas, Venezuela.

Ramírez-Padrón, L.C., Caamal-Cauich, Pat-Fernández, V.G. & Martínez-Luis, D. (2018). Ventaja comparativa revelada de la fresa (*Fragaria* spp.) mexicana en los mercados importadores. *Agroproductividad, 11*(1), 105-110.

Balassa, B. (1965). Trade Liberalisation and "Revealed" Comparative Advantage. *The Manchester School, 33*(2), 99-123.

CEPAL. (2008). Indicadores de comercio exterior y política comercial: mediciones de posición y dinamismo comercial. Comisión Económica para América Latina y el Caribe. Santiago de Chile: Organización de las Naciones Unidas.

SADER. (2020). Proyecto Nacional de Plantas Nativas para la Alimentación y la Agricultura tendrá atención especial a pequeñas unidades productivas. Secretaría de Agricultura y Desarrollo Rural. Consultado el 26 de mayo de 2023, disponible en línea en https://www.gob.mx/agricultura/prensa/proyecto-nacional-de-plantas-nativas-para-la-alimentacion-y-la-agricultura-tendra-atencion-especial-a-pequenas-unidades-productivas