



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 9, Issue, 2(F), pp. 24125-24129, February, 2018

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

SOME ASPECTS OF GRAPEFRUIT PRODUCTION IN THE STATE OF VERACRUZ, MEXICO

**Bertha Alicia Arce Castro¹., Jorge Ramírez Juárez²., Nora María Bonilla Hernández LRI³.,
Alejandra Apodaca Borrell⁴ and Maria Georgina Arroyo Grant⁵**

¹Docente Investigador de la Facultad de Ciencias Administrativas y Sociales, Universidad Veracruzana, Jalapa Veracruz, Dirección: Paseo 112, Nueva Xalapa, Campo Nuevo, 91097 Xalapa, Ver. México

²Investigador del Instituto de Investigaciones y Estudios Superiores de las Ciencias Administrativas Universidad Veracruzana. Av. Dr. Luis Castelazo Ayala S/N, Industrial las Ánimas, 91190 Xalapa Enríquez, Ver

³Maestra de Tiempo Completo de la Facultad de Ciencias Administrativas y Sociales, Universidad Veracruzana, Jalapa Veracruz, Dirección: Paseo 112, Nueva Xalapa, Campo Nuevo, 91097 Xalapa, Ver. México

⁴Licenciada en Relaciones Internacionales, Becaria CONACYT, auxiliar de investigación en la Facultad de Ciencias Administrativas y Sociales, Universidad Veracruzana, Jalapa Veracruz, Dirección: Paseo 112, Nueva Xalapa, Campo Nuevo, 91097 Xalapa, Ver. México

⁵Maestra de Tiempo Completo de la Facultad de Ciencias Administrativas y Sociales, Universidad Veracruzana, Jalapa Veracruz, Dirección: Paseo 112, Nueva Xalapa, Campo Nuevo, 91097 Xalapa, Ver. México

DOI: <http://dx.doi.org/10.24327/ijrsr.2018.0902.1602>

ARTICLE INFO

Article History:

Received 06th November, 2017

Received in revised form 14th
December, 2017

Accepted 23rd January, 2018

Published online 28th February, 2018

Key Words:

Grapefruit, fruit fly, Grapefruit marketing,
Production, citrus.

ABSTRACT

The income generated by exports is very important for grapefruit producers in Mexico, the big problem that the producers of the State of Veracruz have, is that they must face adverse conditions typical of infestations by insects that cause shrinkage in fruits. pests are fought with agrochemicals that are considered harmful to health, which limits access to international markets such as the United States or Europe, grapefruit must be channelled to national markets. The state of Veracruz is the main producer of grapefruit in the country, generating 54% of the annual production in an area of 7 thousand hectares with a production of 168 thousand tons per year, distributed in the municipalities of Martínez de la Torre (64%), Tuxpan (18%), La Antigua (10%), Veracruz (7%) and Pánuco (1%). This article shows the results obtained through interviews with the owners of the grapefruit cultivars and those responsible of the packers of this region and also the losses in the income are calculated as a result of the shrinkage of the damaged fruits

Copyright © Bertha Alicia Arce Castro et al, 2018, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

The agricultural sector in Mexico is subject to many pressures to fulfil its function, that is, be able to generate food, raw materials and create employment opportunities for a significant percentage of the population that works in the fields.

It must face competition from products from all over the world, due to the commercial opening of Mexico, which starts with the General Agreement on Tariffs and Trade (GATT) in the eighties, followed by the Free Trade Agreement Trade with North America (TLC), and all trade agreements signed on three continents. Mexico is positioned as a gateway to a potential market of more than one billion consumers and 60% of world GDP (Pro Mexico, 2016).

The green revolution, which for four decades has led to increased yields per hectare of staple foods such as cereals whose mass production has satisfied the needs of the ever-growing human population, charges a high cost to the environment that has recently been used of agrochemicals, clearing more land, using more water and reducing biodiversity, events that have generated large imbalances that put our permanence in the land at risk (FAO, 1996).

Currently, global trends revolve around a sustainable green revolution, where the International Federation of the Organic Agriculture Movement (IFOAM) considers that there may be agricultural systems that provide healthy production of food and textile fibres, which do not damage the fertility of the soil,

*Corresponding author: **Bertha Alicia Arce Castro**

Docente Investigador de la Facultad de Ciencias Administrativas y Sociales, Universidad Veracruzana, Jalapa Veracruz, Dirección: Paseo 112, Nueva Xalapa, Campo Nuevo, 91097 Xalapa, Ver. México

ensure good production, respecting the environment (FAO, 1996).

Mexico through the FTA participates in world citrus exports, one of them being grapefruit. The grapefruit producing states par excellence are Veracruz (39%) in the first place, Michoacán (22%), Tamaulipas (11%), Nuevo León (10%) and to a lesser extent Yucatán (6%), Campeche (3%), Puebla (3%) and Sonora (3%) the most abundant varieties are white pulp: Marsh (Veracruz), pink pulp: Ruby Red (Veracruz) and red pulp Rio Red and Ruby Star (Veracruz, Michoacán, Tamaulipas, Yucatán, Tabasco and Nuevo León); It is important to highlight that the area destined for grapefruit in the states of Yucatan and Michoacán is growing and that their contributions to the national and foreign market can be evaluated in the coming years (Trujillo, 2008; SAGARPA, 2015).

The International Grapefruit Market

Grapefruit cultivars are classified according to the coloration of the pulp in white, pink and red. Highlighting the varieties Duncan, Jaffa Sweetie, Marsh, Melogold, Oroblanco (Sweetie) as those of white pulp, Foster, Henderson, Marsh pink (Thompson), Ray Ruby, Red blush (Ruby Red) and Shambar of pink pulp, and Flame, Jaffa Sunrise, Rio Red, Star Ruby (Sunrise) red pulp.

Currently the demand for citrus juices and by-products is directly linked to the supply of them, so that their timely availability and under specific conditions of quality and health, are elements that contribute to all the product offered is consumed, which, in addition to the new food trends of potential consumers, it makes it possible to forecast with greater certainty an increase in the demand for such products. The volume of citrus juices processed worldwide varies between two and 2.5 million tons per year, mostly supplied by Brazil, the United States and Mexico in order of importance (FIRCO, 2009). The alimentary habits sustained in the preservation of the health of the human being and in the conservation of the environment that the consumers of the developed countries have adopted, constitute in essence an opportunity of increase of demand for the citrus fruit and in particular of the grapefruit. Worldwide, Mexico ranks fourth as a producer of grapefruit (424,678.08 tons) preceded by the United States (1,404,320) and China (607,446) (FAO, 2016). Citrus in general is one of the fruit products in Mexico that generate more foreign currency and that due to its extension and demand for labour have greater commercial value. The records of the Agricultural and Fisheries Information Service (SIAP) indicate an area sown for the country of 565,483.99 hectares, 92% of which is in production (SIAP, 2014).

The grapefruit *Citrus paradisi L.*, belongs to the *Rutaceae* family, it is considered a hybrid between *Citrus grandis* (*pampelmusa*) and *Citrus sinensis* (orange) that originated, unlike other citrus biotypes, in the Caribbean (Barbados) and not in Asia (Scora et al., 1982). It is a hybrid probably produced spontaneously between the *pampelmusa* and the sweet orange (*Citrus × sinensis*) in the plantations of the Caribbean Sea around the 17th century (Morton, 1987).

Grapefruit production in Mexico

In Mexico, citrus species grown mainly are orange (59%), lemon (31%) and to a lesser extent grapefruit (3%), mandarin,

tangerine and tangelo (7%). In 2015, registered citrus production was 7'752,445.11 tons, with grapefruit contributing 6% of the total volume (424,315.36 tons). It is noteworthy that grapefruit orchards in Mexico produce on average the highest yield per hectare (25.01 ton / ha) compared to other citrus species, the average value per ton of \$ 1,756.52 pesos. (SIAP, 2015).

Exports of Mexican grapefruit began to have a presence in the international market from the year 1962, date in which the volumes sold amounted to 152 tons. Since then, exports have shown a pattern of ups and downs, which have been defined by the movement registered in the international market.

In the period of 1962-1975, they showed an important growth, the average volume exported was 5,465 tons. However, during 1976-80, Mexican grapefruit had the highest levels of presence in the international market, volumes reached annual averages of 16,571 tons, with an increase of more than 200% over the previous five-year period.

However, export levels of grapefruit could not be maintained, so that in the following five-year periods (1981-1989) the annual average of exports was only 6,644 tons. The explanation of this fall is linked to the behaviour recorded by the world market, since the highest growth of exports in the world occurred during the period of 1961-80, registering a growth rate of 6.8%, while in the case of the main exporting countries (USA, Israel and Cuba) the rate was even higher (7.6%) (Infoacerca, 2015).

Grapefruit is a fruit whose consumption is mainly fresh, unlike orange, whose demand for concentrated juice is very high. In the case of grapefruit, 85% of Mexican production goes to the fresh market; predominantly pink, red and red doubles cultivars, which have a greater preference in the market, although when the supply of these is reduced (ibid). During the process of commercialization for the national market, the fruit must go through a process in the packer, which consists of washing the fruit and waxing it in order to give it a greater presentation. Later it is put on plastic bars, or the sale is made in bulk as it still happens with important volumes.

In Veracruz in orchards of the cultivar 'Rio Red', which is currently the most abundant, it is characterized because the pulp of the fruits is red, very sweet and attractive for fresh consumption. The national commercialization is carried out through two channels: self-service stores: large supermarket chains, demand a standard of quality similar to that of export, in addition to having supply throughout the year.

The sale of the product is made through a fixed price, since the advantage offered by this channel is that a relationship between quality and price and wholesalers is established. Through this channel product is distributed throughout the country. The highlights of Mexico City (for being the main distributor), as well as Guadalajara and Monterrey, trading between 75% and 80% of fresh volumes (Ibid.)

International marketing has the United States as its main destination due to its geographical proximity, as well as being an excellent market due to its marked preference for processed citrus juices, which has increased due to the popularity of fresh juices prepared from concentrated and the introduction of functional fortified products, among others (FIRCO, 2009).

DISCUSSION

The state of Veracruz is the main producer of grapefruit in the country, generating 54% of the annual production in an area of 7 thousand hectares with a production of 168 thousand tons per year (SAGARPA-SIAP, 2015); in the second place, Michoacán has 52 thousand tons, thirdly, Tamaulipas with 28 thousand tons and fourth place Nuevo León with 24 thousand tons (SAGARPA-SIAP, 2015).

Grapefruit production in the state of Veracruz, according to the SAGARPA (2015) is mainly distributed in the municipalities of Martínez de la Torre (64%), Tuxpan (18%), La Antigua (10%), Veracruz (7%) and Pánuco (1%) (Figure 1).

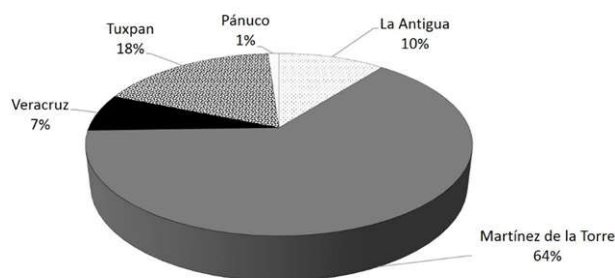


Figure 1 Distribution of the area sown with grapefruit (*Citrus paradise*) by district in the state of Veracruz (SIAP, 2015).

Analysis of grapefruit production 'Rio Red': Veracruz case

In order to obtain information, a survey was designed to be applied to grapefruit producers located in the state of Veracruz. The data obtained allow to complement the scenario faced by the producers of this fruit. The population of citrus growers is estimated in Veracruz at just over 15 thousand of the 25 thousand producers considered in the national register of the Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA, 2008). However, for practical statistical purposes, of the total of this population, discriminatory criteria were used that facilitated the obtaining of field information, thus it is considered as Martínez de la Torre impact district with 1,905 citrus producers, with 14 thousand 056 hectares of sweet citrus, which as of In 2009, they joined the program of the State Government in the fight against the fruit fly, through counseling, trapping and control. Preferably by means of groups with several producers that have their neighboring orchards, to achieve better results at a lower cost. It is important to point out that, according to the information provided by the CESVER, dependence of SAGARPA, in the citrus region of Martínez de la Torre, 5 thousand hectares of citrus fruits have been treated, being the grapefruit the fruit most affected by the Mexican fly species of the fruit (*Anastrephaludens*). The results show that the highest rates of capture are detected in grapefruit orchards, secondly, mandarin orange and finally orange.

In the state of Veracruz there are 2 packers specialized in post-harvest handling of grapefruit. The packinghouse of FincaSayula, has a surface with grapefruit production of 192 ha. The fate of the fruit depends on the quality of the product and currently it sells 50% of its production to the juicing industry and the rest is processed and packaged for the national and export market. Of the processed fruit, 40% is exported, 40% is sold to the national market to self-service chains (Walt-

Mart, Aurrerá), and 20% is sold in bulk to the local market. The VERAFRUIT packer in the last three harvest cycles has devoted all its production to the local (juicer) and national (Walt-Mart) markets, sending an average volume of 5 thousand tons per harvest cycle to the national market. The grapefruit veracruzana is sued in Holland, France, Spain, Italy, Belgium and Germany. This has been possible thanks to the promotion that the government of Veracruz makes and the effort of citrus farmers to produce premium quality grapefruit (García, P., Pérez, H., García, D., 2010) in order to obtain field information, we proceeded to determine the population to be surveyed, in this way, through the information provided by the State Council Citrícola the following information was obtained, being located by municipality the cultivated hectares of grapefruit and the number of producers (Table 1)

Table 1 Number of grapefruit producers of the 'Rio Red' cultivar in the area of greatest impact in Veracruz

Municipality	Cultivated area HA.	Grapefruit producers cultivate 'Rio Red'	Producers by municipality (%)
Atzalan	35.17	3	1.64
Gutiérrez Zamora	445.37	16	8.79
Martínez de la Torre	691.65	3	1.64
Misantla	92.13	4	2.19
Nautla	68.83	3	1.64
Papantla	595.74	24	13.18
Tecolutla	365.99	21	11.53
Álamo	1,128.65	100	54.94
Tuxpan	91.28	7	3.85
Tlapacoyan	262.16	1	0.54
Total	3,776.94	182	100

Source: Prepared by the author with data from the State Citizen Council <http://www.concitver.com/PADRON/>

Methodologically, the following criteria were adopted to limit the sampling and validate the representativeness of the information obtained: a) The survey is directed to the export segment; b) Non-probabilistic quota sampling; c) Selection of the area where statistically there are the largest number of producers; d) Variety of grapefruit 'Rio Red' and e) Grapefruit cultivars were considered, ranging from less than 1 hectare to 75.

RESULTS

The following information was obtained from the sampling obtained, in the municipality of Álamo, Temapache concentrates 54.94% of the state production, followed by Papantla with 13.18%, Tecolutla 11.53%, Gutiérrez Zamora 8.79, and geographically neighboring municipalities, which make up the most important grapefruit production basin 'Rio Red' in the State.

From the information obtained it was determined that 80.97% of the respondents have plantations of less than one hectare to eight. Producers complain about pests and losses in production, which affects their competitiveness, identifying fruit flies of the *Tephritidae* family as the main scourge, ranked as one of the 10 most important pests in the world (Birke *et al.* , 2013).

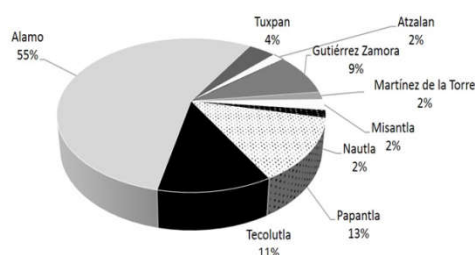


Figure 2 Distribution of grapefruit producers 'Rio Red' in VeracruzSource: Prepared by the author with data from the State Citizen Council <http://www.concitur.com/PADRON/>

Table 2 Calculation of gross income less waste / ton / ha

Concept	Pesos
Ingress	\$ 65,000.00
Loss of 6.5 %/Ha	\$ 6,305.00
Ingress Net	\$ 58,695.00

Direct source: Interviews to the owners of the packers, 2017

Table 3 Estimation of production costs of grapefruit 'Rio Red' per Ha

Concepto	CONTROL
Work cultivation	\$ 2,400.00
Fertilization	\$ 6,660.00
Control	0
Weed control	\$ 3,220.00
Harvest	\$ 8,750.00
Other costs	\$ 50.00
TOTAL	\$ 21,080.00

SOURCE: FIRA, 2015

Table 4 Calculation of loss in production considering the data of the survey made to producers of the State of Veracruz

Grapefruit orchards without phytosanitary control	Damaged Harvest Merma (%)	Merma (kg/ha)	Merma (\$/ha)
Grapefruit orchards without phytosanitary control	9.70%	2,522	\$ 6,305,00
Conventional (Malatión)	3.80%	988	\$ 2,470,00

SOURCE: Own elaboration, 2017

This pest causes the losses direct damage (harvested fruits) and by the indirect effect due to the implementation of quarantine barriers by importing countries (Ahuja and Mangan 2008), which respond to the growing concern of consumers and regulatory bodies, in countries that import fresh fruit and its derivatives, due to the consumption of food without harmful chemical residues (FAO, 1996). However, government policies in Mexico have contributed little to the conservation of natural resources and, even less, to adding value to agricultural products or generating mechanisms that position Mexican fruit exports with competitive advantages in international markets.. The information obtained allows us to make the following approximations.

Gross revenue: It was determined that the orchards of grapefruit provide approximately 26 tons per hectare and that the price paid to producers is \$ 2,500 a ton. which generates gross revenue per ton of \$ 65,000.00, despite the loss by reduction in fruit causes 6.5% of income per hectare.

Production cost

The technological level of regions of the country such as Veracruz, Tabasco, Yucatan and the Huasteca (SLP, Hidalgo and Puebla.) Is lower than that of other citrus producing areas,

characterized by being seasonal crops, fertilization is more deficient based on nitrogen, mainly. The control of pests and diseases is reduced, all the above affects the yield per hectare and therefore the income. As shown in Table 3, the percentages of shrinkage per hectare are almost 9.70% to 2.3% of the production per hectare, as can be seen in the following table depending on the medium used. This leads to a loss of income in production due to the decline caused by the plague, in addition to limiting its entry into international markets.

CONCLUSIONS

One of the main export forms of grapefruit is fresh and must face phytosanitary and safety standards that importing countries determine (Avendaño et al., 2007), which leaves them at the mercy of environmental protection agencies, that impose restrictions on the use of a wide range of agrochemicals, and also establish severe limitations on the importation of products with chemical residues of restricted products.

As in many parts of the world, in Mexico, fruit fly management programs are based on the use of chemical control through organophosphate applications restricted in 1998 by the United States Environmental Protection Agency (EPA)

These pesticides are characterized by low residual power, but very high toxicity (FAO / WHO, 1997, EPA, 2006) and have been recognized as carcinogenic by the same agency since 2000. In Mexico it is estimated that the losses caused by these insects to the fruit sector reach 2.5 billion pesos annually. Only for the citrus area of the state of Veracruz were reported during the 2010/2011 harvest losses close to 800 million pesos due to the incidence of fruit flies (Prigadía, 2011).

It is therefore urgent to have alternative products, which on the one hand do not harm the environment, and on the other hand allow to reduce the infestation of fruit flies in fruit trees for export and national consumption, without drastically increasing production costs

The recognition of Free Zones (Baja California Norte and Sur, Sonora, north and center of Sinaloa, Chihuahua, and Northern regions of Nuevo León [2008, 2010, 2012], some regions of the States of San Luis Potosí [2010], Tamaulipas [2011], Tlaxcala [2012], state of Mexico [2012], Morelos [2012], Aguascalientes [2013]) and Low Prevalence of native fruit flies that currently support several states and regions of the country (southern Sinaloa , center and south of Nuevo León, Tamaulipas, and certain municipalities of Guerrero) is an incentive to generate new control strategies that allow other states or regions of the country to have this recognition, which allows producers to export without limitations (Salcedo et al. ., 2010, SAGARPA, 2015

In Veracruz, the control of the fruit fly has the participation of the State Committee of Vegetal Health of Veracruz (CESVER), which joint support with the federal, state and producer associations that establishes that to efficiently carry out any program management, control and eradication of fruit flies of the genus *Anastrepha*, it is necessary to operate a trapping network and sampling of fruits, once they have detected specimens must perform control actions as established in the NOM-023 -FITO-1995 and in the manuals of the National Campaign Against Fruit Flies. In the state of Veracruz

CESVER works with producers committed to this phytosanitary campaign and the work areas are located in the Central Zone (Actopan, Puente Nacional, Emiliano Zapata, Paso de Ovejas) and Zona Norte (Martínez de la Torre, San Rafael, Misantla, Tihuatlán, Tuxpan, Ixhuatlán de Madero, Alamo, Tempache) (CESVER, 2011).

The citrus sector of Veracruz, requires a new approach if you want to position the grapefruit in Mexican exports, you need to redirect your efforts to meet the desires and needs of consumers who are looking for healthy products, exquisite taste and friendly with the natural environment, as they have done other states of the Republic and not just settle for participating in national markets being outside the benefits that international trade offers.

Bibliografía

- Avendaño, R. B, Schwentesius, R., R, Lugo, M., S. 2007. La inocuidad alimentaria en la exportación de hortalizas mexicanas a Estados Unidos. Comercio Exterior, Vol.57 No 1 2007
- Birke, A., Guillén, L., Midgarden, D. and M. Aluja. 2013. Fruit flies, *Anastrephaludens*(Loew), *A. obliqua* (Macquart) and *A. grandis*(Macquart) (Diptera: Tephritidae): Three pestiferous tropical fruit flies that could potentially expand their range to temperate areas. In: Peña, J. (ed.) Potential Invasive Pests. CABI International. pp. 192-213.
- CESVER. 2016. Combate CESVVER mosca de la fruta en <http://www.cesvver.org.mx>
- Díaz-Fleischer, F., D. R. Papaj, R. J. Prokopy, A. L. Norrbom & M. Aluja. 2000. Evolution of fruit fly oviposition behavior. En: *Fruit Flies (Tephritidae): Phylogeny and Evolution of Behavior* (M. Aluja & A. Norrbom, eds.), pp. 811-841 (Capítulo 30). CRC Press, Boca Raton, Florida, USA.
- INFOACERCA, 2015. Revista claridades agropecuarias, junio 2015
- EPA. 2006. Registration Eligibility Decision (RED) for Malathion. United States Environmental Protection Agency. United States. 195 p.
- FAO, 2014. La producción mundial de fruta tropical en 2014. AgroNoticiasLatinAmerica&TheCaribbean <http://www.fao.org/agronoticias/agro-noticias/detail/en/c/159358/>
- FAO, 1996. Enseñanzas de la revolución verde: Hacia nueva revolución verde Cumbre mundial sobre la alimentación, Roma, Italia. Cap.6
- FAO/WHO. 1997. Pesticide Residues in Food (Malathion). Joint meeting of the FAO panel of experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group. Lyon, France. pp: 1- 43.
- FIRCO, 2009. Comité sistema Producto cítricos Estudio de Mercado para identificación de necesidades de infraestructura logística para la comercialización de jugo de cítricos en Veracruz. Martínez de la Torre.
- García Pérez Eliseo, Pérez Hernández Ponciano, García Díaz, José Juan. 2010. Necesidades de Investigación y Transferencia de Tecnología de la Cadena Agroalimentaria Toronja en el estado de Veracruz Colegio de Posgraduados FUNDACIÓN PRODUCE DE VERACRUZ, A.C. COFUPRO
- Morton, J.F. 1987. *Fruits of warm climates*. Miami: CreativeResourceSystems.
- OMS, Organización Panamericana de la Salud. 2015. Preguntas y respuestas sobre el uso diazinón, malatión y glifosato, Dos Ríos Argentina <http://www.paho.org/arg/Prigadaa>, 2011. Mosca de la fruta deja pérdidas en Veracruz por ochocientos millones de pesos anualmente. *Periódico el Gobernante*. Domingo 26 junio 2011
- SAGARPAa. 2015. Comunicado de prensa No. 344/15. Registran mangos de Oaxaca record en exportaciones. <http://www.sagarpa.gob.mx/saladeprensa/2012/2015/mayo/Documents/2015B354.PDF>
- SAGARPA .2013. México, el mayor exportador de mango; en 2013. <http://www.sagarpa.gob.mx/saladeprensa/2012>
- SAGARPA. 2015. Áreas Libres de Moscas de la Fruta. <http://senasica.gob.mx/?doc=3901>
- SAGARPA, 2008. Padrón nacional de la Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación <http://www.sagarpa.gob.mx/desarrolloRural/>

How to cite this article:

Bertha Alicia Arce Castro *et al.* 2018, Some Aspects of Grapefruit Production In The State of Veracruz, Mexico. *Int J Recent Sci Res.* 9(2), pp. 24125-24129. DOI: <http://dx.doi.org/10.24327/ijrsr.2018.0902.1602>
