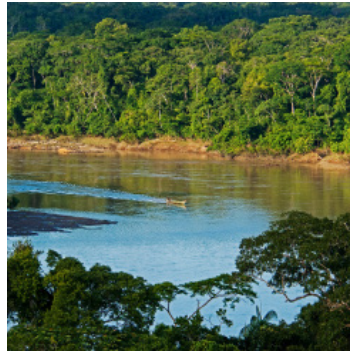


Postharvest and processing



■ Successes and challenges of near-infrared spectroscopy in the avocado value chain

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Two near-infrared spectrometers (NIR) were tested at various points in the avocado value chain. The first was a handheld unit for estimating dry matter content. When measurements were taken with the fruit skin removed, the $R^2 = 83\%$ and $SEP = 2.25\%$ DM for 'Fuerte', Hass, and 'Mendez #1' ('Carmen'-Hass) combined. A comparison between the conventional method to determine dry matter and this NIR method, showed that, on an orchard basis, 76% of the DM-values being within 1.5% DM of each other. After a robust model has been developed, handheld NIR can be used to quickly determine dry matter of avocados pre- and postharvest.

The second unit was a packline-mounted T1 unit from Taste Technologies for application in a packhouse or ripening facility. On hard fruit, the unit was able to eliminate class 1 fruit with orchard cold (frost) damage with accuracy of 80-90%, depending on severity of the damage. This unit was used on a semi-commercial basis at Westfalia Packhouse in 2014. Furthermore, it was able to estimate dry matter with a standard error of prediction (SEP) of 1.9% DM and $R^2 = 76\%$ - comparable to the handheld unit.

For ripe fruit, the T1 was able to detect diffuse flesh discolouration (grey pulp) with an accuracy of about 80%, depending on severity. Other disorders and diseases were not consistently detected due to the isolated nature of these defects in the fruit flesh. The feasibility of online NIR largely depends on the volume of fruit being scanned.

■ Controlled atmosphere storage of New Zealand 'Hass' avocado fruit

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New Zealand-grown 'Hass' avocados are exported significant distances to international markets. The quality of the ripe fruit in the market is affected by fruit age (time off the tree), with quality declining as age increases above 30 days for cool-stored fruit. This fruit age limit can be increased to 42+ days by using controlled atmosphere (CA) storage. The use of CA for New Zealand exports has been investigated: both the O₂ and CO₂ concentrations used, and static or dynamic atmosphere management. While a 5% O₂/5% CO₂ CA has long been recommended, more recently, better fruit performance has been achieved with O₂ concentrations closer to the lower safe O₂ limit, in conjunction with a lower CO₂ concentration (e.g. 2% O₂/2% CO₂). This can be achieved using static or dynamic CA systems, although for shipping, dynamic CA is limited to setting the lowest safe O₂ before shipping. While a high CO₂ concentration delays ripening in storage and slows ripening after CA, for New Zealand fruit, it may increase rots. Having a longer fruit age/quality relationship opens possibilities for using CA beyond simply shipping, e.g. holding fruit on-shore in CA. This talk will review the science behind CA and the potential for CA use by the New Zealand industry.

■ Initial survey of dry matter and oil content across Peru

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The very long fruit maturation period of avocado and lack of other maturity indices means that dry matter (DM) accumulation is the main accepted technique to determine time of harvest. Although many companies in Peru carry out routine DM measurements, there has been no comprehensive and consistent study of changes across the diverse growing regions of Peru throughout the season. Also, DM sampling tends to cease once commercial harvest occurs ($\approx 22\%$ DM), and thus there is little information on maturity changes after this point. Avocado fruit DM was sampled on a fortnightly basis from 10 orchards across a diverse latitudes and environments, and altitudes up to 2300 m. Oil content was determined on a subset of dried tissue samples using pet ether in a soxhlet system. Fruit from higher altitude flowered earlier and thus reached minimum maturity ($\approx 22\%$) about 6-8 weeks earlier. The rate of accumulation of DM was similar between most orchards, and was not necessarily faster at higher altitudes. Small, medium and large fruit were sampled to determine whether there were differences in DM between fruit sizes. For some orchards there were differences in DM with fruit size, but even when present, the differences were generally not large (average of 1-2%). The correlation of oil content with DM showed a strong linear relationship typical of 'Hass' observed in other countries and no effect of altitude was observed. These results provide an initial benchmark on the pattern of DM accumulation in many growing regions, and demonstrate the typical relationship of DM with oil content.

■ A preliminary study on the response of Peruvian 'Hass' avocado fruit to controlled atmosphere storage

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Storage conditions during transportation are critical to the successful export of avocados such that they arrive at the importer unripe and free from external and internal defects. Peruvian 'Hass' avocados are shipped under controlled atmosphere (CA) conditions, with the nominal oxygen and carbon dioxide concentrations based on general guidelines and the capabilities of the container systems. No systematic study of the response of Peruvian 'Hass' avocado fruit to CA has been reported, and thus this preliminary study has been undertaken.

Fruit were harvested on mid July 2015 when fruit dry matters were in the range 22.7% to 24.0% from two orchards south of Lima: at Canete (140 km) and Chincha (210 km) and two orchards north of Lima: at Santa Rosa (100 km) and Barranca (200 km). Fruit were stored in four CA regimes of: 2% O₂/2% CO₂, 2% O₂/10% CO₂, 4% O₂/6% CO₂ and 4% O₂/10% CO₂ in plastic tents in a coolstore at 6°C.

Fruit were removed from CA after 28 and 42 days and assessed immediately for external defects and then allowed to ripen at 20°C and assessed again when ripe for external and internal defects. The impact of the four CA regimes on the quality of the fruit out of store and when ripe will be presented and discussed.

■ The cause of avocado black spot

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Avocado black spot is a disorder of commercial significance that appears after 2-3 weeks in coolstorage to cause brown to black blotches usually 2-3 cm in diameter on green fruit. This disorder may be caused by pathological, physiological or physical factors, or a combination. A series of experiments were conducted in Peru over several seasons and in different climatic zones to investigate the etiology of this disorder. There were several symptom types attributed to black spot, nodule damage probably caused by physical injury, fuzzy blotches that were associated with a fungus, and blotches with sharp borders that are probably due to chilling injury. The black spot associated with a fungus was apparently worsened by water loss on the orchard, and was able to be controlled by postharvest application of prochloraz.

■ Response of irrigation on post-harvest life of the avocado fruit (*Persea americana* Mill.) var. Hass

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Even though storage condition of the fruit has an effect on consumption condition, the post-harvest physiology has a mayor influence in the quality of the fruit. The objective of this work was the development of a model to predict the post-harvest life of the fruit as the response to specific climate and agricultural practices (Irrigation and nutrition).

During 3 years (2010-2012) were characterized pre-harvest factors of 42 site and the consequent post-harvest evolution, being storage the fruit for 25, 35 and 45 days at 4-5 °C.

The data collected during 3 seasons, was analyzed through principal components (PCA) and multi-variable regression of the partial least squares (PLS). The post-harvest condition of the fruit was affected by the Ca and N in the pulp, the spring irrigation, the days from blooming to harvest and the oil content of the fruit. Water deficit above 40% affected the shelf-life of the fruit.

■ Quantifying fruit shape in avocado: a better way forward

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¹. University of California, Riverside

The rating of avocado fruit shape has historically been tied to an arbitrary system containing discrete values that do not coexist on a linear scale. The goal of this presentation is to present a new methodology using pre-existing, commonly available software and equipment to capture and analyze fruit images. Through the use of Adobe Photoshop, pictures taken with a digital SLR camera can be reduced in scope to the length and width of the fruit. These resulting images can then be mined for the volume of negative and positive space, the length and width of these spaces, and the overall ratio of length to width of the entire image. This mined data allows for comparison of regularity through the entire shape of the fruit and ratio of volume between hemispheres, among other possible analyses. Analysis thus generated can be used to identify desirable phenotypic traits and to correlate them to environmental, genetic, and physiological measurements. We will present preliminary data supporting this approach.

■ Effect of fruit holding temperature on bruise expression in avocado (*Persea americana* M.) Cv. Hass fruit

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Avocado consumers are generally concerned about fruit quality at the time of consumption. Up to 80% of avocado cv. Hass fruit can have internal quality problems, particularly flesh bruising. Flesh bruising is dependent on fruit characteristics that include firmness, impact energy, and temperature. Three experiments conducted to assess if low fruit holding temperatures can decrease bruise expression in ripening Hass avocado fruit are reported. In the first experiment, firm ripe fruit (n=20) impacted from 25 cm at room temperature (20°C) and held at 5°C exhibited less bruising compared with fruit held at 15°C and 25°C. In second experiment, firm ripe fruit (n=20) impacted from 25 cm at room temperature were held at 5°C or 25°C. Fruit were then switched between the two holding temperatures after 8 h and held at the alternate temperature for another 40 h. Fruit held at 5°C for the first 8 h and at 25°C for the subsequent 40 h had less bruising. Firm ripe fruit (n=20) were impacted from 50 cm at fruit temperatures of either 2.5°C or 20°C and then held at 2.5°C, 5°C, 7.5°C, 10°C or 20°C for 48 h in third experiment. Fruit impacted at 2.5°C had low bruising compared with those impacted at 20°C. Fruit held at 2.5°C and 5°C did not develop visible bruising regardless the flesh temperature at the time of impact. Fruit held at 7.5°C and 10°C did not develop bruising when they had been impacted at 2.5°C. However, fruit impacted at 20°C flesh temperature developed obvious bruising. Fruit held at 20°C after impact bruised regardless the flesh temperature at impact. These results suggest that biochemical browning processes which result in visible bruising are lessened at low flesh temperatures. Managing fruit temperature through to the consumer could help to reduce symptoms of bruising and thereby improve consumer satisfaction.

■ Effect of orchard slope, harvest time, ripening temperature on de-synchronization of 'Hass' avocado fruit skin colour

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'Hass' avocado fruit are characterized by a change in skin colour from green to purple black after harvesting as indicative of ripening. Recently, markets importing South African 'Hass' avocado fruits have been complaining about skin colour not changing to purple/black during ripening. Therefore, the aim of this research was to investigate pre- and postharvest factors leading to 'Hass' skin colour being de-synchronized with softening during ripening.

'Hass' avocado fruits were harvested at early, mid or late-season from two blocks with a slope (upper or lower slope) at Kiepersol area, afterwards, transported to the ARC – ITSC postharvest laboratory. At the laboratory, fruits were sorted and graded, afterwards, stored at 5.5°C for up to 28 days. After withdrawal from cold storage, were ripening at 16, 21 or 25°C, and during ripening evaluated for firmness, skin colour (L, C and hue angle), external and internal damage (chilling damage), pathological disorders (stem-end rot and anthracnose).

Avocado fruit 'c.v. Hass' grown from lower parts of the slope showed significantly higher de-synchronized colouring. Furthermore, lower ripening temperature (16 and 21°C) significantly affected colouring of Hass avocado fruit when compared with higher ripening temperature (25°C). In the case where fruits showed de-synchronized colouring, the L, chroma and hue slightly decreased. During 'Hass' ripening, the colour parameters (L, chroma and hue) were expected to decrease. In addition, colour de-synchronization was mainly associated with early-season fruit harvest from lower parts of the slope which further showed higher internal and external cold damage.

In conclusion, 'Hass' avocado fruit skin colour change was affected by harvest season, slopes within an orchard and postharvest ripening temperatures.

■ Effect of controlled atmosphere on quality postharvest and shelf-life of *Persea americana* "avocado" var. Hass

G. Obando Paredes, C. Avalos Carranza, W. Mendez Vilchez

Investigación y Desarrollo, Camposol S.A., Chao, Trujillo, Perú

The conservation technologies have evolved to improve the quality and expand shelf-life of fruits. The study determined the effect of different concentrations of O₂ and CO₂ (CA) on the quality post-harvest and shelf life of *Persea americana* "avocado" var. Hass. The fruits were harvested mid-season (June, 2014) at Frusol, Viru's valley. It was used a System CA through hoses with plastic hermetic bins with application of three concentrations of gases (T1: 5% O₂-5% CO₂, T2: 10% O₂-10% CO₂ and T3: 5% O₂-10% CO₂) and a control group (conventional atmosphere). Fruit was stored at 6°C and was evaluated the quality at 28 and 35 days of cold, such as: External appearance (shell color and damage lenticular), firmness, dehydration and in shelf's conditions at 20°C (appearance external and internal). It was determined significant difference in the different treatments and stages of evaluation, T3 (5% O₂-10% CO₂) respect to other treatments; showed better quality parameters (better shell color, less damage lenticular, and also kept pulp resistance to pressure and reduced physiological damage and decay). It was concluded that concentration (5%O₂-10%CO₂) extend the shelf-life of 28 to 35 days cold out and of 28+5 to 35+5 days in shelf's conditions. The use of CA is an excellent technique of conservation to keep of quality characteristics and expand of the shelf life of avocado fruits.

■ **Effect of application of biofilms in quality postharvest and shelf life of *Persea americana* "avocado" var. Hass**

G. Obando Paredes, C. Avalos Carranza, W. Mendez Vilchez

Investigación y Desarrollo, Camposol S.A., Chao, Trujillo, Perú

The application of biofilms is a technology that is gaining importance in recent years to keep the quality and extend the life of fruits. It was determined the effect of application of a biofilm on the post-harvest quality and shelf life of avocados var. Hass. The fruits were harvested at "Mar Verde", Viru's valley and harvested in early season (April, 2015). The treatments were: T1: Control group, T2: Finished product obtained from the normal production process without application of biofilm and T3: Product finished application biofilm. The fruit was stored at 6°C and the quality was evaluated at 28 and 35 days of stored cold, such as: external appearance (color shell and lenticular damage), firmness, dehydration and in conditions shelf at 20°C (appearance external and internal). It was showed significant difference between treatments and stages of evaluation, it showed that T3 (finished product with application of biofilm); compared to T2 presented best quality parameters (better color shell, less lenticular damage; and also kept the pulp resistance to pressure and reduced physiological damage and decay). It was concluded that biofilms, expand shelf-life of 28 to 42 days cold out and of 28+5 to 42 + 5 days in shelf's conditions, being Then, that shown that under the conditions of the study, the quality characteristics of fruit (biofilm) is similar to fruit of control group.

■ **Industrial high pressure processing of avocado products: emerging trends and implementation in new markets**

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High pressure processing (HPP) technology emerged as a post-harvest, post-packaging technique for high value added avocado products in the late 90's. The North American avocado demand for fresh, long lasting products was the main drive for this innovative and yet successful technology, which during the current century started to become mainstream for high value added propositions such as fresh avocado pulp, dips, snacks or guacamole in both Mexico and the US.

The market demands and trends towards products with close to natural attributes that can be labelled as "natural", "minimally processed", "free of additives or preservatives" and a clean label pushed the level of its implementation. This, together with the evolution in the technology and the improvement of HPP industrial equipment - which in beginning of 2015 are 55% more productive and cost effective than those of i.e. 2007, or up to 100% when compared to those of 2005- allowed HPP systems to cross borders and broaden their utilisation outside North America. In the last 36 months, the demand for such clean-labelled products has pushed avocado processing industries in Chile, Peru, Spain, Australia, New Zealand and South Africa to integrate HPP lines in their plants, in an effort towards NPD, value-added propositions, market expansion, and better management of stocks and logistics.

Avocados continue trending up as one of the world's healthiest fruit making HPP one of the best technologies for this application as the effects of pressure causes minimal effects its high nutritional values.

This technical session will provide real, up-to-date examples of recent HPP avocado applications, business cases, and economical models.

■ **Madurity indicators and postharvest performance of 'Hass' and 'Méndez' avocados in Michoacan**

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'Méndez' avocado has a great economic importance in Mexico because a significant proportion of its annual crop occurs in a time of limited availability of 'Hass' (June-September). Although the production and exportation of 'Méndez' has increased in the last years, there are no minimum requirements of quality like the existing for 'Hass'. The goal of this research was to compare some parameters of quality at harvest and postharvest of fruit produced by the "crazy" bloom of 'Méndez' and 'Hass' avocados in Michoacán, México. In 2012 and 2013, fruit of the two cultivars were harvested at different maturity stages and stored at ambient temperature or refrigeration until eating maturity. The dynamics of pulp dry matter (DM) accumulation differed between cultivars; however, they reached harvest maturity 10 months after bloom, 'Méndez' at 22.7% DM and 'Hass' at 21.1% DM. Fruit harvested before attaining harvest maturity showed irregular maturation and their skin did not turn from green to black. Pulp flavor, color and texture did not show differences between cultivars, neither in respiration nor in ethylene production. In the conditions were this study was done pulp dry matter content, as time of harvest indicator, differed between cultivars, but their postharvest performance was similar. Research funded by INIFAP and APEAM.

■ **Relevant parameters determination in avocado hot air drying process**

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Avocado proper dehydration requires a thorough understanding of variables that matter most during process and optimal ranges will prevent deterioration fruit fundamental properties. In this paper are presented results that identify what relevant parameters are in the avocado drying process, from a comparative analysis with other 10 foods. An experiment was carried out where 10 foods, including avocado, were dehydrated in the same range of conditions and is periodically measured in order to get drying kinetics curve and process duration. Thus, it was possible to obtain the drying time for each food and correlate with their intrinsic properties (moisture content, dietary fiber, carbohydrates, protein, total lipids) and the process conditions (temperature and humidity inside and outside the drying chamber). Through a correlation analysis it was determined that parameters that most influences drying process are first dietary fiber, followed by lipid content. Surprisingly the factor that influences less dehydration is temperature within chamber. Additionally it was obtained the temperature and humidity interval which are suitable for drying avocado process. (Partial results of the P27 Project CeMIE-Geo, supported by Energy Sustainability Fund SENER-CONACYT)

■ **HPP-treated avocado pulp: physicochemical, volatile, and sensory changes during storage**

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The ability to produce long-storing avocado pulp (predominantly as guacamole) is one of the significant commercial successes of high pressure processing (HPP) technology. While there is some research on characteristics of HPP-treated avocado pulp, the physical, sensory and volatile attributes have not received significant attention. Using a standard commercial HPP avocado pulp without additives (600 MPa for 3 min sealed in low oxygen transmission packaging), we measured changes in pulp colour, volatiles, tissue reactance and resistance (impedance measures), polyphenol oxidase activity and respiration rate during storage at five temperatures (0, 4, 8, 12, 20°C) for up to 90 days. Sensory work was used to determine flavour descriptors and monitor changes during storage at 4°C. At 4°C, pulp lightness did not change significantly until after 40 d, when it declined linearly. Concentrations of four volatiles, benzaldehyde, 2-hexenal (associated with 'grassiness' flavour), 1-octen-3-ol and 2-butanone, declined during storage, whereas other aldehyde concentrations such as hexanal and 2-heptenal increased. Impedance measures showed that tissue resistance and reactance decreased to 28 d and remained relatively constant thereafter. With further storage, Cole-Cole plots became linear, suggesting a significant change in the physicochemical and dielectric properties of the pulp. Overall, low frequency resistance data suggested a progressive loss of compartmentation of cells during prolonged storage. HPP avocado pulp retained fresh avocado flavour for up to 40 days: off-flavour development started to be detected after 42 d, when the avocado pulp was rated as unacceptable in terms of marketable flavour quality.

■ Pre- and postharvest factors affecting fatty acids, tocopherols, phytosterols and pigments in avocado and avocado oil

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Avocados are an unusual fruit in that they contain significant amounts of both oil and protein. We have examined the concentrations of the fatty acids in the oil, and observed very high proportion of monounsaturates (very similar to olive oil). Key micro-nutrients that we have examined are tocopherols (alpha-tocopherol-Vit E), phytosterols (mainly β -sitosterol), and oil-soluble pigments such as chlorophyll, carotenes and xanthophylls, including lutein (a pigment thought to be beneficial to eye health). Although most of our research has been carried out in New Zealand, we have also worked in a range of countries and examined a diverse range of factors which might influence concentrations of these components, including preharvest (such as maturity, growing environment, and cultivar/variety), postharvest (storage duration and ripening), processing conditions, and shelf life conditions and duration. We will outline how these factors influence these compounds, touching on both whole avocado fruit and avocado oil.



WORKING WITH
WORLD AVOCADO
CONGRESS HELPS
US UNDERSTAND
YOUR PACKHOUSE
NEEDS AND MEET
YOUR CUSTOMERS
DEMANDS.



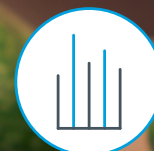
INFEED &
TREATMENT



INSPECTION
SYSTEMS



SORTING



DATA &
ANALYTICS



PACKING



MATERIALS
HANDLING



SERVICE &
SUPPORT



■ **Fatty acid content of avocado (*Persea americana* Mill. Cv. 'Hass'): A tool for certification protected designation of origin (PDO)**

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The objective of this work was study the relationship between fatty acids content and the altitude of orchards and fruit maturity stage of avocado cv. 'Hass' at different localities of Antioquia province in Colombia. Orchards between 1340 and 2420 m.a.s.l. were selected and fatty acids profile and content of fruit was analyzed. Oleic acid showed the highest percentage for all locations and their percentage decreased drastically at lower altitudes meanwhile the percentage of palmitoleic and linoleic acids increased in these orchards. The oleic / palmitoleic, linoleic / palmitoleic and oleic / linoleic indexes increased significantly at higher altitude. Palmitoleic acid increased significantly with the maturity stage (dry matter content) of avocado for all localities. Some fatty acids showed a high linear correlation with fruit maturity stage varying the type of acid or index with altitude. The fatty acid content is a variable to consider in future studies for Protected Designation of Origin (P.D.O.), due to the close relationship observed with the geographical growing area and its importance for human health. More assessments must be taken through years, harvests and with more contrasting environments to get more robust information and to feed the model.

■ **Minimum contents of dry matter appropriate for crop avocado cv. 'Hass' in Colombia**

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Colombia has become an important producer of 'Hass' avocado in the last three years, however a minimum dry matter content has not been established yet as a maturity index for harvest. The aim of this study was to determine the correlation between oil percentage and dry matter content to establish a minimum harvest index for 'Hass' avocado fruits grown in Colombia. Samples were collect for maturity determination over three years of 'Hass' avocado fruit grown in fifteen different orchards in the Antioquia province to determine the dry matter and oil percentage of fruit throughout the season. A simple linear relationship between oil content and dry matter was thus established for the province of Antioquia. The equations for all the orchards studied presented a good correlation coefficient, ranging between 0.70 in the Cartucho orchard in Retiro to 0.99 in the Gacamayas and Paraiso orchards in Entrerrios and Retiro respectively. Using the minimal oil standard of 11.2% as a reference, the orchards which were found to have a high dry matter percentage at harvest were Cartucho in Retiro (26%) followed by Piedras Blancas and Santa Cruz in Venecia (25%), while 'Hass' avocado fruit from the Cebadero orchard in Retiro, Coconi in La Ceja and Guacamayas in Entrerrios reached this oil standard for 22% dry matter, which could be a commercial advantage. Based on these oil content results a minimal dry matter index of 23.5% was proposed as harvest maturity indicator for 'Hass' avocado grown in Colombia. This harvesting index will need to be refined over time and with the addition of samples from more regions and climatic data.

■ Oxidative characterization of Hass avocado and creole avocado oils (*P. americana* Mill. Var. *Drymifolia*)

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In México Hass avocado oil is an imported product and has high cost, otherwise the oil avocado criollo not in the market, this variety of avocado is grown primarily for regional consumption having the disadvantage that no it is marketed by the fragility of the fruit and its early maturation. In this paper Hass avocado oils and creole are evaluated before and after a process of frying (250 ° C, 2 min) using as an indicator the quality parameters of commercial olive oil. The exhibits consider the variables: organic compounds by GC / MS, the presence of trans compounds by infrared spectrometry and color tristimulus colorimeter. Degradation reactions are obtained by frying, so persistence of polyunsaturated fatty acids linoleic acid, eicosanoic, oleic, beta-sitosterol, squalene palmitoleic and not trans components are detected. After frying process are hydroperoxides minimum percentage degradation and not detectable by infrared spectrometry. In Creole avocado oil degradation compounds are formed, but their levels of linoleic oleic acid and palmitoleic are high. Compounds as squalene, tocopherols sitosterol and undergo degradation in the three oils in equal proportion, no formation of methyl ketone compounds and lactones are detected. It is concluded that the oil obtained from avocado criollo (American P. Mill. var. drymifolia) is of similar quality to the avocado Hass with it could diversify its use and promote market entry, reducing the waste of the fruit of this variety and reduce import costs.

■ Pedicel artificial protection of the avocado fruits (*Persea americana* Mill.) cv. Hass in cold storage

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Was evaluated the effect of the artificial protection of the pedicel in avocado fruits cv. Hass in cold storage. Plastic capsules with contained of different solutions of a neutral gel, "tara gum" and acetylsalicylic acid were placed on the cutted pedicels of the avocado fruits cv Hass. The treatments were encapsulated of pedicel without gel (*ES*). Encapsulated of pedicel with gel to 0.1% (*EG*), Encapsulated of pedicel with gel to 0.1% + "tara gum" to 0.15% (*EG-T₁*). Encapsulated of pedicel with gel to 0.1% + "tara gum" to 0.2 % (*EG-T₂*). Encapsulated of pedicel with gel to 0.1% + "tara gum" to 0.05% + acetylsalicylic acid to 0.05% (*EG-T₃S₁*) and Encapsulated of pedicel with gel to 0.1% + "tara gum" to 0.05% + acetylsalicylic acid to 0.1% (*EG-T₄S₂*). The fruits were stored at 5° C (85-90% RH) for 15 and 30 days. Then were placed to 20 ± 1.5 ° C for 7 days. The data were analyzed using a statistical design of DCA also was used Tukey (p <0.05) and non-parametric test of Friedman (p <0.05). The results showed that the fruits treated with *EG-T₄S₂* and *EG-T₃S₁* had less; weight loss, color skin purple, tasting and more hardness at 15 and 30 days of cold storage, situation that remained 7 days after the end of cold storage.