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Evaluation of Oil Quality of (*Elaeis oleifera*), San Lorenzo Canton, Ecuador

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Abstract: The fundamental problem lies in waste of *Elaeis* oleífera that exists within the company located in the area of San Lorenzo, the fruits are not marketed due to not knowing how to use it, there is no optimization of this palm variety. This research aimed to analyze the profile of saturated, unsaturated, mono-unsaturated, polyunsaturated fatty acids, by chromatography method, in five lots of *E. oleífera* palm of the private plantation located in the canton San Lorenzo, Esmeraldas province. The methodology applied was descriptive and comparative, as a result the *E. oleífera* x *E guineensis* (OXG) hybrid had more fixed indices and in an average proportion compared to the GXO hybrid, and in turn this compared to the backcross hybrid, had higher rates of linoleic, stearic and palmitic acids.

Keywords: *Elaeis oleifera*, Production, Biochemical Analysis

1. Introduction

The world production of oil palm in 2014 had a slight increase of 1.34% with respect to 2012, reaching the highest figure of the period analyzed 2000-2014. This behavior did not affect the level of exports and imports, which declined. In this regard, world prices were affected by increased production and decreased to 3.51% [16]. Palm trees are an important factor in the subsistence economy of several neo-tropical peoples, both Indian and peasant farmers [5].

Latin America, contributes 5.77% of the world production of oil palm, which makes it a strategic player of the economies in each region. At the same time the expansion of cultivation in recent years has been driven by government programs that support the oil palm for rural development provided by countries such as Ecuador, Peru, Colombia and Honduras [10].

Ecuador, is the second largest producer of crude oil palm in Latin America, and is the seventh largest producer in the world, even with lower yields compared to Colombia and Costa Rica. In spite of the producers of more than 1,000 hectares have the leadership in the palm industry, the 87% produce less than 50 hectares [21].

The gender *Elaeis* worldwide has two species of great economic importance for the oil palm agro-industry. *Elaeis oleífera*, is native to northern South America and Central America. While most crops of commercial interest are grounded in African genetic material, some commercial crops in Colombia and Ecuador are being based on interspecific hybrids (OxG), result of *E. oleífera* mother and *E. guineensis* fathers crossing, resulting hybrids with intermediate characteristics [2].

It was suggested that vitamin E from oil palm has interesting biological properties, within which there is a potential blood cholesterol lowering effect, effective antioxidant activity within biological systems and possible anti-carcinogenic properties. These properties are the subject of exhaustive research [28].

Tocotrienols are not limited to serving as antioxidants, also appear to have an inhibitory effect on β-hydroxy-β-

methylglutaryl CoA reductase, which influences the decrease in the level of endogenous cholesterol and the aggregation of platelets. [27].

Government sectors see oil palm companies as a source of employment and development for poor regions. Fieldwork shows that there is a difference in the perception of small farmers. The cultivators of Quinindé and Concordia are satisfied with the income they get from exploiting this resource. However, the farmers of San Lorenzo, on the other hand, were not happy, since in the area there is a disease that affects the palms, called "bud rot" and as a result, land prices in San Lorenzo bringing with it the depreciation of oil quality [21].

The fundamental problem lies in the waste of *E.* oleífera, which exists within the company located in the area, not knowing how to use the fruits of the plant, because they are not commercialized. There is no optimization of the natural resource in the area. In general terms, it is considered that the content of fatty acids, to produce edible oil from this variety in its pure state. The general objective of this study was to evaluate the oil quality of different batches of *E. oleifera* in the private plantation located in the San Lorenzo canton of Esmeraldas province. It was established as a specific objective to analyze the profile of saturated, unsaturated, polyunsaturated fatty acids by chromatography in five lots of palm E. oleífera

2. Method

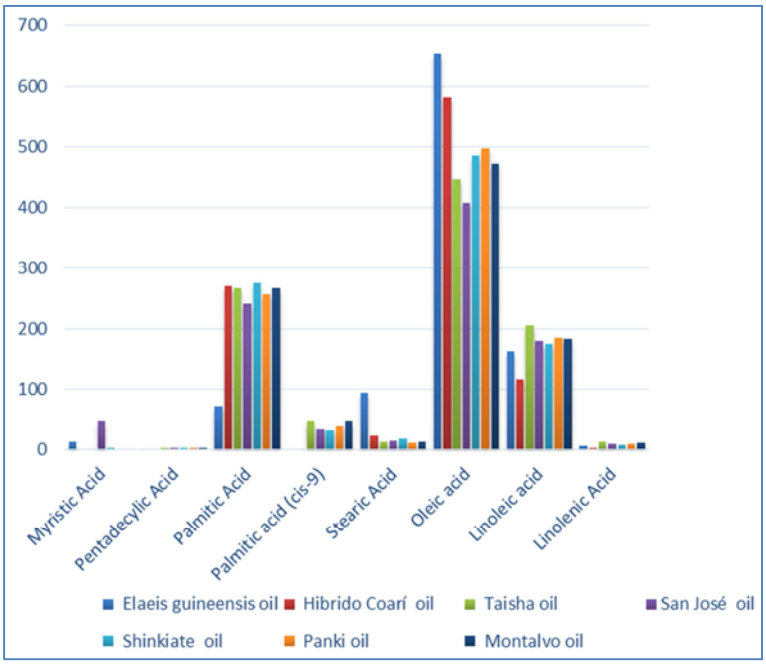
It was a descriptive, field, non-experimental and cross-sectional study. The research was carried out in the private plantation located in the San Lorenzo Canton located in the northern border of Esmeralda Province. The vegetation of the place corresponds to 50% of forest intervened and 50% of shrubs, whose climate is semi - humid. In relation to the temperature of the site they show averages that oscillate 9°C - 25°C, with relative humidities of 87°C - 91°C. The sample consisted of 200 palms of E. Oleífera by lots. The area designated with the 13'N was selected for this study, which includes lots 1: Montalvo, 2: Taisha, 3: San José, 4: Panki y 5: Shinkiate.

To collect information a structured instrument was used in sections that allowed to collect the necessary variables for the development of this research. Quality of edible oil was considered as dependent variable and fatty acid profile as independent variable. The methodology consisted of analyzing the saturated, unsaturated, mono-unsaturated and polyunsaturated fatty acids with three repetition by chromatography, of fatty acids: C16 (palmitic), C18 (oleic), C18: 2 (linoleic) and C18: 3 (linolenic). The oil extracted in the previous step was determined by reading in the gas chromatograph by the following steps: a transesterification with methanol, catalyzed with iodine trichloride in 20% methanolic solution (Merck-Shurchardt) was performed, and a glycerol and methyl esters were obtained.

Subsequently, extraction was carried out with hexane. For the chromatographic analysis, the temperature ranged from 100°C (5 min) to 136°C (1 min) at 2°C/ min and from 160°C to 250°C (25 min) at 7°C/ min and helium was used as entrainment gas.

3. Results

As can be seen in the graphs which expose the findings obtained in the investigation, and main results:



Authors, 2016

Figure 1. *General Profile of Fatty Acids.*

The figure 1. Indicates the comparison of the results in mg / g of all the fatty acids. It was observed that the fatty acid with the greatest presence in all lots is oleic acid.

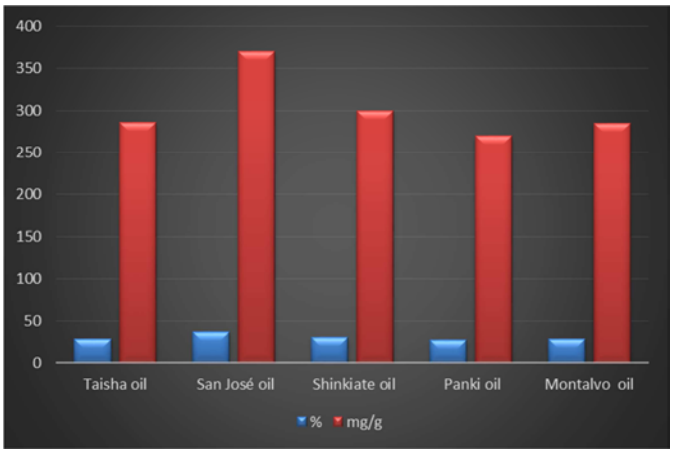


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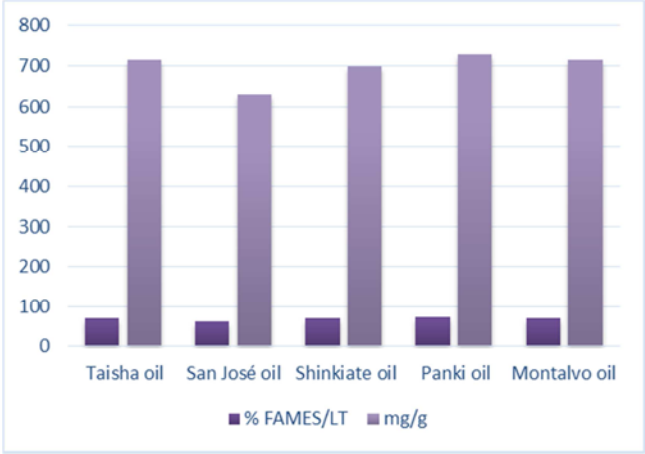
Figure 2. *Total Saturated Fatty Acids.*

The figure 2. Indicates that the "San José" edible oil has the highest content of saturated fatty acids 369.88 mg / g, compared to the rest of the oils.



Authors, 2016

Figure 3. *Total Unsaturated Fatty Acids.*

The figure. 3. indicates that the "Panki" edible oil has the highest content of unsaturated fatty acids with 729,68 mg / g, it should be noted that two batches of oils have similar "Panki" and "Taisha" unsaturated fatty acids content with 729, 68 mg / g & 713.89 mg / g respectively.

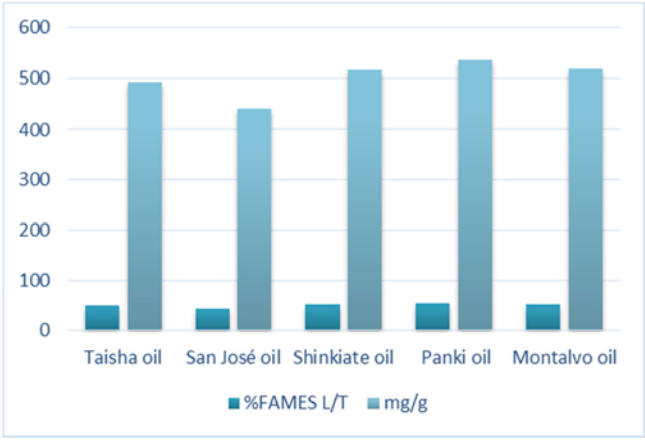


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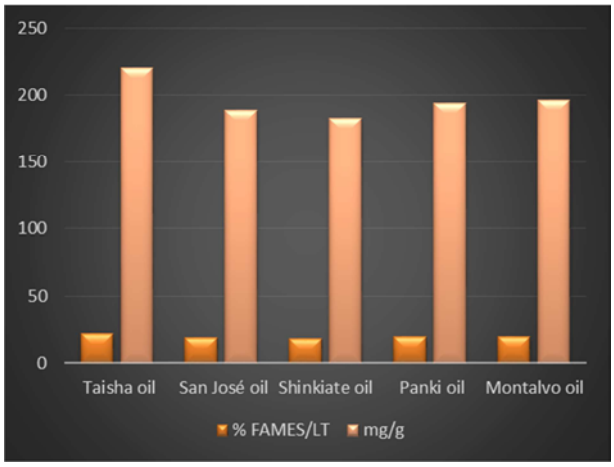
Figure 4. *Total of Monounsaturated Fatty Acids.*

In the figure. 4. It is evident that the "Panki" edible oil has the highest content of unsaturated fatty acids with 535.34 mg / g. With respect to the percentage of methyl esters of fatty acids (FAMES) an average yield.



Authors, 2016

Figure 5. *Total Polyunsaturated Fatty Acids.*

In the figure. 5. It is evident that the "Taisha" edible oil has the highest content of polyunsaturated fatty acids with 220.12 mg / g, in this case the remaining batches did not reach in the 200 mg / g range.

4. Discussion

The work of Saltos [22]. That makes reference on the oils of highest quality and more healthy and with high nutritional properties for the organism are without a doubt the extra virgin oils (extracted or cold-pressed). Also consider where the oils come from, since the quality of the soil and other factors intervene in the properties, the development of both studies result in the fact that the quality of the oil changes depending on the type of extraction that is perform; since the chemical extraction also does not affect the vitamin content of the same. [8]; It is worth noting that canola oil has a high concentration of unsaturated monounsaturated fatty acids (61%), compared to edible oils such as soybean (22%), sunflower oil (29.8%) or oil palm that has a concentration of (52.1%); while in this study dealing with the evaluation of oil quality in five different palm lots *(Elaeis oleifera)* it has an average of 50.10% mono-unsaturated fatty acids. It was also identified that the commercial variety of edible oil palm (Elaeis guineensis) actually possesses a concentration of unsaturated mono fatty acids (65.31%). 652.81 mg / g.

With regard to the study conducted by Lafont, Páez, & Portacio [14]. Describes the Extraction and Physical-Chemical Characterization of Marañón (Anacardium occidentale L) Seed Oil, mentions that said oil possesses (10.43%) 16: 0 Palmitic acid. Compared with the edible oil of palm (Panki) that possesses (27.58%) palmítico 16: 0 acid this one has fatty acids of better quality.

Sanchez [23]. carried out a study in different varieties of olives to obtain olive oil was determined fatty acids and was obtained as average of mono-unsaturated 73.70%, polyunsaturated of 9.64%, saturated of 16.47%, and 83.35% unsaturated fatty acids. While in this study that was the determination of fatty acids in 5 lots of palm *E. oleifera* is evidence of 19.65% polyunsaturated fatty acids. Andres Ceròn [1], indicates in its study that the content of saturated fatty acids in guanabana seed oil is 35.49% and of unsaturated fatty acids is 64.51% whereas in the oil of *E. olifera* the following concentrations of acids were determined saturated fatty acids 30,23% and the unsaturated 69,76%, it is evident that the oil of *E. olifera* has fatty acids of better quality in this case saturated and unsaturated.

5. Conclusions

It is concluded that the province of Esmeraldas was chosen for the analysis of oil quality because it is a producer of the same, it is a land that has always had the largest companies of the country, which is a great advantage to the inhabitants of San Lorenzo, since they are source of employment and development for this community. On the other hand, the hybrid *E. oleifera* x *E guineensis* (OXG) have more fixed indices and an average proportion compared to the oil of pure oleifera. And compared to the oil of *E. guineensis* presents higher rates of linoleic, stearic and palmitic acids; that is to say they present greater strengthening.

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