

Employment of Wax Sugarcane (*Saccharum Officinarum*) in Formulation of a Lip Gloss by Simple Extraction and Bioethanol

Carina Nazato^{1,*}, Nádia Hortense Torres², Suelen Catarina Urias Ferraz¹, Franz Zirena Vilca², Daniela Ferraz de Campos Silva¹, Claudio Lima de Aguiar³, Marcia Nalesso Costa Harder¹

¹Department of Biofuels, Technology College of Piracicaba, Piracicaba, Postcode: 13.414-155, Brazil

²Department Ecotoxicology, Center of Nuclear Energy on Agriculture, Piracicaba, Postcode: 13416-000, Brazil

³Department of Agroindustry, Food and Nutrition, Superior School of Agriculture "Luiz de Queiroz", Piracicaba, Postcode: 13418-900, Brazil

Abstract The objective of this study was to add value to wax cane sugar replacing synthetic wax in the manufacture of lip gloss. Three formulations were prepared: F1 (Control); F2 (vaseline sugar cane wax obtained by simple extraction and the artificial strawberry flavor replaced by "açai" natural powder) and F3 (vaseline sugar cane wax obtained by biotetanol extraction with strawberry flavoring food). The pH was 5.5 in both treatments. F2 had the highest humidity content (3.7%). The ash content was higher in F3 (1.6%); and the greater acceptability in the sensory analysis is the control formulation, requiring further treatments.

Keywords Antioxidant, Filter Cake, Vaseline

1. Introduction

With the constantly searching for improved qualities product such as sugar devoid of impurities and uniform crystal we obtained a diversification discard agroindustrials[1] which once properly processed can act as raw materials in different situations such as bagasse; stillage; yeast and filter cake.

In the filter cake is observed an average order of wax and raw lipids from 5 to 14% on a dry basis with different proposals for their use but they often are sent to fields as fertilizer in the six weeks prior to planting grass[2]. During the grinding rod, about 40% of lipid material is dispersed in the juice as sludge while the remainder is retained in the pulp after the grinding.

Then in the process, organic and inorganic ions contained in the juice are precipitated as a calcium salts and occlude these waxy materials and acids present in the juice and consequently the wax is concentrated in the cake[2]. According to Adamenas[3] under the dry filter cake are found 5-17% of wax and a mill with crushing capacity of 4000t a day lost about 4t of wax during the harvest. In plants they act as a protection against water loss from the surface by

the evapotranspiration and microbiological attack which can be classified according to their origins: natural (animal and plant) or synthetic (petroleum)[4].

Thus along the surface of plants the wax acting as a thin layer of waxy material, forming the interface between plant and the atmosphere, which can control the volatile compounds that can attract insect pests and pollinators, preventing the development of diseases and promote drought resistance[5].

Raw wax from sugar cane is a soft solid dark color waxy comprising 45% wax; 35% fatty matter and 20% resin and the fine wax fraction contains more than 55% by valuable ester; 8% of free acids; free alcohol 10%; 25% of aldehydes and ketones and 2% seconds hydrocarbon[6, 7].

Raw oil wax is forwarded to the preparation of animal feed, used to obtain phytosterols and defoamer in the manufacture of powder extinguishers and among other uses. Already refined wax emulsions can be used in coating fruits; floor polishes; paints and cosmetics; while the resin has more options for industrialization restricted and is used in tires and plasticizer additive[8].

In Cuba wax cane sugar is produced on a large scale and are found several patents for its products in the country[3, 9], the example is the policosanol, a product derived from the wax of sugar cane sugar effective in preventing cerebral vascular diseases marketed for more than 30 countries such as Australia; Mexico; Argentina; Norway and Canada, according to Porto With Cuba[10].

* Corresponding author:

cnazato@gmail.com (Carina Nazato)

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To Adamenas[3], the highest quality natural wax is evident when compared to synthetic waxes often also irreplaceable in certain processes and the prices are lower and self-sufficiency in obtaining reveal a special convenience for the domestic market natural waxes.

Thus the lip gloss is formed by five properties: white body (wax; pasty bodies fatty acids and body fluids); dyes; fragrance antioxidants and active ingredients[11]. Therefore the aim of this study was to add value to the wax raw sugar cane using it as a substitute natural to synthetic material (vaseline liquid and solid) that are used in a formulation of lip gloss.

2. Materials and Methods

2.1. Simple Sugar Cane Wax Obtainment from Sugar Cane Juice

The sugar cane wax extraction for the formulation F2 and was obtained from the cooking of sugar cane juice where the compound supernatant was removed and stored at 4°C in a beaker at refrigerator for later use.

2.2. Extraction of Wax Sugar Cane from Filter Cake from Sugar Cane Juice

The filter cake used for the raw wax extraction raw used in "F3" was courtesy from Pedemeiras Plant (Tietê, São Paulo, Brazil) by the processing of sugar cane harvested in 2010 and 2011.

To obtain the wax cane sugar used in F3 followed by the methods described in Vieira[9] with some adaptations. For the extraction were organized filter paper cartridges with 140 g of filter cake, which were submitted to Soxhlet extraction for about two hours in each batch. After this process the flasks followed for the removal of the solvent by heating in a water bath at 90°C, generating the concentrated analyte.

2.3. Solid Lip Gloss Formulation

Table 1. Concentration of components and raw materials (%)

Raw materials	Function	F1	F2	F3
Beeswax	Wetting	11	11	11
Sugar cane wax	Wetting	–	35	40
Solid vaseline	Emollient	35	–	–
Liquid vaseline	Emollient	5	5	–
Cocoa butter	Emollient	41	41	41
Vitamin E	Antioxidant	0.5	0.5	0.5
Phenobem	Preservative	0.1	0.1	0.1
BHT	Antioxidant	0.05	0.05	0.05
Essence of strawberry	Flavoring	10 drops	–	–
Açaí	Flavoring	–	7.35	–

Formulation of the lip gloss was based on the methodology used in the local compounding pharmacy,

which refers to a product with the final mass of 8g. In this sense, we prepared (a) a sample with the original formulation (F1); (b) a sample replacing totally the vaseline waxy solid by the compound of sugar cane juice by simple extraction and essence for flavoring natural "açaí" (F2) and (c) a sample by replacing both the solid vaseline, liquid vaseline as the raw wax from sugar cane extracted with ethanol (F3) in Table 1.

2.4. Treatment 1: Prepare of Control lip Gloss

In a 250 mL beaker previously weighed was weighed up all the assets except the flavoring. Then the beaker was merged in a water bath at 70°C and all products were homogenized with a glass rod. Removed from the heating and added to the flavor and homogenized. The extract was put in a refrigerator at 4°C for the analysis. After this the samples were withdrawn from the heating for the addition of flavoring and subsequently distributed in sealed plastic cups with plastic film.

2.5. Treatment 2: Preparation with Solid Sugar Cane Wax

In this formulation the compound with wax was reserved in the refrigerator in a completely solid which was subjected to heating in a water bath at 70°C yielding a semi-solid and crumbly (for ease of handling). This is done such a quantity is weighed in a 200 mL beaker and allowed it.

As based on the methodology provided by the local pharmacy was weighed fractions of their assets for the F2 and put them in warm water bath. After casting the extract was removed from the bath and to which was added the natural flavouring of "açaí".

2.6. Treatment 3: Preparation of Lip Gloss with Wax by Cane Sugar Extracted with Bioethanol

In third formulation, 140 g of filter cake were subjected to Soxhlet extraction process for a period of 2 hours in reflux. At the end of the operation was obtained 4.242 g of raw wax extract. To obtain the wax extract, followed by the standard methodology of formulation of lip gloss, by replacing the vaseline and removed the flavouring, in which all assets have been heating in a water bath and, after casting were put in refrigerator.

2.7. pH

Sample pH was verified by measuring in pH tapes from Merck®.

2.8. Humidity

In this essay masses of crucibles were perverts and the samples were weighed. After this, the crucibles were followed for incineration in an oven at 450°C where they remained until the total carbonization of the compounds. After this step were followed the ashes to cool in a desiccator. Then the crucibles were weighed again to determine the ash content contained in the highlights lip gloss.

2.9. Sensory Analysis

All procedures were requested the opinion of the Ethics in Research of the Technology College of Piracicaba. Therefore we tested the acceptability in a hedonic scale since it is essential to recognize the "emotional status" of consumers about the product understanding their preference [12].

Sensory analysis was the evaluation of attributes related about the lip gloss, like: aroma; visual texture and brightness. Where needed 40 volunteers (because they are not trained professionals) with a mean age of 20 years. It was an organized form presented to each panelist in order to express their preferences about products [12].

Each volunteer evaluated each of the three gloss samples, using the visual and olfactory senses the attributes of aroma; glow and texture, being free from direct contact with the samples as a precautionary measure since it was not possible to determine its safety health if they were eaten minimally. The analysis was unit operations in the laboratory where the samples were placed on the bench calf white.

3. Results and Discussion

3.1. Formulation of Lip Gloss

Control formulation (F1) was easily incorporated at a temperature of 55°C leading to a patchwork of artificial strawberry flavor, which clear color; uniform; solid consistency and texture of fat due to the presence of solid and liquid vaseline.

However in F2 with over heating in a water bath the extract containing the wax was dense and not was presented in a homogeneous mixture, decanted the bottom of the beaker in a thick and pasty. F3, the final product was incorporated in a homogeneous material with dark green color, but less oily. A strong smell were appeared, which can be attributed to the possible presence of acrolein. The Figure 1 illustrates the three formulations.



Figure 1. Lip gloss control (F1), lip gloss with extracted wax + "açai" (F2) and lip gloss with raw wax (F3)

Formulation of cosmetic products must comply with the integrity of the skin keeping the physiological pH (between 4 and 6.5) to be tolerated well and microbial safety and toxicological in addition to the pleasant texture and easy to use [13]. Thus to average the pH of three treatments were maintained at 5.5 following the margin of tolerance.

Regarding the humidity labial products were not found in literature for evaluation parameters with the data obtained. However can be seen that F1 did not show significant

humidity content which may correspond to the lipophilic character of the raw materials used and does not indicate the presence of bound water or water activity.

Treatment F2 showed the presence of humidity percentage compared to almost triple F1 because of the wax extract has not been extracted with a selective solvent and collecting, so the water present in sugar cane juice; "açai" beyond natural and added sugars; salts; organic acids and albuminoids contained in sugar cane juice [14], which also may have contributed to the heterogeneity of the final product and increased susceptibility to microbial contamination according to Yamamoto *et al.* [15], the pathogen contamination instability may compromise; modify the physical and inactivation of the active ingredients.

Since F3 showed a humidity rate slightly higher than the control where all raw materials used had character lipid but there could have been the inseparability of all ethanol used in the extraction of wax and being the same order of 96°GL and a small amount of water may have remained besides being hygroscopic and it is possible to have absorbed atmospheric humidity to the formulation. Table 2 show the analysis of pH; humidity and ash for F2 and F3 compared to the control (F1).

Table 2. Analysis of pH and percentage of humidity and ash of F2 and F3 compared to the control

Formulations	pH	Umidity (%)	Ash (%)
F1	(5.5 ± 0) ¹	(0.57 ± 0.4)	(0.7 ± 0.08)
F2	(5.5 ± 0)	(3.7 ± 4.1)	(0.7 ± 0.35)
F3	(5.5 ± 0)	(0.75 ± 0.31) ²	(1.6 ± 0.11)

¹Mean ± Standard deviation.

²Duplicate (insufficient sample)

As regards the inorganic material present in the formulations were not found in the literature referring to the parameters lip gloss and according to Atz [16] no provisions with regard to specific residues of toxic elements such as As, Cd, Co, Cr, Cu, Ni, Pb and Hg. According to researches of the same author for the concentrations of these toxic elements in samples of lipstick in silver were obtained an average grade total of 4.22 mg g⁻¹.

It was observed that data obtained with the F1 showed a smaller amount of inorganic material compared to F2 and F3 attributing to the fact that the solid and liquid vaseline are composed mostly of hydrocarbons (and to a lesser extent by inorganic material since the basic difference in the formulations was the replacement of artificial flavoring and vaseline).

Treatment F2 represent a larger quantity of ash compared to control since the compound of wax obtained by simple extraction can contain inorganic acids and phosphatides. The third treatment showed the greatest content of ash which can be assigned by the matter of the extract of raw wax used concentrate inorganic matter such as phytosterols; iode; organic and inorganics acids [8]; phosphorous; octacosanoic; oleic and palmitic acids [9].

Table 3 refers statistical analysis of the F test by Tukey 5% significance and shows the evaluation of three formulations lip gloss.

Table 3. Mean sensory attributes of the lip gloss formulations F1 and F2

Formulations	Attributes (Mean \pm Standard deviation) ¹		
	Aroma	Brightness	Texture
F1	7.88 \pm 1.7 a	7.35 \pm 1.4 a	7.3 \pm 1.8 a
F2	5.63 \pm 2.7 b	6.57 \pm 1.9 ab	7.01 \pm 2.4 ab
F3	5.31 \pm 2.7 b	6.32 \pm 1.8 b	6.06 \pm 2.3 b
LSD2	1.04	0.92	1.07

¹Means followed by same letter in column do not differ by Tukey test (<5%)

²LSD: Least Significant Difference test of Tukey at 5% significance level

Since the sensory analysis (Table 3), was observed that substitution pattern of the aroma of strawberry flavoring by natural "acaí" (F2) may have been confused with the assets used which were not homogenized. The exemption of smell in F3 reduced the intensity of adoption change significantly ($p < 5\%$) compared to F1.

Although F2 did not presented significant differences compared to F1. Already there was F3 lower acceptability compared to the control and therefore changed significantly ($p < 5\%$). Correlating visual texture of the three treatments with the macroscopic and the homogeneous yellow light, F1 expressed the same acceptability to the heterogeneity of F2. However F3 presented a brownish-green colour intense and was statistically lower than control.

4. Conclusions

We can concluded that the overall acceptability of the products was higher F1; followed by F2 and F3. F1 had higher greasy texture as F2 due to its higher humidity content may have more susceptible to physical instability. Although F3 having lesser scale in brightness preference; aroma and texture, it had a physical resistance under high temperature at the end of the sensory analysis. In pharmaceutical industry the sugar cane wax may have potential to replace the synthetic product and assign particular anti-free radicals and low-greasy requiring further treatment to reduce the extraction of humidity desirable organoleptic parameters.

For use of F2 is required a method that carries the lip gloss all compounds in the sugar cane juice wax were loaded with the active formulation including carbohydrate and salts, so that the separation does not occur phases.

Need analysis proves the composition of the raw sugar cane wax since HPA may have been dragged in the extraction with ethanol. As the raw sugar cane wax was incorporated into the cosmetic formulation without the formation of double-stage and there is need for intense smell removal of the wax and include processes that confer satisfactory brightness and texture conventional.

Moreover, it would interesting for further study, the detection and quantitation of metal in the sugar cane wax, analysis, for allocation of iodine and phosphorus contained

in the use of cosmetic raw wax, as well as studies to determine the stability of the product end and the availability of policosanol, influence and its effects on such cosmetic and health. Therefore with the data from this study we can conclude that the raw sugar cane wax can be an alternative application for employment in the lip gloss.

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