

PRODUCTION AND CHARACTERIZATION OF HANDMADE VINEGAR PRODUCED WITH APPLE PEELS.Rafaela Soares Biase¹, Sérgio Luis M.Violi², Fernando M. Rodrigues³

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Summary

The objective of this work was the production and characterization of a vinegar using Apple bark purchased in local shops in the town of Paraíso do Tocantins. The fermentation process used a hydro-alcoholic solution 6% (v/v) with Apple Peel culture medium for 11 days. with ambient temperature between $28 \pm 2^\circ \text{C}$, with irrigation of 10 times a day, without aeration. At the end of the fermentation process, the vinegar produced was filtered, sterilized and stored in glass container for determining chemical physical hydrogen potential pH, alcohol and acidity followed the methodological procedures of Instituto Adolfo Lutz. The vinegar produced presented physicochemical characteristics within what is established in the current legislation.

Keywords: Technology; acidity; fruit.

Introduction

Vinegar is a dilute solution of acetic acid, elaborated by two consecutive processes: the alcoholic fermentation, when the sugar is converted to ethanol; and the fermentative oxidation, which turns alcohol into acetic acid (SCHIMOELLER, 2011; VELOSO, 2013). Annually in Brazil are discarded a great part of the fruits harvested for presenting deformations, advanced stage of ripening or in some cases by overproduction. In this way the manufacture of fruit vinegar can provide means of using unusable or surplus raw materials of production (BORTOLINI et al., 2001; EVANGELISTA 2008; UBEDA et al., 2011). Fruit vinegars have better sensory and nutritional qualities, since they present characteristics like flavor and own aroma due to the vitamins, organic acids, proteins and amino acids originating from the fruit and the alcoholic fermentation. (AQUARONE et al., 2001). Fruit peels have a high content of soluble solids and nutrients, which can be used to make vinegar (PAGANINI et al., 2003). The use of the barks for the production of vinegar is shown as an alternative to reduce the losses of post-harvest wastes of fruits that lose their commercial value due to defects (TESSARO et al 2010; BORTOLINI, SANT'ANNA and TORRES 2001; SANTOS et.al., 2008; ABUD, SILVA and ARAÚJO 2012). The objective of this work was to produce and characterize a vinegar from reutilization of apple peels.

Methodology

The experiment was carried out at the vegetable processing laboratory of the Federal Institute of Science and Technology Education of Tocantins Campus Paraíso do Tocantins. For the creation of the vinegars were used the shells of Red Delicious, acquired in the local Commerce in the City of Paraíso do Tocantins. The fermentation process used a methodology developed by Santos (2008), where a 6% (v / v) hydro-alcoholic solution was used with the apple peel culture medium for 11 days at $28 \pm 2^\circ \text{C}$, with the use of the irrigation process 10 times a day, without aeration. The fermentation process, the vinegar and the wood processing barks were laminated, stored and sterilized in a glass container. For pH, alcohol content and acidity followed the methodological procedures of the Instituto Adolfo Lutz (IAL, 2008).

Results and discussion

Table 01 shows the results for the chemical physical parameters found for vinegar produced with apple peel

Table 01. Chemical physical parameters for vinegar produced with apple peel		
CHEMICAL PARAMETERS	Apple peel vinegar	Normative Instruction N°6/2012
Hydrogen ionic potential pH	2,57± 0,02	-----
Acidity (%)	4,86 ± 0,03	Minimum in 4
Alcohol content (%)	0,23 ± 0,04	Maximum in 1
Yield (%)	77,02 ± 0,01	-----

Pedroso (2003) evaluating apple vinegars produced in airlift bioreactor found a variation of 3.10 ± 0.26 for pH and a mean acidity percentage of 4,11. The vinegar produced in this experiment reached values lower pH and acidity higher than that found by Pedroso (2003). Pestana et al. (2004), producing vinegar from flowers of *Hibiscus rosa-sinensis* L, reached a minimum and maximum pH, respectively, of the final product of 2,91 and 3,35, higher than that found in this experiment. According to Aquarone et al. (1983), industrially, the conversion of ethanol into acetic acid and in the proportion of 1: 1, an income considered economical when it reaches a percentage of 76.70%. Camochena and Ferreira (2006) evaluated the acidity observed a minimum and maximum variation respectively from 3,84% to 9.60% in commercially sold vinegars in the region of Paraná. The vinegar produced with apple peel in this reached a percentage within the recommended in the current legislation.

Conclusions

The vinegar produced with the reuse of the apple bark presented physicochemical characteristics within what is established in the current legislation which makes it apt to be consumed as the commercially sold vinegar.

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