Original Research Article

Dehydration of fermented manioc rasp – Change the title

ABSTRACT

The objective of this work was to evaluate the quality of the Ripa enriched with urea, yeast and sugar cane molasses, fermented and subjected to the drying process. Using as parameters: moisture content, Brix, pH, acidity and protein content. We used a completely randomized design with ten replications, two treatments and one control. The model included non-fermented (RNFM) and fermented (RFM) treatments of the variety of Rosinha cassava. Fermentation was performed during 132 hours under ambient conditions, with a 10% yeast treatment (w/V), 4% Urea (w/V) and 20% molasses (w/V) and the other 70 ml of distilled water. Regarding the moisture content of the material after the dehydration period, mean values between 46.42% and 58.33% were observed. The Brix degree of the water treatment and the control samples did not differ, however, differed from the treatment urea + molasses + yeast, which presented the highest values of this parameter. The pH averages ranged from 4.49 to 7.85, differing statistically. Titratable acidity ranged from 1.760 to 14.040. A considerable gain of crude protein was observed in the treatment urea + molasses + yeast, which was statistically higher than the others.

Keywords: sugarcane; Dehydration Urea.

1. INTRODUCTION

Cassava (*Manihot esculenta* Crantz) is an heliophyll, perennial, arbustive plant belonging to the family of Euphorbiaceae [1]. Its domestication isconsidered one of the greatest inheritances of indigenous civilization, with its cultivation started 3,500 years ago, in the Amazon River basin [2].

Cassava is one of the most consumed foods in the world, especially in tropical regions, where cultivation occurs in greater intensity [3]. According to the last survey of the United Nations Food and Agriculture Organization (FAO [4]), the world production of cassava root corresponded to 253,690,000 tons in 2014, with Brazil in the fourth position with a production of 23.25 million tonnes. Having Nigeria as the world's largest producer with a total of 54,830,000 tons, followed by Thailand, Indonesia.

In Alagoas, the production of cassava is distributed throughout the state, constituting one of the main agricultural activities. Its production focuses on Agreste Alagoano, a region responsible for approximately 62% of the cultivated area [5]. According to the historian Alagoano, Álvaro Queiroz [6], the political emancipation of the Alagoas (September 16, 1817) was due to the prosperity of the territory corresponding to the southern Cone of the captaincy of Pernambuco, prosperity originated from agriculture and that had cassava With one of the main crops of the season (QUEIROZ, 2017).

However, a limiting factor to cassava cultivation is its short shelf-term. The percibility of the roots in Postharvest is linked to the amount of water in the root (+ 60%), which provides contamination by microorganisms [7]. According to the same author, deterioration occurs in two ways: a physiological or primary call, caused by physiological agents; And the other secondary, of microbial order. In the primary deterioration, certain enzymes act on the carbohydrates, causing the softening of the pulp. In secondary deterioration, there is the entry of microorganisms (bacteria or fungi) that intensify the transformations and end by ferment and rot the root, inducing the smell of fermented root and subsequent appearance of molds.

Dehydration is one of the techniques used to prolong the service life of food. For this, there are two methods of drying, the natural drying, which consists of the exposure of the food to the sun; and artificial drying, which deals with a unitary operation whereby heat is artificially produced in conditions of temperature, humidity and carefully controlled air circulation [8].

Therefore, this project aimed to evaluate the quality of cassava scraped enriched with urea, yeast and molasses, fermented and subjected to the drying process. Using as parameters: moisture content, Brix, yield, pH, acidity and protein content.

2. MATERIAL AND METHODS

Origin of the Material: the plant material used in this study was acquired in the experimental field of the Agrarian Sciences Center-CECA/UFAL.

Preparation and drying of the scrapings: The roots were harvested, cleaned, washed, selected and chopped, followed by spreading for drying (lowering the moisture from 60 to 70% to 12 to 14%). The drying was done in a forced ventilation oven with a temperature of 55 °c, at a time of 48 hours.

Fermentation of the material*:* commercial yeast of bakery (Sacchromyces cerevisiae), urea and sugar cane molasses were used. These used materials were acquired in local trade. The inoculants were inoculated in pots containing a solution with 10% yeast (w/V), 4% Urea (w/V) and 20% molasses (w/V).

The samples after fermented were dried. The unfermented samples were immediately subjected to drying. The experimental design was completely randomized (DIC), with ten replications, two treatments and one control. The model included as non-fermented (RNFM) and fermented (RFM) treatments of the variety of Rosinha cassava. Fermentation was performed during 132 hours under ambient conditions, with a 10% yeast treatment (w/V), 4% Urea (w/V) and 20% molasses (w/V) and the other 70 ml of distilled water.

Physico-Chemical Analysis

Moisture content, PH, titratable acidity, total soluble solids (° Brix) and yield (kg root spent/kg shaving produced), according to the methodology proposed by Instituto ADOLFO LUTZ [9] and AOAC [10]. Protein content will be indirectly done by means of nitrogen content (micro-Kjeldahl). Method (AOAC, 1997).

3. RESULTS AND DISCUSSIONS

Table 1 shows the analysis of variance summaries for the evaluated characteristics, as well as their respective variation coefficients. It was observed a significant effect at 1% probability, by the F test, of the types of treatment under the hydrogenionic potential (pH), moisture (UM), titratable acidity (TA), Grade Brix (º Brix) and crude protein (PB) of the analyzed material.

Table 1. Summary of variances analyses, referring to the data of hydrogenionic potential (PH), moisture (UM), titratable acidity (TA), Grade Brix (Brix) and crude protein (PB) of cassava ' zest submitted to different treatments for dehydration.

Sources of variation	GL	Middle Square				
		pH	UM	AT	ºBrix	PB
Treatments	2	$28,3224^{**}$	$682,4166^{**}$	$460,3293^{**}$	$53,33^{**}$	$937,6520^{**}$
Repetitions	9	$0,0035^{ns}$	$9,8121^{ns}$	$0,0451^{ns}$	$0,0000^{**}$	$0,1054^{ns}$
Residue	18	0,0043	5,2769	0,0345	0	0,1106
Total	29	-	-	-	-	-
C.V. (%)	-	1,08	4,13	2,98	0	4,4

ns, * *: no significant and significant at 1% probability by F test, respectively, C.V.-coefficient of variation. GL – Degree of freedom.

The pH averages ranged from 4.49 to 7.85, differing statistically between each other (table 2), thus constituting a material that presented characteristics between acid and slightly alkaline. According to Mühlbach [11], the ideal pH of food intended for animal feed should be above 6.0, where conditions are created that favor fermentation and allow greater intake of dry matter by animals, thus reflecting in obtaining Best productive indexes. Gonçalves et al. [12] Working with cassava starch residues, observed mean pH values of 5.30 in previously dry samples without any type of additive, however, the drying period was 3 hours, lower than that of this study.

Table 2. Averages of the hydrogenionic potential (pH) and moisture (UM) of cassava ' zest subjected to different treatments for dehydration.

Treatments	Medium	
	pH	UM
Urea + molasses + yeast	5,974b	46,426c
Water	4,494c	62,300[a]
Witness	7,8520[a]	58,330b

Averages followed by the same letter in the column do not differ statistically from each other by the Tukey test.

Regarding the moisture content of the material after the dehydration period, mean values between 46.42% and 58.33% were observed. Although the treatment with urea + molasses + yeast resulted in lower moisture content, the observed values are still relatively high, which may compromise the storage of this material and compromise its useful life. Souza et al. [13] state that cassava zest after the end of the drying period should present less than 15% of moisture. Being this point easily determined through practices like, by taking a piece of scrape and this scratching like a chalk. According to these same authors, three factors are paramount for the success of the natural drying process: raw material quality (humidity 70 to 60%), climatic factors (temperature, air relative humidity, precipitation, ventilation, radiation) and Processing (size and thicknesses of the scrape, load per yard area, frequency and efficiency of the revolving).

Titratable acidity ranged from 1.760 to 14.040 (Figure 1), and the highest values were observed in the treatment urea + molasses + yeast. A result that corroborates with Bezerra et al. [14], who affirm that the increase of titratable acidity occurs due to the beginning of the bacterial fermentative process with the production of organic acids, such as lactic, butyric and Acetic, among others. Therefore, the conditions present in this treatment influenced the increase of this variable. According to Vilpoux [15] accentuated acidity values are associated with higher fermentation intensity or time of the root pubescent process.

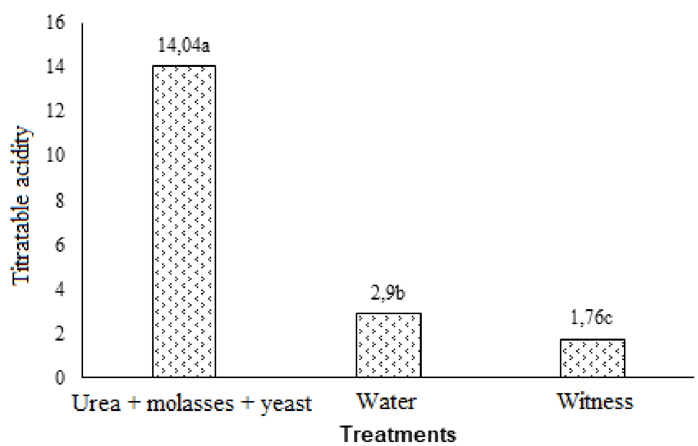

Figure 1. Titratable acidity averages of cassava ' zest subjected to different treatments for dehydration.

Averages followed by the same letter in the column do not differ statistically from each other by the Tukey test.

The Brix degree of the samples of the control and water treatments did not differ from each other (table 3), however, differed from the treatment urea + molasses + yeast, which presented the highest values of this parameter. The Brix degree in a practical way indicates the contents of soluvéis solids present in a given sample. The soluvéis solids in turn represent the substances such as sugars, vitamins, acids, amino acids, and some pectins present in vegetables, being directly linked to the degree of maturity and flavor of these [16]. When thinking about animal feeding, a good degree Brix of a food to be offered, represents a greater acceptability of this by the animal, thus contributing to its insertion in the diet. From the results obtained, it is clear that cassava has limitations on this variable, which was corrected with the addition of molasses in one of the treatments.

Table 3. Averages of Brix grade (º Brix) and crude protein (PB) of cassava scrapings subjected to different treatments for dehydration.

Treatments	Medium	
	ºBrix	PB %
Urea + molasses + yeast	6ª	18,7390a
Water	2b	1,7630c
Witness	2b	2,1790b

Averages followed by the same letter in the column do not differ statistically from each other by the Tukey test.

A considerable gain of crude protein was observed in the treatment urea + molasses + yeast, which was statistically higher than the others (table 3). This gain is of paramount importance to enable a quality protein food for animals. Souza et al. [13] Emphasize that the adequate supply of proteins in animal feed has as consequence a better utilization of nutrients for the productive and reproductive processes of these, thus reflecting in higher zootechnical gains. Geron et al. [17], working with dehydrated residual cassava scraped, found average values of 3.81% of crude protein in the material, values higher than that of the control of this work, which reinforces the need for complementation with a source External.

4. CONCLUSIONS

The cassava zest from the dehydration process showed differences in the parameters analyzed according to the types of treatment applied.

The treatment urea + molasses + yeast presented the best values of Brix grade and crude protein.

Based on the values of titratable acidity and moisture, it is perceived that new studies should be developed seeking the reduction to acceptable levels of these values.

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