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## BEEKEEPING PRODUCTIVE ABILITY FOR BEE HONEY: *APIS MELLIFERA*, IN THE SAVANNAH REGION, IN THE STATE OF RORAIMA

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**Abstract:** The theme of this work is part of the discussion on Brazilian beekeeping production. It plays a relevant role for family farming in Roraima, as it rescues and discusses the physical-chemical and quality characteristics of honey as a commercial product. It differs from other works, as it is not limited to data on apiary productivity, rather, it focuses on standardization and formation of the identity of honey from Roraima. The objective of the study is to identify and compare the physicochemical characteristics of bee honey: *Apis mellifera* in the Savannah of Roraima and its quality as a commercial product, based on Brazilian regulations. The methodology used was a literature review, narrative type, on physical-chemical characteristics and quality of bee honey: *Apis mellifera* in Roraima, Savannah region; Therefore, the research is descriptive and quantitative in nature. The main results obtained were: regarding humidity, the average identified, in Roraima, was 18.91%, below the level of Brazilian regulations, which is up to 20%. Sugars, glucose and fructose, responsible for elements such as viscosity, crystallization, acidity, aroma and sweetness of honey; found in total sugars and reducing sugars, ranged from 60.1% to 60.3% and from 25.0% to 26%, respectively. The free acidity of honey, expressed in terms of mEq/kg, varied from 25 to 26. The ash content varied between 0.51% and 0.60%. The work concludes that bee production of bee honey: *Apis mellifera*, through family farming in the Savannah region of Roraima, is within Brazilian commercial standards, according to physical-chemical and quality aspects.

**Keywords:** bees; physical-chemical characteristics; bee production.

## INTRODUCTION

Brazil is a major producer of honey and bee products, holding a privileged position in the global bee industry. Despite significant production, unlike other countries, there is traditionally not a high consumption of fresh honey by the Brazilian population. This way, the majority of national production is exported to meet the needs of other countries (FERREIRA & ASSIS, 2020).

The Technical Regulation on Identity and Quality of Honey, set out in Normative Instruction number 11, of October 20, 2000, is the basic instrument for the Brazilian beekeeping industry, in terms of honey quality. This is defined before being marketed by its sensorial characteristics (color, flavor, aroma and consistency) and physical-chemical characteristics (reducing sugar content, humidity, apparent sucrose, water-soluble solids, minerals, pollen, acidity, diastase activity and hydroxymethylfurfural).

Honey, the food product targeted by the study, according to decree 9,013/2017, is that which is produced by honey bees from the nectar of flowers or secretions coming from living parts of plants, or from excretions of plant-sucking insects that remain about the living parts of plants that bees collect, transform, combine with their own specific substances, store and leave to mature in the hive's combs (BRASIL, 2017). As for the target region of this investigation, it has a very varied flora, where honey and other bee products can be obtained in quantities and with diverse characteristics.

It is worth mentioning that studies regarding honey produced in Roraima are mostly based on productivity data from apiaries, without explaining results regarding the physical-chemical quality of honey, in accordance with pre-established standards in Brazilian legislation.

Essentially family production, beekeeping

in Roraima stands out as an activity that brings social, economic and environmental benefits to the communities that develop it. Therefore, this literature review aimed to identify and compare whether bee honey: *Apis mellifera*, in the Savannah of Roraima, it follows the recommendations of Brazilian legislation and is within the standard for commercialization.

## GOAL

This investigation aimed to identify and compare the physical-chemical characteristics of bee honey: *Apis mellifera* in the Savannah region of Roraima, as well as its quality as a commercial product, based on Brazilian regulations, Technical Regulation of Identity and Quality of Honey.

The methodological resource for developing the research was the literature review, of the narrative type. The search for works to be consulted in this type of review does not follow explicit and/or systematic criteria, such as literature reviews of the types: integrative review and systematic review. For the authors Cordeiro et al. (2007), the selection of studies/works in the literature review, narrative type, “does not need to exhaust [all] sources of information”. As well as, “does not apply sophisticated and exhaustive search strategies”. Regarding the selection of studies and the interpretation of information, these “may be subject to the subjectivity of the authors”. This type of methodology is quite “suitable for the theoretical foundation of articles, dissertations, theses, course completion works”, among others (p.469-470).

## DEVELOPMENT

One of the significant works carried out on the evaluation and physical-chemical characterization of bee honey: *Apis mellifera* in the Savannah region of the state of Roraima, found in Matos et al, (2016). According to research by Matos et al. (2006), humidity

values ranged from 17.00 to 20.27%, with an average of 18.91%, which was considered within the limit allowed by the legal standard, which is 20% (MARCHINI et al., 2004). In comparison to literature reports, moisture values of 19.0 to 19.3% were the highest values found in bee honey *Apis mellifera* in the country, according to Lira et al. (2014). This data is important, as knowledge of the moisture content of raw materials is fundamental in conservation, storage, maintenance of quality and, consequently, in the marketing of the product. It is essential to highlight that Africanized bees seal the honey when the humidity is between 17% and 18% (EVANGELISTA et al., 2005), thus indicating its maturity (BRAZIL, 2000). Furthermore, this quality parameter influences the stability of the honey, microbial changes, whether due to contamination attributed to bees, nectar, the environment and/or inadequate management by the producer.

Water, the second largest component in honey, influences its viscosity, specific weight, maturity, flavor and conservation. Sugar-tolerant microorganisms, present in the bodies of bees, in the nectar, in the soil, in extraction and storage areas, can cause fermentation in honey, when the water content is very high (MARCHINI et al., 2004).

Matos et al. (2016), also observed that the concentrations of total sugars and reducing sugars present in honey samples ranged from 60.1% to 60.3% and from 25.0% to 26%, respectively. It is worth mentioning that the minimum value of 65% for reducing sugars is that established by Brazilian legislation. In this sense, it is clear that the values of honey production samples in Roraima can be considered similar to the values established by the law that regulates the quality of honey in the country.

These sugars establish the physical-chemical characteristics (viscosity, crystallization and

acidity) and sensorial characteristics (aroma and sweetness), which are striking in honey of *Apis mellifera*. When they have a high percentage of fructose, they are generally sweeter and more viscous. Furthermore, due to the hygroscopic characteristic of this sugar, they also acquire the ability to inhibit the crystallization of honey.

Honey, being a concentrated solution of two reducing sugars: fructose and glucose, has the ability to reduce copper ions in alkaline solution (MARCHINI et al., 2004). Glucose is a relatively insoluble sugar, responsible for the granulation of honey, its precipitation increases the moisture content of the aqueous phase, allowing the proliferation of osmophilic yeast cells and fermentation. The fructose in large quantities in honey, due to its high hygroscopicity, brings sweetness to it.

As for ash contents, they varied from 0.51% to 0.60% in the samples collected (MATOS et al., 2016). However, the values did not exceed the maximum limit of 0.60% established by Brazilian legislation (BRASIL, 2000). It is important to highlight that the percentage of ash present in honey expresses the richness of the mineral material, and ash levels above those specified suggest adulteration by inorganic materials, coming from objects not specified in the description of the honey. The amount of ash, when considering the *Apis* genus, is correlated with the color of the

honey, with it being found that the greater the mineral intensity, the darker the honey (LACERDA et al., 2010).

Regarding the pH of honeys in Roraima, Matos et al. (2016) recorded an average value of 3.6. Although pH is not currently indicated as a mandatory analysis in the quality control of Brazilian honeys, it is useful as an auxiliary variable for evaluating its quality (SILVA, 2004). Furthermore, the pH of Roraima honeys was 4.2; also varying between 3.54 and 5.30; in some cases. Regarding the free acidity of honey, expressed in terms of mEq/kg, it ranged from 25 to 26 (MATOS et al., 2016); These values are within the quality standards recommended by legislation, which determines a maximum limit of 50 mEq/kg of honey (BRAZIL, 2000).

## CONCLUSIONS

In light of the data presented, collected from studies carried out with bee honey: *Apis mellifera*, produced in the Savannah region in Roraima, bee production by family farming in the region is within the limits established by Brazilian legislation regarding physical-chemical standards and production quality. This way, the state of Roraima highlights its beekeeping production capacity in the Savannah region and, consequently, its potential for commercialization and export of bee honey: *Apis mellifera*.

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