

INNOVATION IN FERMENTED BEVERAGES BY PATENTS ANALYSIS IN BRAZIL

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Abstract—Despite the long existence of the fermentation processes, they still are very used in the food industry and other interested areas of the society. From this process, several food and drinks with a unique flavor and extended shelf life were developed. Fermented drinks are consumed in Brazil, and they can be alcoholic and non-alcoholic. The country has a high potential growth in the production of beverages, so the development of technologies and products in this area is essential. Recent researches have been protected by intellectual property using patent applications. With that, the aim of this work was to identify the patent trends on fermented drinks. The methodology was exploratory and quantitative and it was associated with the use of the key words “drink” and “fermented”. The search was conducted using the software AcclaimIP® trial version with the data base filter of the National Institute of Industrial Property (INPI). It was obtained a total of 30 patent deposits, being the major part concentrated on the main group A23L2 (no-alcoholics drinks), followed by C12C7 (preparation of other alcoholic drinks) and C12G3 (preparation of wort). It was concluded that the investigative efforts are focused on the production process of food products and alcoholic beverages, especially beer production.

Keywords—Food, fermentation, patents, technological forecasting.

I. INTRODUCTION

The fermentative process was used by the ancients with the objective to increase the shelf life of the agricultural products which were perishable, such as milk, vegetables and meat. Consequently, this fact resulted in an enormous variety of food and drinks that until today, make part of the human diet in several developing countries being most of them located in the South-East Asia (HUGENHOLTZ, 2013). These processes were handcrafted and the role of the microorganisms was not known yet. With the fermentation, the food that was developed had a high quality, and also presented different and desirable sensorial characteristics (CAPLICE e FITZGERALD, 1999).

Among the mainly advantages of the fermentation process are: the diversification of flavors, odors, and

textures of the food that contributes for the enhancement of the human diet and preservation of the foodstuffs through the production of lactic acid, alcohol, acetic acid and basics fermentations. Moreover, it results in biological fortification of the food with proteins, essential amino acids, essential fatty acids, and vitamins and reducing the cooking time and fuel requirements (STEINKRAUS, 1994).

With all the benefits of the fermentative process and the necessity of producing food in large scale objecting expansion, it occurred the development of the fermentation in big scale for commercial production of fermented food and drinks. Each type of raw material is related with a substrate for the formation of synthesized metabolites for microorganisms that will contribute to the increase of the shelf life and quality of the product. For fermentation of milk, vegetables, and meat, usually it is used the bacteria which produces lactic acid. On the other hand, for production of alcoholic drinks, it used yeasts to produce beers, wines, and spirits (ROSS, *et al.*, 2002).

Fermented drinks can be alcoholics or non-alcoholics. Among the non-alcoholic fermented drinks are the ones that are produced having the milk as the raw material, known as fermented dairy drinks, for example yogurt and fermented milks that have a high nutritive value and a high consumer acceptance. In this category, there are functional dairy drinks that have probiotic microorganisms which generate benefits to the human organism. Due to this fact, the development of new functional drinks has increased (KEMPKA, *et al.*, 2008).

Alcoholic drinks are produced by the fermentation process. During the alcoholic fermentation occurs series of reactions where specific microorganisms (yeasts) act on the substrate, in this case sugars, to produce carbonic gas and, mainly ethanol. Beers, spirits, fermented of fruits are among the alcoholic drinks (LIMA E MELO FILHO, 2011).

With this context, the present work had the objective to do a technological prospection to evaluate the patent deposits associated with fermented drinks in Brazil, and analyze the trends and the scientific and technological development in this area.

II. METHODOLOGY

For the technological prospection, it was done a research about patent deposits aiming analyzing the evolution of patents registration related to fermented drinks in Brazil. It was used a software called AcclaimIP® trial version to search the patents and it was chosen a data base from Brazil, the National Institute of Intellectual Property (INPI). The search was done using “bebida” and “fermentada” as key words.

With the objective of verifying the information about patents, it was analyzed the patent deposits existents until the present year. The documents were evaluated and it was extracted the significant information about the quantity of patents deposited in Brazil containing the used key words, the priority and publication date, the assignees, and the areas of interest using the International Patent Classification (ICP).

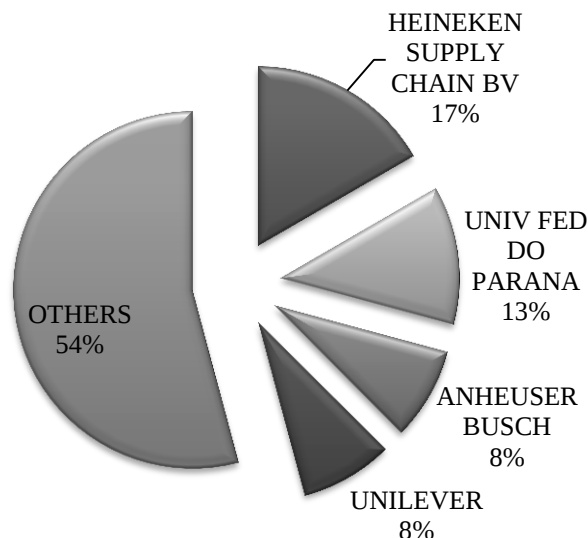
III. RESULTS E DISCUSSION

The search done with the key words “bebida” and “fermentada” resulted in 30 registers of patents in Brazil. It was done a search in English using the key words “fermented” and “drinks” to verify the number of patents in other countries. It resulted in 3176 patents being the majority (2101 patents) registered in the World Intellectual Property Organization (WIPO) followed by China (463 patents) and South Korea (405 patents). The number of patents registered in Brazil (30) indicates that the country needs to advance in this area to develop products that bring benefits to society.

The analysis of patents by assignees is presented by the Figure 1. It is observed that there are assignees which are companies, academic institutions, and independent inventors. In the area studied, the biggest

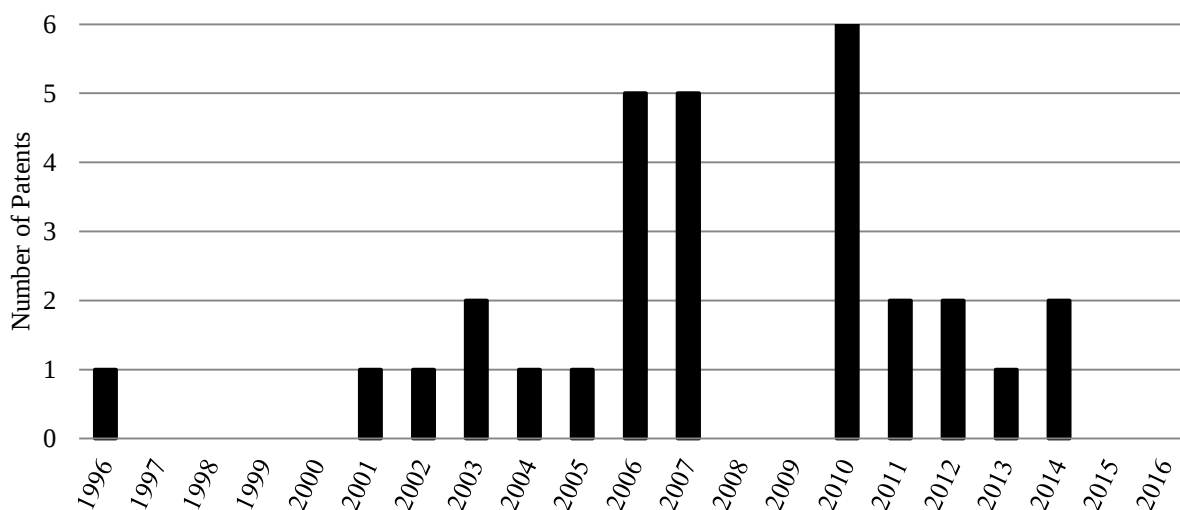
holders of patents are Heineken Supply Chain, with 17% of documents, and the Federal University of Paraná, with 13%. Among the other institutions represented in Figure 1 as “Others” are the State University of Campinas (UNICAMP), the Federal University of Goiás (UFG), the Federal University of Pernambuco (UFPE), Federal University of Espírito Santos (UFES), and Rural Federal University of Pernambuco (UFRPE), everyone with one patent.

Figure 1. Number of patents by assignees.



The annual evolution of patent deposits was analyzed from the year of 1996 to 2016, as it can be seen in Figure 2. It is noted that the first patent deposit was in 1996 followed by a period of four years without any deposit and returning in 2011. In 2010, it was registered the biggest number of patents, and after this period there was a reduction on the number of patents. During the 2015 and 2016, there were no deposits of patents.

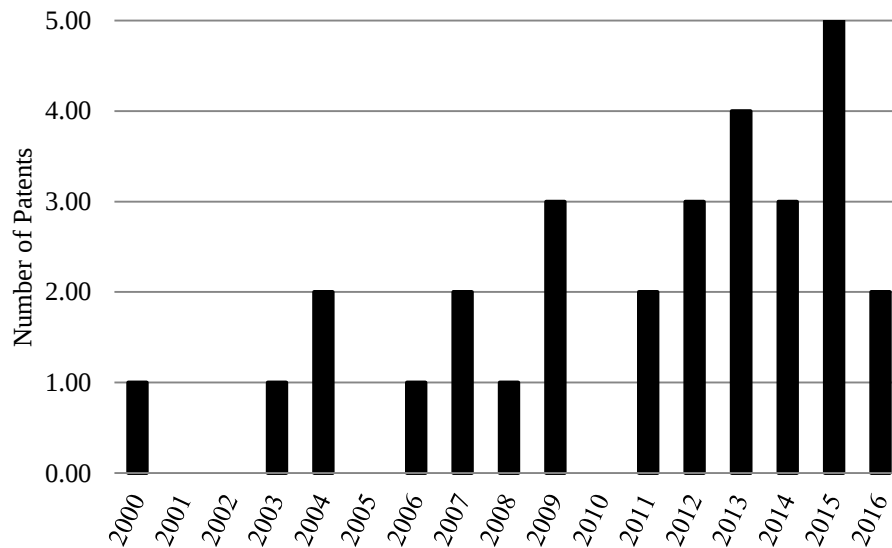
Figure 2. Number of patents by priority year.



It was performed a temporal analysis of the deposited patents by the year of publication. According to Figure 3, the first patent was published in 2000, followed by two years with no publication, and then an

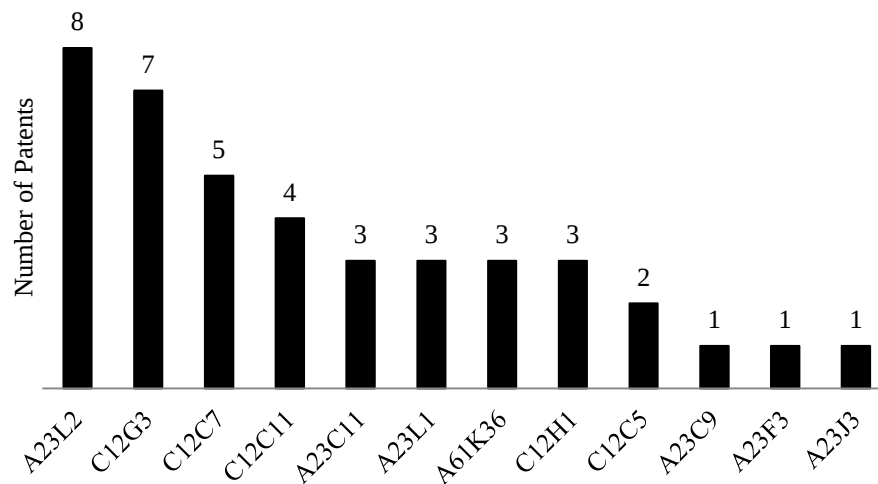
increase in the number of published patents. In 2015, there were more publications of fermented drinks in Brazil. The first deposited patent in Brazil was published after four years of international deposit being related to a process to produce alcoholic drink. The longest time to publish a patent was eight years and the shortest one year. In 2016, it was published a patent from Heineken Supply Chain and other from the Federal University of Paraná (UFPR).

Figure 3. Number of patents by publication year.



In order to better understand about the areas and applications of the deposited patents related to fermented drink in Brazil, it was conducted a distribution analysis of patents in accordance with the International Classification of Patents (ICP). The major part of the documents is in the main group A23L2 and C12G3 that are related to a production and preparation of alcoholic drinks, as it can be visualized in the Table 1. Also, it was observed a significant number of patents in the main groups C12C7 and C12C11 both referred to beer production (Table 1). These results are consistent with the production of alcoholic drink in Brazil because the country is one of the biggest producers of drinks, being the beer, the alcoholic drink consumed and produced in Brazil (CERVIERI JUNIOR, et al., 2014).

Figure 4. Number of patents by the International Classification of Patents (ICP).



It is noted that most of the patents refers to food products with processes and products related to alcoholic drinks, mainly beer, according to the patents classification (Table 1). However, there patents associated with non-alcoholic fermented drinks and its processing. Moreover, it was observed the development of new ingredients and processes that make efficient the production of fermented drinks.

TABLE I
MAIN CODES OF THE INTERNATIONAL CLASSIFICATION OF PATENTS (ICP) ASSOCIATED WITH FERMENTED DRINKS

Code	Description
A23L2	Foods, foodstuffs, or non-alcoholic beverages, not covered by subclasses A21D or A23B-A23J; their preparation or treatment, e.g. Cooking, modification of nutritive qualities, physical treatment; preservation of foods or foodstuffs, in general > Non-alcoholic beverages; Dry compositions or concentrates therefor; Their preparation
C12G3	Wine; other alcoholic beverages; preparation thereof > Preparation of other alcoholic beverages.
C12C7	Brewing of beer > Preparation of wort.
C12C11	Brewing of beer > Fermentation processes for beer.
A23C11	Dairy products, e.g. Milk, butter, cheese; milk or cheese substitutes; making thereof > milk substitutes, e.g. Coffee whitener compositions.
A23L1	Foods, foodstuffs, or non-alcoholic beverages, not covered by subclasses A21D or A23B-A23J; their preparation or treatment, e.g. Cooking, modification of nutritive qualities, physical treatment; preservation of foods or foodstuffs, in general > Foods or foodstuffs; their preparation or treatment
A61K36	Preparations for medical, dental, or toilet purposes > Medicinal preparations of undetermined constitution containing material from algae, lichens, fungi or plants, or derivatives thereof, e.g. Traditional herbal medicines
C12H1	Pasteurization, sterilization, preservation, purification, clarification, ageing of alcoholic beverages or removal of alcohol therefrom > Pasteurization, sterilization, preservation, purification, clarification, or ageing of alcoholic beverages
C12C5	Brewing of beer > Other raw materials for the preparation of beer
A23C9	Dairy products, e.g. Milk, butter, cheese; milk or cheese substitutes; making thereof > Milk preparations; milk powder or milk powder preparations
A23F3	Coffee; tea; their substitutes; manufacture, preparation, or infusion thereof > Tea; tea substitutes; preparations thereof
A23J3	Protein compositions for foodstuffs; working-up proteins for foodstuffs; phosphatide compositions for foodstuffs > Working-up of proteins for foodstuffs

IV. CONCLUSION

To conclude, it is observed that currently there are thirty patent registers associated to fermented drink. These patents are related to the development of new drinks and processes to improve the production of alcoholic drinks in Brazil which is one of the biggest producers of this kind of drinks. However, it is necessary a technological advance in this area because of the infinity of raw materials that the country has. Consequently, it would contribute to the economic development and have a highlight position in the international market.

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