RECOVERY OF HIGHER TECHNOLOGICAL ASPECTS OVERRIPE BANANAS

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Abstract: In this study overripe bananas were used in order to obtain alcoholic beverages. Originally overripe bananas were analyzed physicochemical then were subjected to alcoholic fermentation with selected yeasts (commercially available strain (*Saccharomyces cerevisiae*) and two selected strains (*Saccharomyces ellipsoideus*, *Saccharomyces oviformis*)). Fermentation was carried bananas in several versions depending on the agent environment ferment and basic medium supplemented with nutrients - bio stimulators. "Cider" banana obtained after alcoholic fermentation was distilled to obtain bioethanol. The research aimed to establish a good working alternative to obtain a maximum yield of bioconversion of carbohydrates from bananas in ethanol. [M. Garnai, Bacau, 2012]. Bioethanol obtained was analyzed physicochemical and used in order to obtain liqueurs (based on the infusion of fruit in alcohol, respectively, in sugar syrup) [M. Garnai, Bacau, 2012] and some cocktails with an alcoholic content 8% (vol.).

Introduction

The most consumed fruit in Romania are apples, bananas and citrus fruits. Banana consumption in Romania is 8-9 kilograms per capita per year, which means that each novel eat, on average, 40-45 bananas per year. So, the Romans lay 30-40% below the European average, according to a study released by American producer Dole, quoted by Reuters. [according Ziare.com].

About bananas. Banana was first mentioned in Buddhist texts 2500 years ago. This exotic fruit was called "banana" because of the shape it has. Arab merchants in the Middle Ages it was called the "finger" which in their language is called "banana". Giant Banana is a plant that grows well in tropical and subtropical environment. The first country in Europe to import banana was Greece, in ancient times. Bananas can be found in a wide variety of types, so we can find banana yellow, white, red and even pink. Bananas are called "fruit of the wise". This name comes because they contain potassium (340 mg/100g) and magnesium (the two substances protect and strengthen nerve cells, thus improving thinking, memory, intellect). Banana nutritional value of 100 g is as follows: 20 g carbohydrates, 1.2 g protein, 2.2 g fiber, 0.5 g fat, 88 calories. [http://sanatate.go.ro/alimente_salvatoare.htm]

Real "bomb" of vitamins, minerals and trace elements should not miss banana athletes or intellectuals menu daily subjected to high stress. With a high content of potassium, magnesium, calcium, iron, zinc and vitamins A, B, B6 and C, this fruit is a true fountain of health. In addition, it contains tryptophan (0.009 g/100g product), an essential amino acid (which is converted into serotonin in the body once it gets).

[http://www.tititudorancea.ro/z/produse_alimentare_continut_triptofan.pg40.htm].

Serotonin, an important neurotransmitter, is responsible for the welfare and happiness you feel. [http://www.tratamente-naturiste.ro/aminoacizi-proteine-suplimente-naturale/triptofan.htm].

Putting together all these substances clearly shows the banana is among the healthiest fruits. Bananas are a great potential as raw material for processing into food and non-food. On a scale processing existing domestic and regional craft can be a source of inspiration for the development of industrial production, comparable to those involving apples and oranges. [Thomas Happi Emaga, Food Chemistry 103 (2007)].

About overripe bananas. The overripe bananas are very ripe bananas understand that they cannot use that fruit consumption (due to impaired appearance), but shows no signs of fermentation and mold either - type 8 (see Figure 1). Synonymous with overripe bananas term has been met like rotten banana [Hassain, ABMS, 2011].

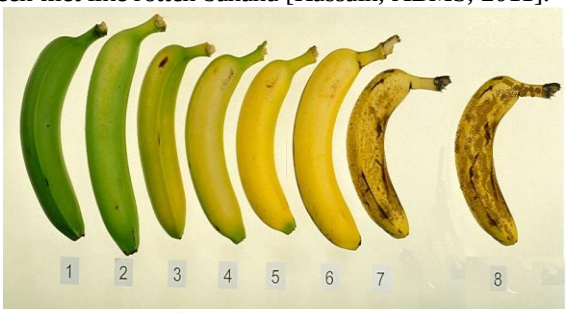

Fig. 1. Gradual ripening of bananas (1 - green banana, 8 - overripe banana)

Abundance of fruit sometimes exceeds consumption needs fresh or preserved. That's why I used the opportunity to transform banana liquor. [Guyle`ne Aurore, Food Science & Technology 20 (2009) 78 – 91].

The book is divided into three chapters following the introduction, use overripe bananas in fermentation technologies and conclusions and future trends.

Use overripe bananas fermentation technologies. Preliminary concepts.
Depending on the product of fermentation of fruit, distinguish two categories of beverages: fermented wine consumed as well-known (fructine or cider of imitation) and distilled in a distillation and the second stage known as spirits.

Both drinks can be obtained from any fruit and vegetables that contain a greater or lesser amount of sugars capable of producing alcohol by fermentation, either separately or mixed, and sometimes "helped" by the addition of sugar, glucose and other sugars, purity and concentration coefficients varying from other sources, usually industrial (raw and refined sugar, glucose syrup, and so on). [Banu C., 2009]

Cider or **cyder** is a fermented alcoholic beverage made from fruit juice, most commonly apple juice but also the juice of peaches or other fruits. Cider varies in alcohol content from 2% ABV to 8.5% or more in traditional English ciders. In some regions, such as Germany and United States, cider may be called "apple wine".

In the United States and Canada, "hard cider" usually refers to the alcoholic beverage discussed in this article, while "cider" may refer to non-alcoholic apple juice. When sugar or extra fruit has been added and a secondary fermentation increases the alcoholic strength, a cider is classified as "apple wine".

Cider may be made from any variety of apple, but certain cultivars grown solely for use in cider are known as cider apples. Cider is popular in the United Kingdom, especially in South West England and East Anglia. The United Kingdom has the highest per capita consumption of cider, as well as the largest cider-producing companies in the world,

including H. P. Bulmer, the largest. As of 2006, the UK produces 600 million liters of cider each year (130 million imperial gallons).

The beverage is also popular and traditional in some European countries as Ireland and the French regions of Brittany (*chistr*) and Normandy (*cidre*); In Spain it is especially popular in the Principality of Asturias (*sidra*) although it can also be found in the Basque Country (*sagardo*) and Galicia (*sidra*); Germany is another country where cider is drunk, above all in Rheinland-Pfalz, Hessen (Frankfurt am Main). Argentina is also a cider-producing and drinking country, especially the provinces of Río Negro and Mendoza. Australia also produces cider, particularly on the island of Tasmania, which has a strong apple-growing tradition. Pear cider is used as an alternative name for Perry by some producers. [http://en.wikipedia.org/wiki/Cider]

The word "liquor" is derived from italian liquorice (liquid). The first producer was known liqueurs doctor several popes, Arnoldus Villanovanus. Liqueurs are alcoholic beverages prepared from ethyl alcohol, sugar, fruit juices and herbal extracts and macerated fruit flavors and food dyes. Of these, water, alcohol and sugar form the "body" of the liquor itself, other ingredients used to flavor taste and olfactory (essences distilled and macerated plant or fruit).

3 types of liquor differ according to alcohol content and sugar: ordinary liquors (containing 10% sugar, of which ¾ glucose and 19-21% alcohol), fine liquors (containing 42-43% sugar and 28% alcohol) and fine liquors (containing 50% sugar and 28% alcohol).

Depending on when serving two types of liquors sold: liquors appetizer, with an alcoholic strength of 35% volume about alcohol and 10% sugar and dessert liqueurs 20-40% 20-35% volume alcohol and sugar.

Liqueurs can be obtained by different methods (of alcohol flavored by fruit flavored alcohol infusion of commercial essences). .[Banu C., 2006]

Alcohol, sugar, pasteurized at 75OC finished product and then cold preservation ensure stability and conservability liqueurs. [Banu C., 2004]

Materials and methods

Raw materials and additives used in this study are overripe bananas, yeast of the genus *Saccharomyces* used in the fermentation process (represented by a commercially available strain (*Saccharomyces cerevisiae*) and two selected strains (*Saccharomyces ellipsoideus, Saccharomyces oviformis*) by alcohol resistant and osmofil character, sugar (used to correct total sugars mash diluted with water) and supplements to stimulate alcoholic fermentation (autolysis yeast, wheat germ and tannin food).

Leaven used as fermentation medium is the mixture of: banana pulp, water and sugar, yeast alcoholic fermentation with / without supplements and stimulation of fermentation.

Bananas were analyzed in terms of their content thrive: total sugars, moisture, total protein, fat, total acidity.

Banana cider was determined in alcohol content ebulliometer method (using ebulliometer Dujardin - Salleron). Bioethanol distillation and ethyl alcohol content was determined by pycnometer method.

Results and discussion

Bananas used in the study were selected by the highest content of total sugars (13.14 g total sugars / 100 g). The research aimed to establish a good working alternative to obtain a maximum yield of bioconversion of sugars in bananas in ethanol.

15 variants were working experienced the power of fermentation was observed 3 strains of *Saccharomyces* (*S. cerevisiae, S. oviformis, S. elipsoideus*) in rich media with different substances / products (autolysed yeast, dietary tannin and wheat germ).

Overripe bananas were sorted (by moldy bananas), washed, hulled.

Banana core (pulp) was crushed with a blender, homogenized using a blender and puree bananas was obtained which was further diluted with 10% fresh water (with the same concentration in sugar like bananas) and supplemented with nutrients.

This mixture (dough) underwent alcoholic fermentation using 3 strains of yeast and then distillation.

After sorting, washing and peeling bananas we achieved an average sample of pulp of banana (cultivar "Dole" whose sugar content was 13%) which was used (in 30%) for the preparation of fermentation media more variants, which have in common the addition of water and sugar (up to 35% sugar).

Variable are the addition of nutrients - stimulators of fermentation (autolysed yeast, wheat germ and dietary tannin) and the nature of yeast used for fermentation agent: *Saccharomyces cerevisiae, Saccharomyces oviformis, Saccharomyces elipsoideus.*

Environments, distributed in fermentation vessels (glass) in the amount of one liter and fitted with fermentation valves were seeded with 10% yeast in suspension with 4 x 106 cells / ml (obtained in 24 hours at 30oC in same as the fermentation medium work).

After fermentation and clarification of evidence (ciders of bananas), to determine the content of alcohol, which in some versions oviformis Saccharomyces, Saccharomyces elipsoideus have reached the limit of 18 to 18.5% alcohol. Fermented samples were further subjected to distillation.

They recovered the first 100 ml of distillate, which was determined alcohol concentration (using pycnometry) as [Banu C., 2006., And A. Fuks, 1951] of 100 kg fruit can get between 7 to 16 liters of spirits with an alcoholic strength of 40 °, depending on the sugar content of fruit subjected to fermentation.

Conclusions and future trends

Using selected yeast strains Saccharomyces oviformis (in V2), *Saccharomyces ellipsoideus* (in V3), resulting in an alcohol content higher than V1 (with *Saccharomyces cerevisiae*).

Autolisate using yeast as nutrient enrichment environments have received greater amounts of alcohol than control samples because of autolysed yeast used amino acids as nitrogen and carbon source, and sugar work environment remained available in larger quantity for fermentation.

Can observe that using selected cultures were obtained better results in terms of alcohol content in versions with 1% yeast autolysate and 1% wheat germ.

In conclusion substances used for enriching work environment led to yields noticeably higher in alcohol than the control sample.

Conversion efficiencies of over 80% can be achieved with elipsoideus in *Saccharomyces* species variants supplemented with 1% wheat germ and 1% autolysed yeast

and species *Saccharomyces oviformis* in variants supplemented with 1% yeast autolysate, with 0.5 % autolysed yeast and wheat germ 1%.

Working variants (distillates) that registered the best results were used in further research for the preparation of alcoholic beverages such as liqueurs, cocktails.

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