

## Characterization of some flavored alcoholic beverages

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### Abstract

The aim of this study was to design and characterize some alcoholic beverages with improved sensory features by addition of flavoring agents and sugar. In this purpose, various plants mixture such as rosemary (*Rosmarinus officinalis* L.), mint (*Mentha piperita* L.), sage (*Salvia officinalis*), thyme (*Thymus vulgaris* L.), lemon balm (*Melissa officinalis* L.), elderberry flowers (*Sambucus* L.) and cinnamon (*Cinnamomum cinnamomum* L.) were used as flavoring ingredients. The macerates involved in this study were prepared using as extraction media vodka with an alcoholic degree of 40% (v/v) at a ratio dried plant: vodka of 1:25 (w/v) for a duration of 72 hours at room temperature. The caramelized sugar was used to improve the taste and the color of the developed alcoholic beverages. The flavored alcoholic beverages were analyzed in terms of sensory properties, total acidity, total dry extract and relative density. Also, the alcoholic degree was determined. The flavored alcoholic beverages are clear, with a slightly sweet taste and a color depending on the plant mixture used in their recipe. The alcoholic degree of the obtained beverages was 40% (v/v). Our results prove that the using of various alcoholic plant extracts could be recommended for improving the sensory properties of the alcoholic distilled beverages and also to obtain a wide range of varieties for this kind of products.

**Keywords:** flavored alcoholic beverages, plant mixture, spice, sensory properties, caramelized sugar

### 1. Introduction

An alcoholic beverage is any drink, other than water, that has an alcohol content of more than 1.2% alcohol by volume [1]. The ethanol is a moderately good solvent for many fatty substances and essential oils. This facilitates the use of flavoring and coloring compounds in alcoholic drinks as a taste mask, especially in distilled drinks. Flavoring is an important part of spirits. The substances used in flavoring was grouped into three categories: herbs and spices, seeds, plants and fruits. The flavors were obtained from the raw ingredients by extraction or distillation from an alcoholic solution. Some flavors may be naturally present in the beverage's raw material. In the beverage industry the quality is heavily influenced by ingredient flavor quality [2].

With the introduction, in the 1980s, of flavored alcoholic beverages (FABs), the alcohol industry has engaged in targeted marketing efforts toward young consumers [3, 4].

FABs are sweet, relatively low alcohol content beverages that are designed for "entry-level" drinkers. The beneficial influence of many foodstuffs and beverages including teas, fruits, vegetables, herbs, spices, coffee and cacao on human health has been recently recognized to originate from their antioxidant activity [3].

For the purposes of our study, we tried to prepare and characterize some alcoholic beverages with various plants mixture. These beverages was analyzed in terms of sensory properties and other parameters: total acidity, total dry extract, relative density and the alcoholic content.

### 2. Materials and methods

#### 2.1. The recipe of flavored alcoholic macerated

The recipe is quite simple: the alcoholic macerates contain a mixture of flavored plants using vodka as extraction solution in a ratio of 1:25 (w/v) for 72 hours at room temperature.

Vodka is a neutral alcoholic product mainly obtained from the fermentation and distillation of grain. In the European Union, the minimum level of alcohol standard acceptable for vodka is 37.5% (v/v) [5]. The caramelized sugar syrup was obtained from sugar and water in a ratio of 2:1 (w/v). The caramelized sugar was used to improve the taste and the color of the developed alcoholic beverages.

## 2.2. The assortments of flavored alcoholic beverages

Thus, were prepared five sample alcoholic beverages:

FAB1 - Vodka with elderberry flower;

FAB 2 - Vodka with mint, thyme and cinnamon;

FAB 3 - Vodka with cinnamon and rosemary;

FAB 4 - Vodka with sage and mint;

FAB 5 - Vodka with the lemon balm.

## 2.3. Chemical analysis

Analysis of sensory properties of FABs was investigated in this paper. The physicochemical analyses (total acidity, total dry extract by gravimetry, relative density and the alcoholic degree) were carried out in conformity with the official methods [6]. The total dry extract was determined with the densimeter at 20°C. All tests were performed in triplicate.

## 3. Results and Discussions

The sensory properties of foods (appearance, flavor, texture) are the most important reason people eat the foods [7].

Analysis of sensory properties of FABs is presented in Table 1. These properties correspond in terms of the quality of the product class to which it belongs [8, 9].

Table 1. Sensory properties of the flavored alcoholic beverages

Characteristics	FAB1	FAB2	FAB3	FAB4	FAB5
	Taste	pleasant flowery flavor with plant notes used as an extract	pleasant spicy flavor with plant mixture notes used as an extract	bitter and camphoraceous aftertaste with plant mixture notes used as an extract	strongly bitter and fragrant with plant mixture notes used as an extract
Color	pale yellow				
Smell	naturally sweet characteristic aroma	herbaceous, slightly floral and woody aroma, cooling	herbaceous, fragrant, slightly camphoraceous	herbaceous, minty and cooling	aromatic, as smell similar to lemon
Aspect	perfect clear				

Table 2. Characteristics of the flavored alcoholic beverages

Physicochemical characteristics	FAB1	FAB2	FAB3	FAB4	FAB5
Total acidity (g/L)	0.04	0.05	0.06	0.05	0.04
Total dry extract (g/100mL)	0.01	0.02	0.01	0.02	0.01
Specific gravity SG20/20	0.9481	0.9478	0.9484	0.9474	0.9481
Alcohol content (% , v/v)	41.01	41.19	40.82	41.43	41.01

Vodka it is made by distilling liquid from fermented cereal grains; is composed mainly of water and ethanol [10]. Vodka is unflavored but, many flavored vodkas have been produced for medicinal purposes by addition of red pepper, ginger, fruit flavors, vanilla and cinnamon [11]. During the maceration process are extracted from the plant material into the alcoholic base, various compounds that give a characteristic flavor and color [10].

Thus, the following FABs were obtained with characteristic plant mixture notes:

**FAB1-** a mixt of vodka and elderberry flowers.

Elderberry flowers (*Sambucus L.*) are characterized by an intense, pleasant, and characteristic aroma. With floral aroma, elderflowers are often used as flavoring agents are used to flavor wines, to make tea or fermented and nonalcoholic beverages [12].

**FAB2** - a mixt of vodka and mint, thyme and cinnamon.

The mint (*Mentha piperita L.*) taste is spicy, cool, sweet, fragrant and slightly pungent. The presence of essential oils in the leaves and other parts of the plant gives it a very appealing aroma and this is because of the presence of monoterpenoids in

essential oils from mint and different phenolic compounds. It is a popular flavor found in food [13,16]. Thyme (*Thymus vulgaris* L.) is the perfect useful herb, with warm and pungent, herbaceous, slightly floral aroma, hay-like flavor. Cinnamon (*Cinnamomum cinnamomum* L.) is used as a flavor ingredient in alcoholic and nonalcoholic beverages and other food products. The flavor is warm, spicy and aromatic [14].

**FAB3** - a mixt of vodka and cinnamon and rosemary.

Rosemary (*Rosmarinus officinalis* L.) has a characteristic cooling, pine-woody aroma with camphoraceous, minty, balsamic undertones, and a fresh, bittersweet flavor [15]. Cinnamon essential oil has a flavor a slightly woody aroma [14].

**FAB4** - a mixt of vodka and sage and mint.

The sage (*Salvia officinalis* L.) dried leaves are strongly aromatic, sweet; the taste is bitter, fragrant warm and astringent [16].

**FAB5** - a mixt of vodka and lemon balm.

The leaves of *Melissa officinalis* L. are used for their digestive, carminative, antispasmodic, sedative, analgesic, tonic and diuretic properties. The leaf of lemon balm contains flavonoids, polyphenolic compounds (rosmarinic acid, caffeic acid, and protocatechuic acid), monoterpene aldehyde, monoterpene glycosides, triterpenes, sesquiterpenes, tannins and essential oils (citral) [17], whence and the like smell to lemony aroma [16].

The experimental results regarding the physico-chemical analysis of flavored alcoholic beverages are presented in table 2 and figure 1.

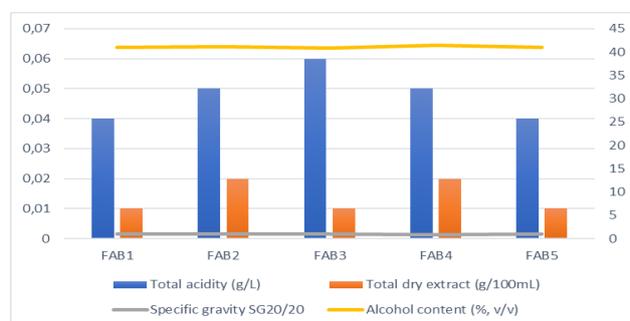


Figure 1. Characteristics of the flavored alcoholic beverages

Total acidity of the beverage was between 0.04=0.06 g/L, the higher values were observed in FAB3 (cinnamon and rosemary flavored vodka).

The values of the dry extract were similar for all the samples, the explanation coming from the fact that the aromatic alcoholic beverages content mainly of water and alcohol and, a very small percentage of plants alcoholic macerate.

The specific gravity of absolute alcohol at 20°C was determinate. No significant differences were observed in the specific gravity 20/20 of the FABs.

The ethanol content of spirits varies. Generally speaking, whisky, vodka, schnapps, rum, liqueurs and brandies contain around 40% ethanol by volume [11]. Because the extraction of macerates was done in vodka, FABs retain alcoholic strength of the raw material used, and addition of caramel sugar syrup is very small (2%, v/v) and does not influence the alcoholic strength. Alcohol content in beverages is influenced by temperature [6]; therefore, it was measured at 20-21°C and contains between 40 and 41 percentages by volume, in all five FABs samples.

#### 4. Conclusion

Vodka is refined, colorless and tasteless, while aromatic alcoholic beverages have distinctive herbal notes depending on the plant or plant mixture added. Extracted compounds are responsible for the characteristic flavor (taste, aroma) and color of the flavored alcoholic beverages. Pale yellow color of flavored alcoholic beverages is the color of caramel sugar, used as a natural pigment. No differences were observed between physicochemical characteristics values (total acidity, total dry extract, specific gravity and alcohol content) of all flavored alcoholic beverages analyzed in this study. The alcohol companies continue to introduce new products on the market because the flavored alcoholic beverages it's a delicious drink for anyone.

**Compliance with Ethics Requirements.** Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human or animal subjects (if exist) respect the specific regulation and standards.

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