

STUDIES ON THE NUTRACEUTIC PROPERTIES OF SOME NATURAL BIO STIMULATING JUICES OBTAINED FROM INDIGENOUS PLANTS AND BEE PRODUCTS

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Abstract

Plants represent an inexhaustible source of organic substances, minerals, vitamins, and antioxidants, which the human body absolutely needs. The opportunity to capitalize on some indigenous plants and bee products in natural, bio-stimulating juices results primarily from the objective itself, that of obtaining competitive nutritional-therapeutic assortments, with a healthy effect on consumers. The technology of preparing natural, bio-stimulating juices is not only relatively simple but also affordable. Also, the valorization of the by-products resulting from obtaining these bio-stimulating natural juices is another important element of economic efficiency. Taking into account their multiple sensory, nutraceutical, and economic characteristics, obtaining bio-stimulating natural juices from indigenous plants and bee products become a major imperative for improving the health status and quality of life for consumers, as well as for the practice of performing national agrotourism.

Key words: beekeeping, biostimulants, juices, nutraceuticals, plants.

INTRODUCTION

A diet healthy ensures a level of optimal energy, vitality, and health. Consumption of vegetables and fruits fresh it is one of its fundamental elements, ensuring in the same time good hydration, also. Fruit and vegetables are essential in a diet balanced, but we can't consume always them like. That's why the juice obtained through squeezing them (pressing) can ensure the need for vitamins and minerals. Natural juices one used in diets, supplements, and medicines because they have high value and are nutritious: vitamins A, B, C, E, and K, protein, fiber, and unsaturated fatty acids (Oancea, 2003; Zahiu et al., 2010).

Beehive products - honey, royal jelly, apilarnil, pollen, propolis, - each separately representing a valuable natural adjuvant - contribute to

strengthening the body, thus that their regular consumption, especially in combination (as beekeepers mixtures) supports digestion, the immune system, and slow down the aging process (Bakour et al., 2017; Yucel et al., 2016).

A functional food category it is that of fortified products (for example, fruit juices fortified with vitamins and minerals). Besides the basic nutrition impact, these mixtures have beneficial effects on one or several human body functions, improving general conditions, implicitly the physics, and subtracting the risk of developing some conditions. This one concern offers big opportunities for industry products food, there is a great transformation potential for classic food, daily consumed, in functional food (Zahiu et al., 2010; Roberfroid, 2011).

MATERIALS AND METHODS

For this study were select and analyzed 3 supplements feeding launched on the market in the period 2022-2023 in form of finished organic liquid product namely "Sea Buckthorn ecological juice" from CS Eco Catena Ltd. (Bacau), "Apifitness to go" from CS Vitaplant Ltd. (Sibiu) and "Bio Curra RO" from CS Alcos Bioprod Ltd. (Dambovita).

Sea buckthorn organic juice is obtained from sea buckthorn fruits (*Hippophae rhamnoides*) through the extraction (pressing) and pasteurization. They are used as vegetable raw material fruits harvested and frozen in max. 27 minutes from the harvesting moment. It is packaged as a 3l tetra pack (bag in box) and in tests, it is the conditioning version of 10 g. (Figures 1, 2).

Apifitness to go it's a naturally energize drink what is obtained on basis of the mixture from honey bee, raw pollen and propolis on top of which is added lemon juice, water, then it stabilizes through pasteurization, UHT or ultrasound. It is packed in 250 ml, transparent bottles; there is also the 3l bag-in-box version) (Figure 3).

Bio Curra RO contains "elixir" of black currants (obtained by adding honey to fruit, followed by fermentation and extraction of the "wine"), to which are added manna honey, manuka honey MGO500, hydroalcoholic extract of propolis, hydroalcoholic extract of *Ginkgo biloba*, hydroalcoholic extract of *Agaricus blazei murill*, hydroalcoholic extract of shiitake (*Lentinula edodes*). The product is packaged in 30 ml glass containers equipped with a spray cap, with secondary packaging in form of a folding cardboard box (Figure 4).

Compounding chemicals determination of the 3 analyzed products was realized through validated, specific methods for the following classes of compounds: *polyphenolcarboxylic acids* (spectro-photometrically, by color reaction with sodium phosphotungstate at $\lambda = 660$ nm, express in caffeic acid), *flavones derivates* (spectrophotometrically, through color reaction with aluminum chloride at $\lambda = 430$ nm, express in routine and *carotenoids* (spectrophotometrically, by direct reading of the benzenes extracts at $\lambda = 460$ nm, express in β -carotene). HPLC determinations for

polyphenolcarboxylic acids, flavones, and carotenoids were performed with a Dionex HPLC device (with diode area 200-600 nm, column: RP8 Lichrosorb, mobile phase A = methanol, B = phosphoric acid 0.01 M aq, in gradient).

Determination of *acids fat* has been realized through chromatography in the gaseous phase after derivatization to methyls esters (transesterification with methyl alcohol and potassium hydroxide), using a Shimadzu GS+MS chromatograph (with QP 5,000 mass spectrometer detector, $\varnothing = 0.25$ mm column, $l=30$ mm, 20macrogolsrogol stationary phase and bearer helium gas).

For *the antioxidants activity* determination was applied the peroxidation lipids pattern from guinea pig homogenate brain, in the presence of ascorbic acid, following lipid peroxidation inhibition reaction through measuring malon - dialdehyde results (color reaction with thiobarbituric acid, spectrophotometric at $\lambda = 532$ nm).

"SOD-like" enzyme determinations are based on the redox system: methylene blue with tetramethylethylenediamine, by color reaction with the nitro blue tetrazolium reagent (NTB), at the absorbance through the formazan formed is read this spectrophotometrically at $\lambda = 560$ nm.

RESULTS AND DISCUSSIONS

Organic sea buckthorn juice, because it is obtained from the fruit harvested and frozen quickly, remains tasty and aromatic. Extraction method follow my pasteurization it's a modern procedure, what ensures a maximum of bioactive substances in the obtained extract. (Tables 1, 2, 3 and Figures 1, 2).

Table 1. Chemical composition of *organic sea buckthorn juice*

| Vitamins and minerals | Content |
|---------------------------|---------------------|
| Potassium | 2204 mg/kg |
| Vitamin A | 1.6 mg/100 g |
| Vitamin E | 19 μ g/100 g |
| Vitamin C (Ascorbic acid) | 1960 mg/kg |
| Vitamin B3 | 2.30 mg/kg |
| Vitamin B12 | 0.073 μ g/100 g |
| Vitamin B9 | 43 μ g/100 g |
| Vitamin B1 | 0.03 mg/kg |
| Calcium | 33.80 mg/kg |

Result juice has orange color, with a reddish tinge (thanks carotenoids in the composition, what pigmenting the fruits).

Sea buckthorn ecological juice has a consistency fluid, it is reddish-yellow in color and the taste is little bit sour-acid, orange.

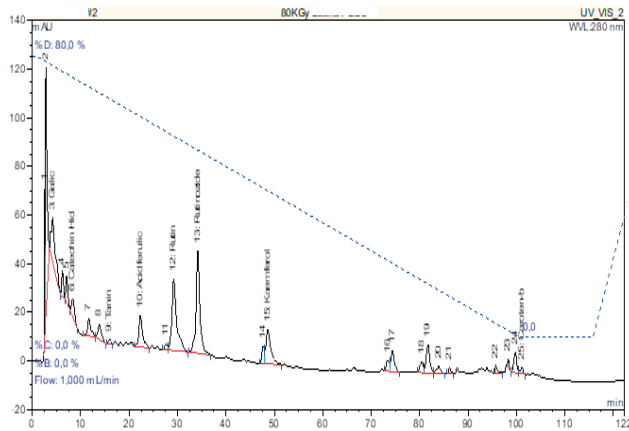
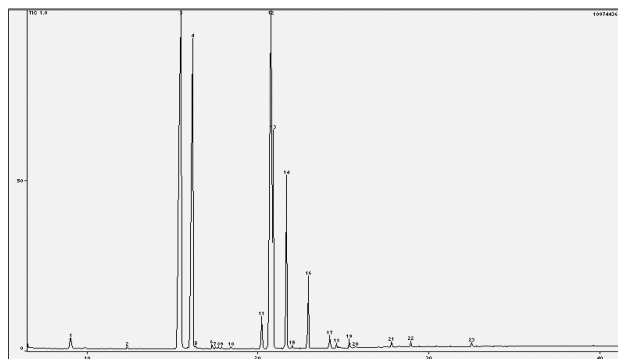


Figure 1. HPLC chromatogram for *Organic buckthorn juice*

Chromatogram enables identification of polyphenolcarboxylic acids (*gallic acid, coumaric acid, ferulic acid, tannins*), of derivatives flavonoids (*rutin, rutoside, kaempferol*), of derivatives carotenoids (*β carotene*).



| | | |
|-------------------------|---------------------|-----------------------------|
| 1 - needle. myristic | 11 - ac. oleic | 16 - ac. peanut |
| 3 - needle. palmitic | 12 - ac. cisvacenic | 19 - ac. behenic |
| 4 - needle. palmitoleic | 13 - ac. linoleic | 20 - ac. tricoesaenoic acid |
| 10 - ac. stearic | 15 - ac. linolenic | |

Figure 2. Chromatography in the gaseous phase for acids fats from *organic sea buckthorn juice*

Table 2. The content main acid fats content from *organic sea buckthorn juice*

| palmitic | palmitoleic | oleic | cisvacenic | linoleic | linolenic |
|----------|-------------|-------|------------|----------|-----------|
| 34.10 | 21.14 | 23.63 | 8.01 | 6.54 | 2.26 |

Table 3. Nutritional information *Organic sea buckthorn juice*

| Characteristics/ 100 ml | UM | Results ml | RDZ g/ 100 ml | Res % |
|-------------------------|--------------|------------|---------------|-------|
| Value Power | kcal/ 100 ml | 50 | 2000 | 2.5 |
| protein | % | 0.55 | 50 | 1.1 |
| lipid | % | 1.63 | 70 | 2.3 |
| total carbohydrates | % | 8 | 260 | 3.1 |

The product can consume as such, but the manufacturer recommends consuming 50 ml of organic sea buckthorn juice with a glass of 200 ml of water (Figures 3, 4).



Figure 3. *Organic buckthorn juice* in a 3 l package



Figure 4. *Organic sea buckthorn juice* in test packaging (10 g)

Apifitness to go offers all the nutritional benefits of the apiculture products from which it is created, being a natural source of vegetable protein, essentials amino acids, digestive enzymes, essentials fatty acids, vitamins, minerals, essential probiotics and prebiotics, trace elements, and antioxidants (Table 4).

Being a natural product, it should be consumed within a maximum of 8 hours after opening.

It is recommended both athletes as well active people interested in a healthy diet because

regularly consumed grow resistance to physical and mental effort, reduces oxidative stress at the cellular level, generates muscle tissue, regulates the appetite, supports digestion, stimulates the metabolic processes, he claims and protects the intestinal flora (Figures 5, 6).

Table 4. Information nutritional *Apifitness to go*

| Characteristics/ 100 ml | UM | Test method | Results |
|--------------------------|-------------|--------------------|---------|
| Value Power | Kcal/ 100 g | Reg. EU 1169/2011 | 364 |
| Value Power | kJ/100 g | Reg. EU 1169/2011 | 1546 |
| PROTEIN | % | Method Kjeldahl | 2.10 |
| Lipids of which: | % | Soxhlet extraction | 0.12 |
| - acids fatty saturated | % | GC-MS | 0.04 |
| Carbohydrates from which | % | Reg. EU 1169/2011 | 88.55 |
| - sugars | % | Method Schoorl mod | 75.62 |



Figure 5. *Apifitness to go* 3l packaging



Figure 6. *Apifitness to go* in a 250 ml bottle

Bio Curra RO it is organoleptically presented as an intense purple liquid with a characteristic smell and sweet taste. It is certified as an

organic natural supplement that contains a combination based of ingredients like blueberries - (elixir), manna honey, manuka honey MGO500, propolis, *Ginkgo biloba* and mushroom extracts: mushroom of God (*Agaricus blazei murill*), shiitake (*Lentinula edodes*) (Tables 5, 6, 7).

Table 5. Physicochemical characteristics - blueberries elixir

| Characteristics | Admissibility conditions |
|--|--------------------------|
| Appearance | Liquid clear |
| Color | red - brown |
| Dose and uniformity of dose for oral drops | Conf. point 4.3. |
| Relative density d_{20}^{20} | 0.980 - 0.999 |
| Content in the ethanol, % m/m, min. | 8.0 |
| Sugars identification | positive |
| Volume released ml, min. | 50 |

Table 6. Microbiological characteristics - blueberries elixir

| Total number of viable aerobic microorganisms: | Results |
|--|-----------------|
| - bacteria/ml max. | 1×10^3 |
| - fungi/ml max | 1×10^2 |
| - <i>Escherichia coli</i> /ml | absent |

Table 7. Physical and chemical features, *Bio Curra RO*

| Characteristics/1000 ml | UM | Results Mr |
|-------------------------|-------------------|------------|
| Alcohol strength | % vol | 11.98 |
| Glucose + fructose | g/l | 256.00 |
| Total acidity | g/l tartaric acid | 18.15 |
| Volatil acidity | g/l acetic acid | 0.55 |
| Relative density | at 20C | 1.10 |
| Total dry extract | g/l | 307.70 |
| Nonreducing dry extract | g/l | 47.70 |
| Total sugars | g/l | 260.00 |
| Glucose | g/l | 101.00 |
| pH | | 3.03 |
| Free sulfur dioxide | mg/l | 17.50 |
| Total sulfur dioxide | mg/l | 82.50 |

These ingredients provide a rich vital life mixture in antioxidants, vitamins, minerals, and active substances supporting health generous and vitality, strengthening the immune system, improving digestion and circulation, and growing resistance to infections.

Bio Curra RO is also rich in resveratrol, a powerful antioxidant with anti-inflammatory properties, which improves heart health, protects brain cells and offers anti-aging benefits (Figure 7).



Figure 7. Bio Curra RO in secondary a packaging

CONCLUSIONS

In the base the saying "*nature was the first pharmacy*" and the consideration that the juices well prepared natural juices are true "*liquids fruit*", in measure in which human life it is tight bound, indispensable even, by fruit consumption, results that and fruit juices obtained from valuable raw materials must to submit same value.

In addition, let's not forget about food for children, where the juices replace almost entirely the whole fruit and this method influences them the consumption behavior.

The natural juices benefits are, in principle, the same as those of the raw materials from which its are prepared. In this study case, the effect is perfectly potentiated nutritional and sanogen of some raw materials and procession naturally extremely valuable sea buckthorn juice, honey, raw pollen, propolis, lemon juice, water, black blueberries "elixir" (obtained through adding honey over currants, followed by fermentation and the extraction of "wine"), to which it is added manna honey, manuka honey, propolis hydroalcoholic extract, *Ginkgo biloba* hydroalcoholic extract, *Agaricus blaze murill* hydroalcoholic extract, hydroalcoholic extract of shiitake (*Lentinula edodes*) - all the ingredients, the technological process, implicitly the finished products, being organics.

Thus, the selected products from the Romanian profile market - analyzed, and notified as bio dietary supplements - ensure intake of minerals, vitamins, and antioxidants with an important reduction effect on reactive oxygen species (ROS - free radicals); contributes to the health of the cardiovascular system; modulates the immune system; help the digestive system; its have a role in the body detoxification.

The opportunity of fruit and bee products capitalization in the nutraceutical juices results in the first row from the objective to prepare some nutritional- therapeutically competitive finished products, of which sanogenic effect at the population level is salutary; how the nation-state of health is a major imperative, this goal must be realized on anything repent and with everything cost. The elements of economic efficiency and sanogenetics in the production of natural juices are the following:

- the raw material is relatively cheap;
- fruits intended for the preparation of juices can be fresh or frozen;
- the technology of preparing natural juices from fruits is relatively simple and accessible;
- the valorization of the by-products resulting in obtaining natural juices from fruits and vegetables represents a stimulating element of efficiency, in the context of the circular bio-economy.

The collected waste at the end of the production process still contains a large amount of antioxidant compounds, so it can be used in other production processes (obtaining animal feed premixes, bio-compost), thus being included in another value category (sub-product), applying the principles of the circular economy.

The present analysis aims to highlight the opportunities and challenges generated by the European Ecological (Green) Pact aimed at the sustainable development of agriculture, with an emphasis on the possibilities of capitalizing on local plant and beekeeping resources by applying good practice models of cultivation, harvesting, conservation and processing.

From a commercial point of view, sea buckthorn processors (the pharmaceutical, juice and cosmetic industries) add great value to the quality of Romanian sea buckthorn and blueberries, our country being able to become a pole of regional development in the field of

production and processing ecological fruit, as well as the beekeeper's products.

Efficient management in agricultural holdings, investments and sustainable management of natural resources represent the premises of structural changes in agriculture and the agricultural industry, with an emphasis on competitiveness agri-food products.

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