# STUDIES ON IMPROVING THE QUALITY OF BAKERY PRODUCTS BY ADDING CHOKEBERRY FRUITS (ARONIA MELANOCARPA)

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RESEARCH ARTICLE

**Abstract**

*Aronia Berry or Black Chokeberry, Aronia Melanocarpa (Michx.) Elliott (Rosaceae), is a native shrub in North America, from which fresh fruits are not usually consumed directly, due to their bitter taste. However, these berries are used in food and industry drinks for the production of juices, syrups, jams, fruit teas, fermented products and wine and are also used in dietary supplements. The purpose of this work was to emphasize the possibility to use the fruits of fresh aronia, fruits dried by the aronia and powder of aronia for enriching some bakery product, more precisely bread. For this purpose, the breads with the aronia have been characterized in terms of height, porosity, elasticity, humidity and acidity.*

**Keywords**: (max. 5) Aronia Berry, bread, physico-chemical, properties
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## INTRODUCTION

Aronia Berry or Black Chokeberry, Aronia Melanocarpa (Michx.) Elliott (Rosaceae), is a native shrub in North America, from which fresh fruits are not usually consumed directly, due to their bitter taste. However, these berries are used in food and industry drinks for the production of juices, syrups, jams, fruit teas, fermented products and wine and are also used in dietary supplements (Sidor et all, 2019. Yang et all. 2021)

The berries have polyphenols and nutrients that promote human health (Kahramanoglu, 2017).

Phytochemical investigations have shown that Aronia Melanocarpa are an abundant source of polyphenols, including procyanidines, anthocyanins, phenolic acids, with considerable antioxidant activity and a remarkable coloring potential ( Yang, 2021, Jurendic, 2021, Naman 2015)

Among the polyphenols present in Aronia, Quercetina is the most powerful antioxidant among monomeric phenolic compounds, followed by cianiidol-glucoside and chlorogenic acid (Toli´c, M.T, 2018). Anthocyanins, flavonols and hydroxycinamic acids contribute with approximately 59.4% of the total antioxidant activity of the aronia without involving a possible synergism/antagonism between individual antioxidants (Kim, D.W. 2021). About proanthocyanidins, the main antioxidants of the fruits of Aronia (Denev, P, 2012). Bushmeleva et al., showed that anthocyanins in aronia fruit show a pronounced reduction and antiradical activity, which exceeds the corresponding indices of other polyphenols and vitamin C (Bushmeleva, K 2021).

The contention of the major bioactive components of the aronia grains is relatively high, from 10 mg to 5500 mg to 100 g of dried fruits, including procyanidine, cyanidine-3-o-galactosid, chlorogenic can be more than 5% of dried fruits. The high concentrations of these bioactive compounds not only contribute to the biological effects observed for the fruits of aronia, but also for the discovery of the therapeutic potential in this part of the plant (Sidor et all, 2019. Yang et all. 2021, Jurendic, 2021).

Aronia fruits, due to their high content of biologically active compounds, have a wide range of pharmacological effects, such as pronounced antioxidant activity and therapeutic benefits: gastoprotective, hepatoprotective, cardioprotective, antiproliferative and antiinflammatory [9], antidiabetic, antiinfectious, antimutagenic activities, cytotoxic, radioprotective and immunomodulatory effects (Kokotkiewicz, A, 2010)

Antioxidants are important in supporting human health, due to their ability to inhibit free radicals that damage normal cells. Thus, antioxidant effects could be valuable in alleviating other conditions resulting from oxidative stress, including cancer, infection, heart disease and diabetes. In this regard, abundant phenolic compounds and other natural compounds in Aronia grains that have a strong antioxidant activity could be a support in improving human health (Sun, Z.-M, 2017).

Unlike climacteric fruits, the fruits of aronia are non-climatic and harvested at full maturity, because they will not continue to ripen. However, because they are fully harveted, fresh beans have a short shelf life due to high breathing rate, water loss and decomposition sensitivity and damage. Thus, post-harvest storage changes change the composition of berries, including, pH, acidity, polyphenol, vitamins and minerals (Diaconeasa, Z, 2018).

Thus, the purpose of this work was to emphasize the possibility to use the fruits of fresh aronia, fruits dried by the aronia and powder of aronia for enriching some bakery product, more precisely bread. For this purpose, the breads with the aronia have been characterized in terms of height, porosity, elasticity, humidity and acidity.

## MATERIAL AND METHOD

Aronia fruits were used as an addition to bread, both in the form of fresh cut fruits, but also dried fruits or even in powder form. The physico-chemical, sensory and functional properties of bread with the following additions were studied: fresh and dried pomelo (Reshmi et al., 2017), pears, apples and dates (Bchir et al., 2014), apple powder (Lauková et al. al., 2016), chestnut flour (Dall'Asta et al., 2013; Moreira et al., 2014), banana flour (Ho et al., 2013), green coffee bean powder (Jakubczyk et al. , 2018), dry pumpkin flour (Rakcejeva et al., 2011), carob seed flour (Papakonstantinou et al., 2018), etc.

Aronia fruits were obtained from the Roşia Commune area, Bihor county, and the aronia powder was made by drying the fruits in an oven with hot air ventilation (t = 60°C) and grinding them.

Reagents and laboratory utensils specific to the methods of determining the physico-chemical composition of bread.

Laboratory equipment used: oven, analytical balance with a precision of 0.0001 g.

The physico-chemical analysis of the bread included: - determination of the height, elasticity, moisture, and acidity of the core (STAS 91:2007 - "Bread, bread products and bakery specialties. Methods analysis");

## RESULTS AND DISCUSSIONS

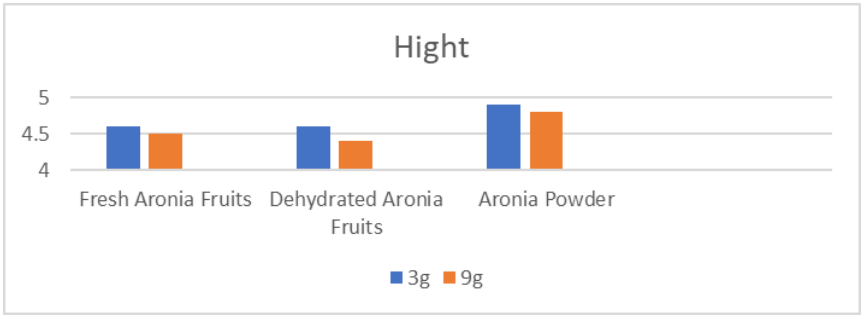
The study was carried out on six samples of bread made with 100 g of wheat flour type 650 and with the addition of 3 g, respectively 9 g of fresh chokeberry, dehydrated chokeberry and chokeberry powder. The dough was prepared by the direct method, it was divided into 6 equal parts, and before fermentation the three types of Aronia fruit presentation were added (Fresh fruits - fpa, dehydrated fruits - fda and chokeberry powder - pa). They were placed in trays of the same size and baked in an electric oven at 170 0C. After cooling to room temperature, the loaves were subjected to physical-chemical analyses. Thus humidity (%), acidity (degrees of acidity), dimensions (height, mm), porosity (%) and core elasticity (%) were determined ( Table 1).

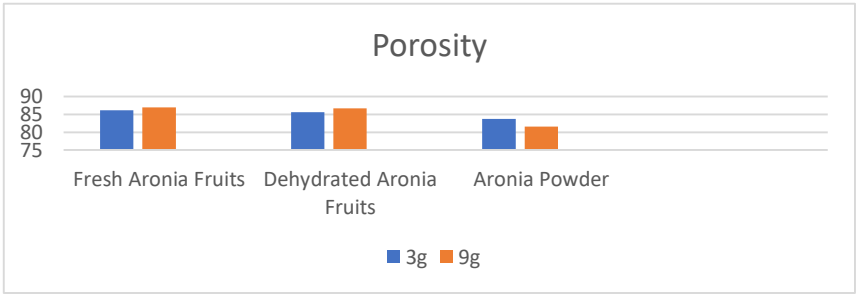
In fig. 1 shows section images of the breads obtained.

Table 1 Physico-chemical properties of bread with the addition of ARONIA

| ADDITION | HEIGHT | | POROSITY | | ELASTICITY | | ACIDITY | | HUMIDITY | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3 g | 9 g | 3 g | 9 g | 3 g | 9 g | 3 g | 9 g | 3 g | 9 g |
| Fresh Aronia fruits (fpa) | (cm) | | (%) | | (%) | | (degrees of acidity) | | (%) | |
| | 4,6 | 4,5 | 86,25 | 86,94 | 89,15 | 88,73 | 2,1 | 2,2 | 40,56 | 41,39 |
| Dehydrated Aronia fruits (fda) | 4,6 | 4,4 | 85,64 | 86,72 | 89,28 | 87,94 | 2,1 | 2,2 | 39,85 | 40,24 |
| Aronia powder (pa) | 4,9 | 4,8 | 83,75 | 81,58 | 88,61 | 87,25 | 2 | 2,1 | 39,24 | 39,89 |

Figure 1. Sectional images of the obtained bread



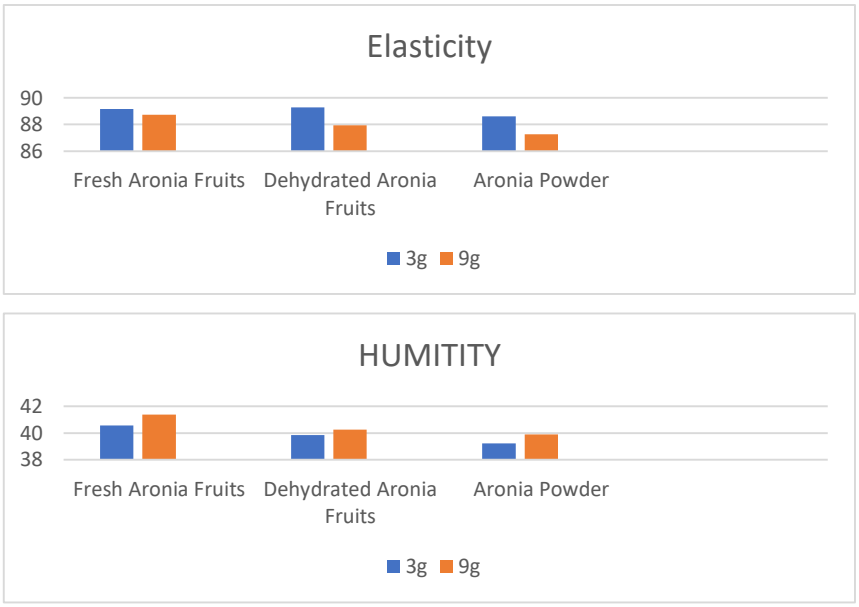



Figure 2 **The influence of the addition of fresh, dried and powdered aronia fruits on the dimensions of the bread**

The height of the bread is higher in the samples with powder, and within the same type of addition, as the concentration increases, the height decreases (Figure 2).

The porosity is lower in the samples of bread with chokeberry powder, and the porosity is higher in the case of fresh fruits.

Correlating the data obtained for porosity with the images shown in fig, for bread in section, it can be seen that the pores are small, in general, and their distribution is uniform, with a few exceptions of larger pores, located near the crust of the bread. This means that the kneading was efficient and favored the inclusion of sufficient air in the dough so that, after the consumption of oxygen in the oxidation reactions, small nitrogen pores remain in it, as nuclei in which the carbon dioxide resulting from fermentation can accumulate (Cauvain, 2015).

Moisture and elasticity have the same tendency, so bread with the addition of fresh aronia fruit has higher values than in the case of bread with the addition of aronia powder.

The elasticity of the bread core is its property to return to its initial shape, after the cessation of the action of the pressing force. It depends on the quality and quantity of the gluten in the flour and the freshness of the product (Bordei, 2007)

The acidity values have no significant differences, varying between 2.00 and 2.20 degrees of acidity

## CONCLUSIONS

In conclusion, the bread with the addition of chokeberry in the form of fruit, dried fruit and powder presented physico-chemical properties, the chokeberry fruit added to the flour being indisputable when kneading the dough. The products have low acidity, and the height, porosity, elasticity and humidity are not negatively influenced on the quality of the breads.

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