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INNOVATIVE APPROACHES TO SAUCE PRODUCTION THROUGH RAW MATERIAL PROCESSING

Sauces play an increasingly important role in modern nutrition, not only as flavor enhancers but also as carriers of valuable nutrients. Plant-based sauces, in particular, provide a wide range of biologically active compounds, including vitamins, minerals, antioxidants, and dietary fiber. These components contribute to improved digestion, support the immune system, and reduce the risk of chronic diseases [1].

Fruits, berries, and vegetables used as the basis for sauces are rich in polyphenols and flavonoids, which exhibit antioxidant and anti-inflammatory properties. Such sauces may also demonstrate choleretic, diuretic, and mild sedative effects, thereby supporting metabolic processes. Moreover, they offer a natural way to reduce the intake of artificial additives, sugar, and saturated fats often present in industrially produced condiments [3].

The inclusion of plant-based sauces in the daily diet not only diversifies meals but also increases their nutritional value, making them an essential element of a healthy and balanced lifestyle [3].

The theses examine the impact of honeysuckle and amaranth on the structural, mechanical, and organoleptic properties of finished sauces .

Previous studies have established the high nutritional value of honeysuckle and amaranth [4, 5, 6].

It has been determined that one of the distinguishing features of honeysuckle berries is their early ripening period, which makes them one of the first sources of fresh vitamins after winter. Their sweet-and-sour taste with a slight tartness creates excellent opportunities for culinary applications, particularly in the production of sauces.

In sauce technology, honeysuckle berries can be used both as the main raw material and as a natural additive to enhance flavor, aroma, and nutritional value. Their high pectin content allows for improved texture and consistency of sauces without the need for synthetic thickeners. Moreover, the natural acidity of the berries contributes to product preservation and stability.

Thus, honeysuckle berries represent a promising ingredient for the development of innovative plant-based sauces with functional properties, meeting the growing demand for healthy and natural food products.

As for amaranth, in sauce technology it is valuable because it enriches the product with high-quality plant proteins, essential amino acids, and dietary fiber. Amaranth is also a source of squalene, vitamins, and minerals, which contribute to antioxidant protection, support cardiovascular health, and improve metabolism. The incorporation of amaranth into sauces not only enhances their nutritional profile but also provides a functional component that meets modern consumer demand for healthy and natural food products.

The incorporation of honeysuckle and amaranth into sauces not only increases their nutritional value but also creates functional products that align with modern consumer demand for healthy, natural, and innovative foods.

Previous studies indicate that both honeysuckle berries and amaranth possess significant potential for use in sauce technology. Honeysuckle is notable for its high content of anthocyanins, vitamin C, organic acids, and pectins, which provide antioxidant activity, improve product stability, and enhance functional properties. Amaranth, in turn, is a valuable source of high-quality plant proteins, essential amino acids, dietary fiber, squalene, and minerals that contribute to improved metabolism and overall health benefits.

The combination of these plant-based raw materials offers an opportunity to develop innovative sauces with enhanced nutritional value and functional characteristics. Such formulations align with current consumer trends toward natural, health-promoting, and technologically advanced food products.

In sauce production, apples and honeysuckle were incorporated as purees, prepared by sieving blanched fruits. To substantiate the inclusion of amaranth flour in sauces, its physicochemical properties were evaluated in comparison with corn

starch. The results indicate that amaranth flour contains higher levels of minerals and protein, as well as dietary fiber, compared to corn starch [3].

The effect of a composite combination of apple and honeysuckle purees with amaranth flour on the structural and mechanical properties of sauces was investigated. An apple sauce prepared with corn starch was used as the control (Figure 1).

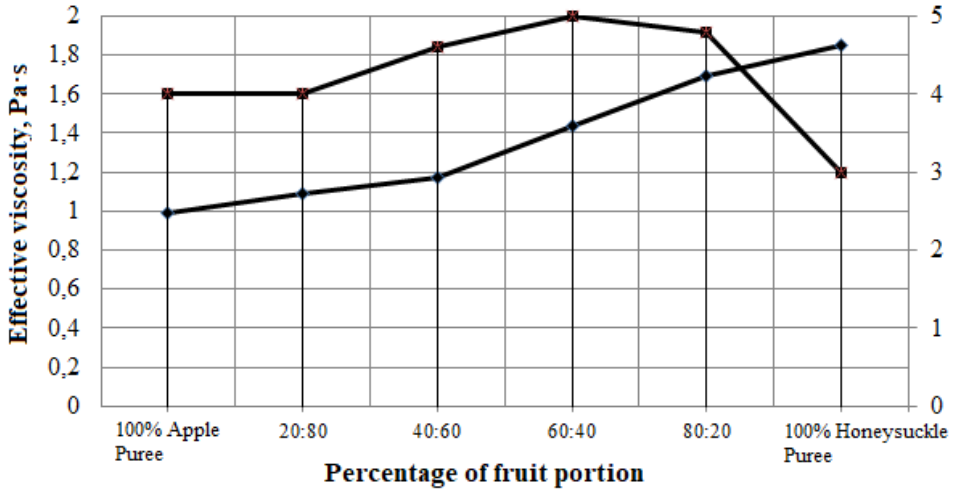
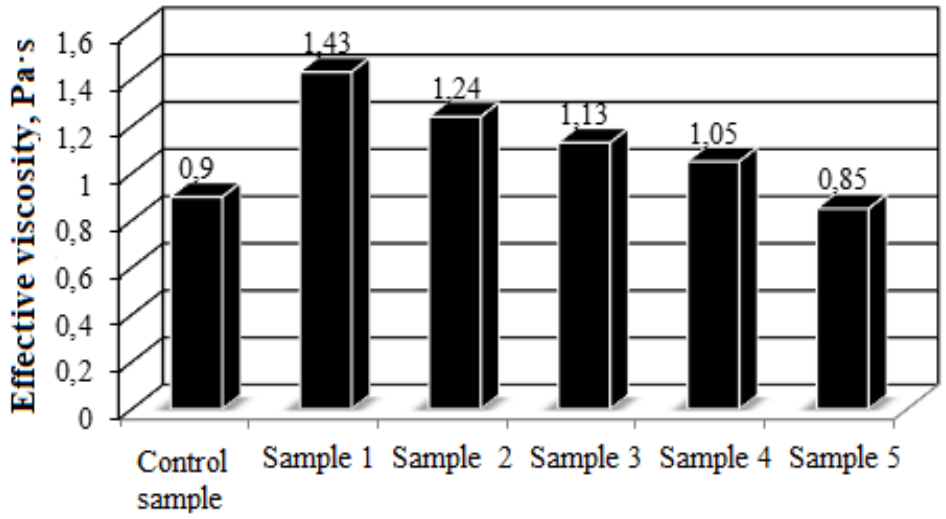


Fig. 1. **Effect of Plant Component Ratios on Sauce Quality Parameters**



Samples 1 to 5 with varying amounts of amaranth flour, from 100% to 0% content, in 20% intervals

Fig. 2. **Effect of amount of amaranth flour**

The results of the study confirm that, in terms of structural, mechanical, and organoleptic properties, the optimal formulation is a composition containing honeysuckle and apple purees in a 60:40 ratio when using corn flour.

The results of the sensory evaluation confirm that, with this compositional combination, the sauce exhibited a harmonious taste, characterized by a slight acidity and a subtle honeysuckle aftertaste.

At the next stage of the study, corn starch was replaced with amaranth flour.

It was confirmed that replacing corn starch with amaranth flour resulted in a thicker and more viscous sauce. Therefore, a study was conducted to reduce the amount of amaranth flour and replace it with a composite fruit mixture. The assessment was based on changes in apparent viscosity.

The resulting graphs (Figure 2) indicate that reducing the amount of amaranth flour by 25% improves the structural and mechanical properties of the sauce, whereas further reduction has an adverse effect.

Further research on sauces made with the new plant-based raw materials will focus on a comprehensive study of their chemical composition and biochemical indicators, microbiological stability, and the impact of technological parameters on product quality, as well as the evaluation of functional properties and health benefits, which will help ensure product safety and extended shelf life, while also enhancing consumer appeal and market competitiveness.

Thus, the initial stages of the study justified the feasibility of using honeysuckle puree and amaranth flour in sauce formulations due to their organic acid content and their potential as starch substitutes.

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