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Rose Hips, a Valuable Source of Antioxidants to Improve Gingerbread Characteristics

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Abstract: The present study analyzes the complex of bioactive compounds from rose hips pulp powder (RHP) obtained after separating the seeds from *Rosa canina* L. in order to obtain the oil. The extract prepared from RHP was characterized in terms of the total content of polyphenols, flavonoids, cinnamic acids, flavonols, carotenoids, but also the content of individual polyphenols and carotenoids, antioxidant activity, and CIELab color parameters. The effects of some salts, potentially present in foods, and pH variations were examined to predict possible interactions that could occur when adding rosehip pulp as a food component. The results turned out to be a high content of polyphenols, carotenoids and antioxidant activity. The main phenolic components are procyanidin B1, chlorogenic acid, epicatechin, procyanidin B2, gallic acid, salicylic acid, and catechin. The carotenoid complex includes all-*trans*-β-carotene, all-*trans*-lycopene, zeaxanthin, α-cryptoxanthin, β-cryptoxanthin, rubixanthin, *cis*-β-carotene, *cis*-γ-carotene and *cis*-lycopene. The addition of $CaCl_2$ and NaCl to the RHP extract reduced the antioxidant activity and the strong acidic environment (pH to 2.5) decreased the antioxidant activity by 29%. The addition of rose hip powder to gingerbread has improved its general characteristics, and increased its antioxidant activity and microbiological stability, the effects of 4% RHP being the most important.

Keywords: *Rosa canina* L.; antioxidant activity; phenolic compounds; carotenoids; bioactive compounds; natural compounds; food

1. Introduction

Publications specialized in the analysis of the food industry report that currently Europe is "the fastest growing market for food colorings, driven by natural and organic products" [1]. Even though synthetic colors still outsell natural ones around the globe, Europe is the largest regional market and thus dictates the trends. The increasing consumer appeal for natural ingredients is expected to raise the demand for natural food dyes in the next few years. Furthermore, extracts obtained from well-known foodstuffs are popular with manufacturers because they are considered ingredients and not additives, and do not require an E number, which scares many consumers [1].

Driven by the consumer demand, companies in the United States of America are also starting to look at natural colorants. Natural food dyes are required in the production of dairy products,