Studies on the Preparation of Spirulina Wines and Their Antioxidative Properties

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ABSTRACT

This thesis can be divided into three parts. In the first part, Spirulina tinctures were prepared by soaking Spirulina powder in ethanol solutions of different concentrations. The optimum soaking concentration and soaking time were studied by sensory evaluation and the analysis of the yields of some functional components in the tinctures. In the second part, fermented Spirulina wines were prepared using a commercial yeast product (Red Star Distiller ’ s Active Dry Yeast) as the experimental yeast strain, and the optimum conditions including the amount of Spirulina powder and the fermentation time were studied. Sensory evaluations of the fermented Spirulina tinctures were also conducted. In the third part, Spirulina red wines were prepared by mixing the fermented Spirulina tinctures with red wines in different proportion. The optimum compounding ratio of the Spirulina tinctures and the red wine were studied. The antioxidant ability of Spirulina red wines were compared in this thesis. Volatile compounds of the Spirulina wine, red wine, and the Spirulina red wine were also compared. The results in this thesis showed that using 12.5% ethanol to extract Spirulina powder for 12 hour was an acceptable method to prepare Spirulina tincture from the view point of the yields of some of the functional components including the total chlorophyll, the carotenoid and the phycocyanin. The fermented Spirulina wine and the Spirulina tincture were used to prepare Spirulina liquor of 40 % ethanol content. Spirulina liquor prepared by mixing one part of Spirulina liquor made from fermented Spirulina wine and two parts of Spirulina liquor made from Spirulina tincture was more acceptable than that from 100 % fermented Spirulina wine or that from 100 % Spirulina tincture. During the fermentation of Spirulina wine Spirulina powder was found to promote the transformation of sugars and also the fermentation rate. Cabernet red wine and Merlot red wine were prepared in this thesis and mixed individually with different proportion of the Spirulina wine made from 1 % Spirulina powder to prepare Spirulina red wine. It was found that the Spirulina red wine prepared by mixing one part of Spirulina wine and four parts of Merlot red wine was most preferred. In the antioxidant ability determination tests, it was found that Spirulina wine had good DPPH radical scavenging activity and that red wine promote both of the DPPH radical scavenging activity and the ferrous chelating ability of the Spirulina wine. The major volatile compounds found in the Spirulina wine, Cabernet wine, and Black Queen wine were isopropyl alcohol, 1-propanol, isobutyl alcohol, isoamyl alcohol, 2,3-butanediol, 2-hydroxypropanol, 3-ethoxy-1-propanol, methionol, 2,6-dimethylcyclohexanol, phenethyl alcohol, acetic acid, hexanoic acid, octanoic acid, decanoic acid, diphenylamine-2-carboxylic acid, hexadecanoic acid, oleic acid, octadecanoic acid, ethyl acetate, isoamyl acetate, ethyl 3-hydroxybutyrate, ethyl n-caproate, ethyl 4-hydroxybutanoate, diethyl succinate, ethyl caprylate, ethyl hydrogen succinate, ethyl 3-hydroxyhexanoate, phenethyl acetate, propyl isothiocyanate, butoxyethoxyethyl acetate, ethyl stearate, ethyl palmitate, ethyl decanoate, methyl palmitate, methyl octadec-7-enoate , and methyl stearate.

Keywords : Spirulina ; Spirulina wine ; Spirulina red wine ; fermentation ; antioxidant ; volatile compound

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