Ellagic Acid and Antioxidant Content of Berry-Based Wines

Tessa L. Meyer

Department of Food Science and Human Nutrition, College of Agricultural, Consumer, and Environmental Sciences, University of Illinois at Urbana-Champaign

Introduction

Alcoholic beverages have been a part of the human diet for thousands of years. Wine, specifically, was drank by the nobility in Egypt. Before clean water was available, it was considered to be one of the safest beverages to drink (1).

Ellagic acid formation is common during wine fermentation, especially in berry-based wines. Ellagic acid is a phytochemical, or plant chemical, that is commonly found in raspberries, blackberries, strawberries, walnuts, pecans, and other foods. Ellagic acid is known to have anti-cancer properties (2).

During the processing of the berry-based wines, sediments form at the bottom of the fermentation product. These sediments are considered to be quality defects, and result in off-flavor wine. The presence of ellagic acid causes the formation of sediments during the fermentation of the berry wines. Talcott and Lee found that fermentation temperature affects the formation of ellagic acid sediments (3).

Materials and Methods

Fruit harvesting. Nineteen varieties of blueberry (Vaccinium corymbosum) and ten varieties of blackberry (Rubus fruticosus) were grown at the Dixon Springs Agricultural Center (DSAC) near Simpson, IL. Two hundred pounds of each fruit were harvested in June and early July 2010.

Fruit processing and fermentation. After harvest, berries were washed and frozen until needed. Blueberry and blackberry fruits were divided into two lots and placed into separate Rubbermaid containers. A solution of sugar (25lbs dissolved in distilled water), pectic enzyme (3 grams dissolved in distilled water), and 50 ppm SO₂ solution was added to each lot. Additionally, 1.5 g/gal of yeast and 5 g/gal of yeast nutrient was added to the solution. Potassium bicarbonate (180 grams dissolved in distilled water) was added to the blueberry lot only. Each berry lot was divided into four even batches. Batches 1 and 2 of each berry fruit was fermented at room temperature (22°C or ~72°F) at DSAC. Batches 3 and 4 of each fruit were fermented in a refrigerator at 13°C (55°F). The fruit was agitated twice daily for three weeks. Brix (i.e., sugar content) and pH were measured daily. The fruit were pressed following a rapid decrease in Brix. The resulting juice was collected and stored one gallon, glass jugs with an airlock. Juice was refrigerated at 13°C (55°F).

Objectives and Significance

The primary objectives of this research are to: (i) determine the effects of fermentation temperature on the formation of ellagic acid in berry-based wines; (ii) determine the total polyphenol content of berry-based wines; (iii) determine the sugar content of blueberries, blackberries, and the wines they produce.

The results of this study will be beneficial to wine makers, especially those of berry-based wines.

Preliminary Results

Brix (i.e., sugar) content of blueberries and blackberries for six sampling dates during fermentation.

Additional data will be collected from the fermentation products upon completion of this study in Fall 2010.

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Literature Cited

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