Determination Of Total Anthocyanin In Ohio Grown Crops

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ABSTRACT

This study was conducted to determine the total anthocyanin content in Ohio grown crops (red cabbage and maroon carrot) and compare these with high anthocyanin containing produce (purple corn, hibiscus, and purple pepper).

INTRODUCTION

The importance of natural color has been increased in the food industry due to enhanced consumer awareness of their potential health benefits from natural color compounds including anthocyanin. Even though there are many fruits and vegetables available containing high amounts of anthocyanin in the US, not many are grown in the state of Ohio. In the present study, two Ohio grown crops, possible sources of anthocyanin (red cabbage and maroon carrot) were chosen and their anthocyanin content was determined.

MATERIALS AND METHODS

Ohio grown crops red cabbage and maroon carrot (Figure 1) were obtained from the Center for Innovated Food Technology (CIFT, Tolego, OH) and compared to purple corn and hibiscus.

Each crop was extracted with pH 3 citric acid buffer and sonicated for 30 min. The extraction volume was adjusted to 80 mL with citric acid buffer.

Citric acid buffer was made by adding 1L of water into the mixture of 19.24 g or anhydrous citric acid and 1.91 g of NaOH pallets.Total anthocyanin content was measured by spectrometric method. An aliquot supernatant from each sample was properly diluted into a spectrometric linear range for anthocyanins (Abs 0.8 – 1.2). The proper dilution factor varied depending on the samples and the range was from 4 to 6. Two aliquots of 0.5mL of properly diluted stock solution with pH 3.0 citric acid buffer were added to test tubes containing 4.5mL of pH 1.0 and pH 4.5 buffers and they were thoroughly mixed by vortex for 10 sec. After staying for 20 min at room temperature, each solution was measured at 520nm and 700nm against blanks of pH 1.0 and 4.5 buffers. Total anthocyanin calculation was calculated by

Total anthocyanin (mg/L) = (A/a) X MW X 1000 X DF

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Where: A = adjusted absorbance = $(A_{520}-A_{700})$buffer 1.0 – $(A_{520}-A_{700})$buffer 4.5, 1000 = molar to ppm, DF = dilution factor

RESULTS AND DISCUSSION

According to total anthocyanin content determined by the spectrometric assay, the highest level was in hibiscus based on wet weight and highest in red cabbage based on dry weight (Table 1).

When samples were dried, colors in the red cabbage and maroon carrot disappeared indication anthocyanin in these crops were highly unstable. Anthocyanin in purple corn and hibiscus was stable even after heat drying.

Since red cabbage and maroon carrot contain the anthocyanins which are unstable from heat and they contain very high amount of water, it would be a problem when processing.

It seems that maroon carrot contains some degrading enzymes such as polyphenol oxidase. During processing, the color was quickly degraded.

Table 1. Percent moisture, total anthocyanin based on wet and dry weight, and color intensity of 5 horticultural crops.

	1. red cabbage	**2. maroon carrot**	**3. purple corn**	**4. hibiscus**
Moisture	90.94 %	88.89 %	≈ 5 %	≈ 5 %
Total anthocyanin wet weight	593.79 mg/Kg	55.51 mg/Kg	5573.06 mg/Kg	5995.54 mg/Kg
Total anthocyanin dry weight	6556.45 mg/Kg	499.81 mg/Kg	5866.38 mg/Kg	6311.09 mg/Kg
Color at 0.3 °Brix	127	63	617	576

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Figure 1. Red cabbage (above) and maroon carrot (bottom) before and after cut.

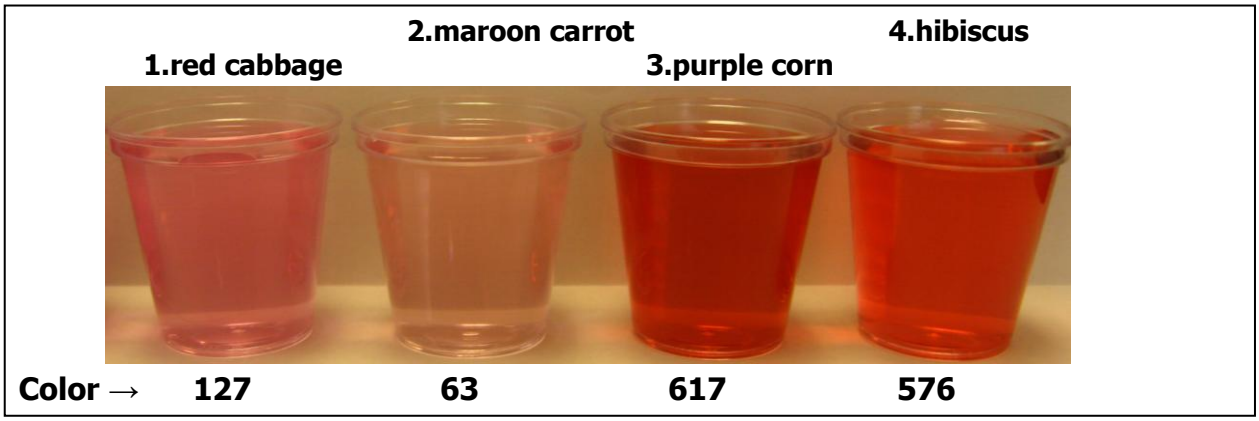

Figure 2. Color comparison of purple pepper leaf, red cabbage, maroon carrot, purple corn, and hibiscus at 0.3 °Brix.

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