INTRODUCTION
Color is an identifying characteristic of food products. In the recent years, consumers have been demanding more colorful foods derived from plant materials, such as fruits and vegetables. Therefore, research efforts on anthocyanins (ACN) have increased. Applying light treatment to acylated ACN is a novel way to modulate its color expression, without external addition of stabilizing compounds. Specifically, photoisomerization of ACN, acylating group from trans- to cis-configuration leads to an expansion of their color expression.

AIM
Our objective was to investigate the impact of different light sources on the production of rare ACN pigments with enhanced performance.

METHOD
Anthocyanin Extraction:
- Pigment extraction using acetone/chloroform (1:2)

Sample Purification:
- Solid phase extraction for semi-purification
- Preparation of samples in specific conditions

Light Treatments:
- Irradiation with sunlight, light box, and UV chamber at 365 nm

RESULTS

Figure 1. Greatest conversion from trans → cis was observed after 72 hours when acylated delphinidin was exposed to the sunlight. The % total pigment degradation was much greater than the % photoconversion.

Figure 2. Greatest conversion from trans → cis was observed after 8.5 hours when acylated delphinidin was exposed to irradiation from the light box, which consisted of LED lamp against sunlight, tungsten, and fluorescent lamp.

Figure 3. trans → cis-Delphinidin isomerization was negligible. The total pigment content decreased immediately with UV treatment, most likely due to the concentration of light dissipation inside the chamber. Longer time points need to be tested.

Figure 4. HPLC chromatogram of the isolated di-acylated cyanidin (control) and light treatment and the production of a new peak from 45 mm of irradiation with 264 nm UV chamber. This suggests that photoisomerization occurs with di-acylated ACN.

Figure 5. Spectral distribution of cis- and trans-isomers in acidic, neutral, and alkaline pH (left) and color expression of delphinidin (Dp-3-cou-5-glu) and p-coumaric acid (right) from pH 1 – pH 9 (left to right)

CONCLUSIONS
Light box (D65, tungsten, and fluorescent lamp) produced greatest conversion with minimal total pigment degradation when the semi-purified extract was irradiated for 3.5 hours.

Sunlight generated maximal conversion at 73 hrs with minimal degradation at 13 hrs. Overall, sunlight produced considerable ACN degradation due to its long irradiation time with negligible photoisomerization.

UV chamber irradiation at 365 nm produced negligible conversion with pigment degradation by half. This suggests that longer irradiation times must be tested.

In pH 4, cis-acylated delphinidin expressed color, whereas its trans-isomer bleached.

Diacylated ACN could also form a cis-isomer from its initial trans-configuration. Further studies must be done to determine the likeliness of photoisomerization based on type of acylating group and position.

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REFERENCES