CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)

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Project Number

S0520

Project Title

Optimal Chromatography Conditions and Antioxidant Activity in Blackberries

Abstract

Objectives/Goals

The experimental objective is to determine the optimal chromatography conditions for separating flavanoids in blackberries so that spectral analyses and an antioxidant activity assay can be performed. The project objective is to ultimately compile a collection of labs, procedures, and experiments for students of different education levels so that they can learn about multiple aspects of chromatography that are not discussed in current chromatography labs and be educated on nutritional aspects of foods in particular antioxidant activity in blackberries.

Methods/Materials

Using three common classroom methods (paper, thin layer, and column), blackberry extract prepared and extracted using various solvents, multiple trials were conducted under regulated conditions. The chromatograms were compared to each other using the Rf (Retention Factor) value. The separated flavanoids were then eluted off of the stationary phase back into solution to perform the spectral analyses and iron-reducing Ferrozine assay.

Results

Paper chromatography using a 20% methanol-water solution and blackberries extracted in acetone yielded the best results of the common classroom solvents tested. Column chromatography was too cumbersome to set up efficiently in the classroom and did not yield sufficient separation for further analyses. Thin layer chromatography did not provide the distinct separation that the paper did. The ferrozine assay colormetrically showed that the purple flavanoid in blackberries gave the most antioxidant activity. The spectral analyses showed that the brown flavanoid provided the absorbance at visible range and the purple flavanoid provided the absorbance at the near ultraviolet/visible range.

Conclusions/Discussion

My results are one of the many steps that will be going into achieving my ultimate objective because in completing these trials using the several methods, several procedures and labs were developed as well as extensive research that can be organized into hands-on, educational activities. This project is important to the academic community because school is where most young scientists develop their inspiration and hands-on work in the classroom on labs that teach multiple aspects of chemistry and health provide students with a diverse medley of skills and knowledge.

Summary Statement

Using common classroom chromatography methods and materials, optimize chromatography conditions so that a compilation of educational labs and materials using a variety of analytical methods can be developed for the academic community.

Help Received

Pauline Lee, PhD from the Scripps Research Institute (helped centrifuge extracts)