Analysis of glycolipids in vegetable lecithin with HPLC-ELSD

Mai Tuyet Nguyen¹, Mike De Vrieze², Davy Van de Walle¹, Vera Van Hoed³, Frédéric Lynen², Koen Dewettinck¹

¹Ghent University, Faculty of Bioscience Engineering, Department of Food Safety and Food Quality, Laboratory of Food Technology and Engineering (FTE). 9000 Gent, Belgium
²Ghent University, Faculty of Science, Department of Organic Chemistry, Separation Science Group, 9000 Gent, Belgium
³Puratos Group, Industrialaan 26, Zone Maalbeek, 1702 Groot-Bijgaarden, Belgium

Abstract
Vegetable lecithins play an important role in the microstructural and macroscopic properties of food and cosmetic products. They are widely used as a natural emulsifier. As lecithin is a by-product of the vegetable oil refining industry, its composition is quite variable and rather complex. Therefore, a more complete view on the chemical composition of lecithin would assist in elucidating its functionality. This study focused on the separation and quantification of several glycolipid classes in lecithin, namely (1) digalactosyldiacylglycerol (DGDG) and monogalactosyldiacylglycerol (MGDG), (2) steryl glucosides, (3) esterified steryl glucosides and (4) cerebrosides, using HPLC-ELSD. MGDG was not detected in soy lecithin.

Keywords: lecithin; glycolipids; HPLC-ELSD

Introduction
Vegetable lecithin is known for its powerful emulsifying characteristics. This functionality is mainly due to its polar lipid content. Polar lipids comprise of phospholipids and glycolipids. There is a lot of research on phospholipids, however, there is not much data for glycolipids, especially their specific functionality. The molecular structures of the four main glycolipid groups in vegetable lecithins are shown. This study will help to quantify the glycolipid composition in vegetable lecithin, which could help to explain the emulsifying behaviour of lecithin.

Material and Method

- Lecithin powder was prepared by precipitation of raw lecithin in acetone (2g lecithin/85mL saturated acetone)
- HPLC Waters 2690
- Alltech® 3300 ELSD: 65°C, 1.7L N₂/min
- Column: YMC-Pack Diol Silica column, 250x4.6mm, 5μm, 120Å
- Flow rate: 1ml/min. Injection volume: 25μl
- Gradient elution
  Solvent A: Hexane + 0.5% acid acetic
  Solvent B: Dichloromethane/Isopropanol 50/50 + 0.5% acid acetic

Results

Conclusion
With this method, it is possible to quantify the four major glycolipids in lecithin both in liquid and deoiled powder form.