*Chemistry of Natural Compounds, Vol. 41, No. 5, 2005*

# GLYCOLIPIDS FROM LEAVES OF *Eminium Lehmanii*

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*The quantitative composition of glycolipids from leaves of* Eminium Lehmanii *(Araceae) was established. It was shown that the predominant glycolipids were monogalactosyldiglycerides and digalactosyldiglycerides. The fatty-acid compositions of six glycolipids, of which digalactosyldiglycerides and sterylglycoside esters contained greater than 70% linoleic acid, were determined by GC. The main carbohydrate component of the leaf glycolipids was galactose.*

**Key words:** *Eminium Lehmanii*, Araceae, glycolipids, fatty acids, carbohydrates.

Glycolipids (GL) are the principal classes of plant leaf lipids and structural components of cell membranes.

It is known [1-3] that monogalactosyldiglycerides, digalactosyldiglycerides, and other polar lipids potentiate the activity of the photosynthetic apparatus, form its structure, and participate in the formation of polyene fatty acids.

In continuation of research on leaf lipids from *Eminium Lehmanii* (Araceae) [4], we isolated the GL fraction (42.1%) of the total lipids and separated it using preparative TLC and system 1 into six pure components: sulfolipids (SL), digalactosyldiglycerides (DGDG), cerebrosides (CB), sterylglycosides (SG), monogalactosyldiglycerides (MGDG), and sterylglycoside esters (SGE). The homogeneity of the isolated fractions was monitored by analytical TLC. Components were identified using $R_f$ values [5, 6].

The quantitative compositions of pure glycolipids were determined from the content of galactose produced by hydrolysis as before [7]. The GL molecular weights used were [8]: SL (837.5), DGDG (936.5), CB (722), SG (576), MGDG (774.4), and SGE (836) (Table 1).

It can be seen that the principal glycolipids of *E. Lehmanii* leaves are MGDG (50.4%) and DGDG (20.3%).

It has been noted [1, 9] that MGDG also dominate in leaves of spinach and mint. GL of cabbage leaves are rich in CB (31.7%) [10]; lettuce and dock [11], DGDG (31.4-24.6%). A significant amount of SG was observed in glycolipids of mulberry leaves [12].

Table 2 lists the fatty-acid compositions of separate GL classes as determined by GLC. It can be seen that saturated fatty acids are represented by a series of 10:0-20:0 homologs, primarily even numbered ones; unsaturated, by three isologs with 18 C atoms. The total unsaturated acids dominated in all GL classes except MGDG. The principal one in SGE and DGDG was 18:3; in MGDG, 18:1. The content of these two acids was practically the same in SL and CB. Saturated acids dominated in MGDG as the 16:0 and 18:0 acids. Palmitic acid dominated over other saturated acids in all GL classes. The carbohydrate components of the GL were determined after acid hydrolysis by TLC on silica gel using $CHCl_3$:$CH_3OH$:$NH_4OH$ (25%) (100:40:7) [13]. One spot with $R_f$ 0.66, corresponding to galactose, was observed.

TABLE 1. GL Composition of *E. Lehmanii* Leaves

| Glycolipid | Mass % | Glycolipid | Mass % |
|---|---|---|---|
| Sulfolipids | 13.0 | Sterylglycosides | 4.3 |
| Digalactosyldiglycerides | 20.3 | Monogalactosyldiglycerides | 50.4 |
| Cerebrosides | 5.2 | Sterylglycoside esters | 6.8 |

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0009-3130/05/4105-0499 

TABLE 2. Fatty-Acid Composition of Glycolipids from *E. Lehmanii* Leaves, GC, %

| Acid | SL | DGDG | CB | MGDG | SGE |
|---|---|---|---|---|---|
| 10:0 | 0.3 | - | 0.3 | - | - |
| 12:0 | 0.2 | 0.2 | 0.2 | 1.0 | 0.5 |
| 14:0 | 0.9 | 0.5 | 2.8 | 1.9 | 1.2 |
| 15:0 | 0.6 | - | 0.4 | 0.7 | 0.9 |
| 16:0 | 28.8 | 15.4 | 26.7 | 40.1 | 11.9 |
| 17:0 | 1.4 | 1.2 | 1.4 | 1.4 | 1.2 |
| 18:0 | 13.9 | 2.9 | 11.7 | 16.2 | 3.1 |
| 18:1 | 21.4 | 3.4 | 21.9 | 27.2 | 5.3 |
| 18:2 | 4.5 | 2.7 | 11.0 | 6.6 | 3.3 |
| 18:3 | 26.7 | 73.7 | 21.8 | 4.9 | 72.6 |
| 20:0 | 1.3 | Tr. | 1.8 | - | - |
| $\Sigma_{sat.}$ | 47.7 | 20.2 | 45.3 | 61.3 | 18.8 |
| $\Sigma_{unsat.}$ | 52.6 | 79.8 | 54.7 | 38.7 | 81.2 |

## EXPERIMENTAL

GC of fatty-acid methyl esters was carried out as before [12].

Fresh leaves of *E. Lehmanii* were extracted with $CHCl_3$:$CH_3OH$ (1:1, v/v) at a 3:1 solvent:leaf mass ratio at 20°C [14]. The filtrate was separated after mixing for 10 min. The leaves were treated three times with the same solvent mixture. The combined extract was treated with water until $CHCl_3$ and $CH_3OH$:$H_2O$ phases separated. The $CHCl_3$ was evaporated in a rotary evaporator. Non-lipid components were removed from the solid using $CaCl_2$ (0.04%). The total lipids were separated by column chromatography [12].

Mild alkaline deacylation of GL was performed using KOH in $CH_3OH$ (10%) for 60 min at 50°C.

GL were hydrolyzed by $H_2SO_4$ (1 N) on a boiling-water bath for 1 h. The aqueous part of the hydrolysate was analyzed colorimetrically on KFK with anthrone reagent.

GL were developed using $I_2$ vapor, $\alpha$-naphthol in $CH_3OH$:$H_2O$ (1:1, v/v, 1%), and $H_2SO_4$ (50%); carbohydrates, *o*-toluidenesalicylate solution in alcohol.

Plants were collected in May 2005.

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