Chemistry of Natural Compounds, Vol. 36, No. 2, 2000

LIPIDS FROM BARK OF *Quercus robur* AND PROCESSING WASTES

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UDC 547.915.663

We studied lipids from oak bark and its processing wastes in order to investigate the plant material in more depth.

Quercus robur (Fagaceae) is indigenous to all regions of Europe and the Caucuses [1]. Bark extract is used to tan leather and in folk medicine as an astringent and to cure gum diseases [2].

Extraction of proanthocyanidines from oak bark by aqueous alcohol produces an intermediate resinous waste and finally a solid waste (grist) [3]. These contain a significant amount of biologically active substances. The literature indicates that oak bark contains triterpenes and sterols [2].

The total lipids were extracted from the resinous waste by $CHCl_3$; from the bark and grist, by the Folch method [4]. Accompanying nonlipid components were removed by washing the extract with $CaCl_2$ (0.05%) solution. The lipid content in the bark, resin, and grist was 3.5, 6.7, and 2.6%, respectively.

TLC on silica gel separated the total lipids into neutral and polar fractions [5]. It was found that the content of polar lipids with pigments was 63.5%; of neutral in the oak bark, 36.5%; in the resin, 53.5 and 46.5%, in the grist, 59.9 and 40.1%. Analytical TLC on silica gel using hexane—diethylether (9:1, 8:2, 6:4) and development of the bands with 50% aqueous H_2SO_4 and in I_2 vapors identified in the neutral lipids hydrocarbons, fatty-acid esters, triterpenols, sterols, and triterpene acids. The compositions of the neutral lipids in the bark and the two processing wastes are qualitatively identical.

Sterolglycoside esters, mono and digalactosyldiglycerides, sterolglycosides, cerebrosides, and sulfolipids were identified in the glycolipids of all samples [TLC, $CHCl_3$—$(CH_3)_2CO$—CH_3OH—CH_3CO_2H—H_2O, 60:20:10:10:3, α-naphthol development].

The composition of the phospholipids was not determined owing to the high pigment content.

The total fatty acids were isolated after base hydrolysis [6] of the total lipids of the studied samples. Their composition was determined using GLC (%):

Lipids	14:0	16:0	18:1	18:2	18:3	Σ_{sat}	Σ_{unsat}
Oak bark	4.6	52.9	17.8	21.9	2.5	57.8	42.2
Grist	6.7	76.3	7.2	7.4	2.4	83.0	17.0
Resin	4.4	48.8	23.2	22.1	1.5	53.2	46.8

The principal acids are 16:0, 18:1, and 18:2. The ratios of octadecenoic and octadecadienoic acids in the wastes are almost identical. Lipids of the solid typically have a high degree of saturation whereas the contents of saturated and unsaturated acids in lipids of oak bark and resin differ little.

Thus, the data indicate that resinous wastes are very rich in lipids, which contain such biologically active components as fatty acid esters and high-molecular-weight alcohols, triterpenols, sterols, triterpenic acids, and unsaturated fatty acids.

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