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CARBOHYDRATES AND LIPIDS OF *Pleurotus ostreatus*

M. A. Khodzhaeva, I. Tolibaev, K. S. Mukhamedova, and M. T. Turakhozhaev

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The composition of the fruiting body of Pleurotus ostreatus *has been studied. The total neutral lipids and phospholipids have been isolated. In the neutral lipids, free fatty acids, triacylglycerols, and sterol and triterpenol esters predominated. In the phospholipids, the main components were phosphatidylethanolamines and phosphatidylserines. The qualitative compositions of the sugars and the pectin are given.*

The oyster mushroom *Pleurotus ostreatus* Kumm. belongs to the basidiomycete group and grows on stumps, deadwood, and logs in the south-eastern region of Central Asia [1, 2]. The food value of this edible fungus gathered in Tashkent province is due to its high contents of protein (20.39%), lipids (18.5%), water-soluble carbohydrates (2.7%), pectin substances (0.5%), and trace elements (6.0%) : P (2.0%), S, K, Na, Ca, Mg, Fe, Cu, and Zn (in percentages on the weight of the air-dry raw material) [3].

We have studied the lipids of *P. ostreatus*. The lipids were extracted with chloroform–methanol (2:1) from the fruiting body of the fungus that had first been dried and ground. The yield of extract was 8.5% on the weight of the dry fungus. By column chromatography on silica gel we obtained the neutral lipids (NLs) and phospholipids (PLs). Individual classes of the NLs and PLs were also obtained with the aid of CC followed by preparative separation of narrow fractions by TLC.

In the NLs, in comparison with models, we identified carbohydrates, carotenoids, fatty alcohols, sterols, pigments, sterol and triterpenol esters, triacylglycerols, and free fatty acids (FFAs). The last three classes of lipids predominated.

According to the results of ATLC in solvent system 3 and 4, the total PLs consisted of seven components (Table 1), the main ones quantitatively being phosphatidylethanolamines (PEs), phosphatidylcholines (PCs), and phosphatidylserines (PSs) The total fatty acid compositions of the acyl-containing classes of lipids that had been separated are given in Table 1.

It can be seen from the Table 1 that the lipid complex of *P. ostreatus* includes fatty acids of the even series from 12:0 to 18:3. The dominating acids among the saturated species are the 16:0 and 18:0, and among the saturated species the 18:1 and 18:2. The fractions of sterol and triterpenol esters, and also the FFAs, were enriched with the 12:0 and 14:0 acids. The N-acyl-PE and lyso-PC fractions proved to be the most saturated.

The carbohydrate composition of the alcohol-soluble fraction of the carbohydrates of the fruiting body of *P. ostreatus* was represented by glucose, fructose, sucrose, and a trisaccharide with R_{fsae} 0.65 (PC, system 5 [sic]).

The products of the hydrolysis of the pectin substances consisted of galacturonic acid, lactose, and glucose (PC, system 5). The galacturonic acid was only feebly methoxylated, a determination of methoxylated groups showing only a trace amount of them.

EXPERIMENTAL

The lipid classes were separated and homogeneous fractions were monitored by CC and TLC. For TLC we used Silufol and silica gel 5/40 μl from Chemapol (Czechoslovakia). The spots of the NLs were revealed with iodine vapor and by spraying

Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (3712) 89 14 75. Translated from Khimiya Prirodnykh Soedinenii, No. 3, pp. 362-364, May-June, 1995. Original article submitted June 20, 1994.

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TABLE 1. Fatty-Acid Compositions of the Total and Individual Classes of Neutral and Phospholipids from *Pleurotus ostreatus*

Class of Lipids	12:0	14:0	16:0	16:1	18:0	18:1	18:2	18:3	Σ_{is} / Σ_{us}	Σ_{s} / Σ_{unsat}
Total NLs	1.7	2.2	31.0	1.1	5.5	20.5	38.0	Tr.	40.4	59.6
Sterol and triterpenol – esters	8.4	9.5	31.0	8.7	9.3	14.2	17.2	1.7	58.2	41.8
TAGs	1.6	2.0	24.6	3.2	5.0	23.0	40.6	Tr.	33.2	66.8
FFAs	9.1	9.3	41.6	11.1	9.3	17.6	2.0	–	69.3	30.7
Total PLs	1.6	3.7	16.2	2.5	6.5	62.2	7.3	–	28.0	72.0
Phosphatidylcholines	2.4	3.3	19.8	5.3	7.8	56.2	5.2	–	33.3	66.7
Phosphatidylethanol-amines	1.7	2.2	15.8	1.4	8.4	68.2	2.3	–	28.1	71.9
Phosphatidylserines	1.6	2.2	14.9	1.5	5.3	63.5	11.0	–	24.0	76.0
Phosphatidylinositols	2.2	5.5	22.4	2.1	8.0	58.3	1.5	–	38.1	61.9
Lyso-phosphatidyl-cholines	2.0	4.1	33.7	1.0	12.6	43.6	3.0	–	52.4	47.6
N-Acylated phospho-lipids	4.1	5.4	21.8	2.3	8.7	54.7	3.0	–	40.0	60.0
Phosphatidyl-glycerols	2.0	4.1	21.4	2.3	7.6	59.0	3.6	–	35.1	64.9

with 50% H_2SO_4 followed by heating until they appeared, and the phospholipids were revealed with the Dragendorff and Vas'kovskii reagents and with ninhydrin. CC was conducted on Chemapol silica gel 100/160. Solvent systems: 1) hexane–ether–acetic acid (70:30:1); 2) heptane–methyl ethyl ketone–acetic acid (43:7:1); 3) chloroform–methanol–ammonia (65:35:5) and 4) chloroform–methanol–water (65:35:5).

The total NLs and PLs, and also individual classes, were saponified as described in [4], and the sterol and triterpenol ester fraction as in [5]. GLC was conducted on a Chrom-4 instrument with a flame-ionization detector. For FAMEs we used a stainless-steel column filled with 17% of PEGS on Celite-545. Solutions were evaporated in a rotary evaporator at 40 ± 5°C. Paper chromatography was conducted on FN-7.17 paper according to [6]. The alcohol-soluble fraction of the fruiting body of *P. ostreatus* was extracted with 80% ethyl alcohol. The concentrated extracts were subjected to PC in system 5. Pectin substances were extracted by the usual method [6], and the amounts of free and methoxylated groups were determined titrimetrically [7].

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