Effect of Temperature on Lipid Composition of Fomes annosus

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Fomes annosus (Fr) Cke. causes an important root rot of conifers. It is distributed throughout the North Temperate regions of the earth (1). Numerous studies have been made on mycological and pathological aspects of this organism, but very little is known about its metabolism of lipids. Lipids are highly reduced carbon sources that serve as a reserve food basis for many plant-pathogenic fungi. This report describes the types of lipids and fatty acids found in mycelium of *F. annosus* grown at different temp.

The fungus was grown for 30 days at 20, 25, and 30 C in stationary 125-ml Erlenmeyer flasks containing 50 ml of synthetic medium (7) at pH 5. Mycelial pads were harvested and excess water was removed by blotting with dry filter paper. Lipids were extracted immediately by the procedure of Folch et al. (3) with chloroform:methanol (2:1, v/v), and the amounts present determined as solvent-free wt of the extracts. Phospholipids, monoglycerides, diglycerides, triglycerides, free fatty acids, and sterol esters were separated by thin-layer chromatography on silica gel (Adsorbosil-5, Applied Science Lab., State College, Pa.) with petroleum ether:diethyl ether:acetic acid (70:30:1.5, v/v). These various classes of lipids were identified by cochromatography with known standards.

Fatty acid methyl esters of the total lipids were prepared by refluxing with 2% solution of concentrated H_2SO_4 in methanol. The methyl esters were analyzed with a Varian Aerograph-2100 gas chromatograph equipped with flame ionization detectors. A stainless steel column (3.2 mm × 183 cm) packed with 10% diethylene glycol succinate on Chromosorb W (Applied Science Lab.) was operated isothermally at 165 C with a helium flow rate of 40 ml/min. Peaks were identified by comparison of the relative retention times of the standards and by a plot of logarithms of retention time against carbon number. Detector response studies with a known mixture of fatty acids showed that the detector response is linear with acids up to 20 carbons long with 4 double bonds, and the area as calculated by triangulation is proportional to wt. All runs were made in duplicate; the average values are given in Table 1.

TABLE 1. Mycelial wt, total lipids, and composition of fatty acids in *Fomes annosus* grown at different temp

	Temp (C)		
	20	25	30
Mycelial wt (mg)	450	530	520
Total lipids (% dry wt)	6.7	6.2	5.3
Composition of fatty acids (% by wt)			
Myristic	0.3	0.3	0.3
Palmitic	15	21	19
Palmitoleic	0.3	4.0	0.3
Stearic	30	37	46
Oleic	11	10	6
Linoleic	44	29	28
Total unsaturated fatty acid	55	43	34

The lipid content of the mycelium decreased with increasing temp of incubation (Table 1). Sterol esters and free fatty acids appeared to be the most predominant lipids present, although mono-, di-, and triglycerides also were detected. No conspicuous differences in amounts of these classes of lipids could be detected in the cultures incubated at 20, 25, and 30 C. The major fatty acids present (Table 1) were similar to those reported by Jack (6) for other fungi. Striking differences in the fatty acid composition can be seen at different temp of incubation. The most abundant fatty acid at 20 C was 18:2 (presumably linoleic); at 25 and 30 C, 18:0 (stearic acid) was predominant. The total amount of unsaturated fatty acids decreased with increasing temp of the incubation. The decrease in total unsaturated fatty acid is primarily at the expense of linoleic acid, and the increase is mainly in the stearic acid content. These changes in lipid composition with different temp of growth are similar to those reported for seed oils (2, 4, 5) and fungi (8).

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