CARBOHYDRATE COMPOSITIONS OF PREPARATIONS OF Fungal Origin*

B. A. Abilyaeva, D. A. Rakhimov, Z. R. Akhmedova, and K. D. Davranov

The fractional composition of the polysaccharides formed by some local strains of basidial fungi (Panus tigrinus, Pleurotus ostreatus, Fomes fomentarius, and Phanarechaeta chrysosporium) in a submerged medium on various plant wastes (spent cottonseed pulp and cottonplant stems) has been investigated. Water-soluble polysaccharides, pectin substances, and hemicelluloses have been isolated from the products synthesized by the fungi, and their qualitative and quantitative monosaccharide compositions have been determined.

Polysaccharides are widely used in the food and medical industries, in view of which a search is being made for new sources of them. In recent years, particular attention has been devoted to the microbial synthesis of polysaccharides. The most diverse substrates have been used as nutrient media for the microorganisms, including wastes of plant material the bulk of which consists of cellulose, hemicellulose, and lignin [1].

The leading position among microorganisms is occupied by basidial fungi, which contain hydrolytic and oxidative enzyme systems favoring the rapid growth and high penetrating capacity of the mycelium into an insoluble substrate [2]. However, problems of the growth of basidiomycetes have not yet been solved, and the conditions for the degradation of lignocellulose wastes with the aim of obtaining biologically active substances, especially carbohydrates, are still being studied.

Our task was to obtain readily water-soluble biologically active polysaccharides by the deep cultivation of fungi on lignocellulose wastes — spent cottonseed pulp (I) and cottonplant stems (II) — and to study the fractional composition of the carbohydrates.

We have studied the bioconversion of lignocellulose wastes by basidiomycetes isolated from various plant wastes and from the soils of cotton-planting regions of Uzbekistan and by the fungi Panus tigrinus UzBI-113, Pleurotus ostreatus UzBI-I105, and Fomes fomentarius UzBI-Za55, and also Phanarechaeta chrysosporium obtained from the museum of the Institute of the Biochemistry and Physiology of Microorganisms, Russian Academy of Sciences (Pushkin). The results showed that during the growth of the fungi the substrates are degraded to different extents, while the pH of the culture medium falls from 5.6-6.0 to 2.3-1.5 through the formation under the action of ligninases not only of carbohydrates but also of organic acids, including phenolcarboxylic acids and phenylacetic acid [3].

Both in the culture liquid (CL) and in a cell-free homogenate of these fungi we determined a total carbohydrate content of from 26.5 to 41.4 mg/ml (Fig. 1). According to PC and TLC it consisted of mono-, oligo-, and polysaccharides. With respect to their capacity for biosynthesizing carbohydrates, the fungi formed the following sequence: P. tigrinus > P. ostreatus > F. fomentarius > Ph. chrysosporium.


Fig. 1. Dynamics of the formation of total carbohydrates on media with spent cottonseed pulp (I) and with cottonplant stems (II). 1) ECL; 2) ICL. A) *Panus tigrinus*; B) *Pleurotus ostreatus*; C) *Fomes fomentarius*; D) *Panarechaeta chrysosporium*.