A STUDY OF THE LIGNIN OF THE COTTON PLANT

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UDC 547.621:032.11

It has been shown experimentally by alkaline nitrobenzene oxidation and cleavage with metallic sodium in liquid ammonia that the lignin of the cotton plant contains guaiacyl and syringyl structural units, and p-coumaryl units are absent [1, 3]. This hypothesis is not in agreement with the fact that the cotton plant is a representative of frutescent dicotyledonous plants for which the presence of p-coumaryl structural units is characteristic. The cotton plant and the lignins obtained from it have smaller amounts of methoxy groups than might have been expected if they comprise only the structural units mentioned above.

Continuing a detailed study of the products of the alkaline nitrobenzene oxidation of the cotton plant collected in the early vegetation stage (two cotyledonous leaves) [4], we have isolated a third aldehyde besides vanillin and syringaldehyde. It was obtained from the total product of the oxidation of 50 g of the initial material by twofold preparative chromatography on plates [gypsum–silica gel (1:13)] in the methanol–benzene (1:9) system; UV spectrum of the aldehyde in ethanol: λ_{max} 285, λ_{min} 245 nm. In an alkaline medium, the position of the maximum did not change, but a second, less intense maximum appeared in the long-wave region with λ_{max} 335 nm. In the mass spectrum of the aldehyde, the most intense peak was the molecular ion with m/e 122, and then the peaks 121 (M–1), 93 (M–CO), and 65 (M–CO–CO). This sequence of decomposition was confirmed by a metastable ion with m/e 72. The mass spectrum and UV spectrum of the aldehyde isolated coincided with those for p-hydroxybenzaldehyde [5].

The 2,4-dinitrophenylhydrazone obtained from the third aldehyde was identical with that of an authentic sample of p-hydroxybenzaldehyde.

Thus, in the lignin of the cotton plant of an early vegetation period, in addition to guaiacyl and syringyl structural units there are also p-coumaryl structural units.

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