LIPIDS OF THE LEAVES OF COTTON PLANT 175-F

S. G. Yunusova, S. D. Gusakova,
Kh. T. Mirzaazimova, A. I. Glushenkova,
S. A. Usmanov, and Yu. Ikramov

UDC 677.21:581.45:547.915

A large number of studies has been devoted to the reserve lipids of the generative organs of oil crops, including cotton [1]. The study of the lipids of the vegetative organs, which play an important functional role in the life of the plants, began comparatively recently.

Continuing an investigation of the lipids of the cotton plant, we have analyzed the cell lipids (CLs) of young leaves of the industrial wilt-resistant variety 175-F.

The leaves were collected from plants grown under artificial climate conditions [2] when the plant had reached the phase of three or four true leaves and were immediately subjected to treatment. To remove surface lipids (SLs), the samples were treated for 1 minute with hot chloroform and were then dried in air for 10-15 min and fixed with liquid nitrogen, after which the frozen samples were ground and the CLs were extracted with chloroform–methanol [3] until the tissues had been completely decolorized.

The yields of SLs and CLs were, respectively, 0.08% on the mass of the fresh tissues and 1.3% on the mass of the ground tissues.

The cell lipids were then fractionated by CC on silica gel [1] as the result of which 32.9% (on the mass of the CLs) of neutral lipids (NLs), 27.6% of phospholipids (PLs) and 39.5% of glycolipids (GLs) were isolated. It can be seen that the bulk of these CLs consisted of polar lipids (67.1%) of which the GLs made up more than half.

The following were isolated from the NLs and identified by the methods of TLC and CC, and by UV and IR spectroscopy, mass spectrometry, and qualitative reactions, and from the results of chemical transformations: alkanes, olefins, isoprenoids, fatty acid esters with fatty alcohols, triterpenols, sterols, and low-molecular-mass alcohols, plastoquinones (I), triacylglycerols, tocopherols, plastoquinones (II), polyprenols, free fatty acids, fatty alcohols, sterols, diacylglycerols, hydroxyacyldiacylglycerols, X, monoacylglycerols, and chlorophyll derivatives.

According to GLC [1], the fatty acid composition of the CLs (% on the mass of the fatty acids) was: 12:0 – tr.; 14:0 – 0.4; 16:0 – 14.1; 16:1 – 2.6; 18:0 – 0.9; 18:1 – 9.2; 18:2 – 14.9; 18:3 – 57.9.

To determine the native chlorophylls and carotenes in the initial tissue, they were isolated by the procedure of [4] and were determined quantitatively according to [5]. The chlorophylls amounted to 11.78 and the carotenes to 0.542 mg/g of moist tissue.

LITERATURE CITED

1. S. G. Yunusova, I. P. Nazarova, S. D. Gusakova, and A. I. Glushenkova, Khim. Prir. Soedin., 319 (1980).
2. Methodical Instructions for the Rapid Temperature Method for the Early Evaluation and Selection of the Cotton Plant for Resistance to Verticillium Wilt [in Russian], Ministry of Agriculture of the Uzbek SSR, Tashkent (1981).
3. M. Kates, Techniques of Lipidology, American Elsevier, New York (1972) [Russian translation, Mir, Moscow (1975), p. 74].
4. R. S. Limar' and O. V. Sakharova, Methods for the Complex Study of Photosynthesis [in Russian], No. 2 (1973), p. 260.
5. GOST [State Standard] 21802-75. Pine-Needle Chlorophyll-Carotene Paste [in Russian], Moscow (1977).

Institute of the Chemistry of Plant Substances, Uzbek SSR Academy of Sciences, Tashkent. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 285-286, March-April, 1989. Original article submitted July 5, 1988.

 0009-3130/89/2502-0250$12.50