

**PIGMENTS OF THE PLASTIDS AND FLAVONOIDS  
OF THE LEAVES OF *Carica papaya***

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The leaves of the papaya tree *Carica papaya* L. are the raw material for the isolation of alkaloid carpaine [1]. We have investigated the wastes from the production of the enzyme preparations Karipazim and Papazim, since one of the real methods of increasing the profitability of the papaya crop is the complex utilization of the leaves of this tree.

To obtain various classes of natural compounds from one volume of raw material we propose treatment by successive extraction.

The dry comminuted leaves of *Carica papaya* were exhaustively extracted with dichloroethane and then the alkaloids [2] were extracted from them and, finally, the phenolic compounds by ethanol. The yield of dichloroethane extract was 17%. The concentrated extract was treated in the appropriate manner [3, 5]. By chromatographing on a column of alumina the yellow-orange mass (sum of the carotenoids) obtained we succeeded in isolating and identifying several dominating individual carotenoids, which are shown in Table 1. Mixtures of the carotenoids that we had isolated with authentic samples gave no depression of the melting points, and in TLC on various adsorbents in various solvent systems they appeared at the levels of authentic samples of corresponding carotenoids. Analysis of the total material under investigation showed that 87.7% of it consisted of  $\beta$ -carotenoids [4-6].

An investigation of the combined washwaters obtained after the saponification of the dichloroethane extracts showed that the papaya leaves contained a mixture of chlorophylls consisting to the extent of 95% of chlorophylls a and b. On studying the mixture of chlorophylls by chromatography on a column with sucrose and starch (3:1) [4-6] we succeeded in isolating and identifying them.

TABLE 1. Carotenoids from Papaya Leaves

Carotenoid	mp, °C	Absorption maxima in various solvents, nm				
		hexane	CS <sub>2</sub>	CHCl <sub>3</sub>	C <sub>2</sub> H <sub>5</sub>	petroleum ether
$\psi$ , $\psi$ -Carotene	174—175°	446	477	456	455	446
		474	507	485	487	472
		506	519	520	522	505
$\beta$ , $\epsilon$ -Carotene	187—188°	419	466	454	448	422
		445	478	485	478	444
		475	509			473
$\beta$ , $\beta$ -Carotene	181—182°	425	450	466	426	427
		450	485	497	484	449
		477	520		484	477
$\beta$ , $\psi$ -Carotene	177—178°	431	463	446	447	435
		462	496	475	477	461
		494	534	509	510	491
$\beta$ , $\beta$ -Carotene-3-diol	168—169°	424	453	433		420
		488	483	463		452
		475	520	497		486
Violaxanthin	183—191°		440	424	427	443
			470	452	454	472
			501	482	484	

\*Violaxanthin is 5,6,5',6'-diepoxy-5,5,6,6'-tetrahydro- $\beta$ , $\beta$ -carotene-3,3'-diol.

The ethanolic extract was filtered, and the solvent was distilled off. When the extract had been concentrated to 1/6 of its initial volume a precipitate deposited in the form of a greenish yellow crystalline powder, mp 185-186°C, yield 5%, calculated on the absolutely dry raw material.

An aglycon with mp 306-307°C was obtained by acid hydrolysis; rhamnose and glucose were detected in the sugar fraction. Enzymatic hydrolysis showed the presence of rutinose.

A comparative UV analysis of the substance that we had isolated and the aglycon with standard rutin and quercetin using complex-forming and ionizing reagents showed their respective identity. Mixtures of the substance that we had isolated and its aglycon with authentic samples gave no depression of the melting points. On PC in various solvent systems, the substance we had isolated and its aglycon appeared at the levels of authentic samples of rutin and quercetin [7-9].

A comparison of the physicochemical characteristics of the substance that we had isolated with those given in the literature enabled us to consider the substance isolated as quercetin 3-rutinoside [10, 11].

Thus, quercetin 3-rutinoside (rutin) has been isolated for the first time from the leaves of the papaya tree introduced into the territory of Georgia.

The results that we have obtained from our investigation of the papaya leaves for their yield and composition of total carotenoids, chlorophylls and rutin enabled them to be recommended as an additional raw material for the production of the preparations Karotolin, Khlrorofillipt, and Rutin.

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#### ESSENTIAL OILS OF THE INFLORESCENCES AND LEAVES OF *Ziziphora brevicalyx*

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At the present time, many species of the genus *Ziziphora*, family Lamiaceae, are being investigated as drug and essential-oil plants [1-6]. The component composition of the essential oil *Z. brevicalyx* Juz.\* has not hitherto been studied.

The raw material was collected in 1986 in the environs of the village of Khandiza (Surkhandar'ya province, Uzbek SSR; southwest Pamir-Alai, spur of the Hissar range) at heights of 1550-1700 m above sea level. The essential oil was distilled from

\*At the present time, *Z. brevicalyx* Juz. has been assigned to *Z. clinopodioides* Lam. [8].