CAROTENOIDS OF THE HYBRID CITRANGE 502 AND ITS INITIAL VARIETY FORMS

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From the initial varieties of orange *Citrus sinensis* Osb. and *Poncirus trifoliata* (L). Raf we have obtained a frost-resistant hybrid giving high-quality fruit.

The pigments were extracted with petroleum ether. The resulting solution of carotenoids was saponified with an ethanolic solution of caustic soda. The extract of carotenoids, washed free from alkali and dried with anhydrous sodium sulfate, was separated initially with the aid of column chromatography and then by thin-layer chromatography. The isolated and purified carotenoids were investigated on SF-10 and Specord UV-VIS spectrometers.

The carotenoids were identified on the basis of the maxima of the absorption curves obtained in the visible part and in the ultraviolet region of the spectrum, the form of the absorption curves, the coloration of the carotenoids on the adsorbents and in solution, the positions of the zones on the chromatogram, the chromatography of mixed samples of the zones isolated with authentic carotenoids, and the performance of characteristic color reactions.

The total amount of carotenoid pigments was determined by the colorimetric method.

The positions of the carotenoids in column chromatography, their identification, and their amounts are given in Table 1.

The carotenoid complex of the peel of the fruit of the hybrid Citrange 502 includes 20 individual substances, of which 16 were identified; the carotenoid complex of the peel of the

TABLE 1

Numbers of the chromatographic zones	Carotenoids	Amount, % on the mass of the carotenoids		
		citrange	sweet orange	trifoliate orange
1	Phytoene	Tr.	Tr.	Tr.
2	Phytofluene	″	″	″
3	η-Carotene	6,8	6,0	47,3
4	α-Carotene	—	Сл.	7,2
5	Neo-α-carotene I	5,2	—	2,9
6, 10, 16, 18	Phytoene-like carotenoids (individual unidentified substances)	16,4 (4 carotenoids)	3,6 (2 carotenoids)	—
7	β-Zeacarotene	4,5	3,3	—
8	Mutatochrome	2,7	0,2	—
9	β-Apo-2-carotenal	9,1	1,9	—
11	Hydroxy-α-carotene	—	1,3	19,8
12	α-Carotene epoxide	—	—	7,6
13	β-Apo-10-carotenal	1,7	1,7	—
14	Cryptoxanthin	17,2	37,9	9,0
15	Sintaxanthin	1,4	2,1	4,5
17	Cryptoflavin	1,9	—	—
19	β-Citraurin	16,2	—	—
20	Zeaxanthin	6,9	—	—
21	Luteoxanthin	2,7	1,9	—
22	cis-Luteoxanthin	3,8	—	—
23	Auroxanthin	3,5	1,0	—
24	Trollixanthin	—	39,1	1,7
	Total, %	100	100	100

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sweet orange variety *Citrus sinensis* Osb. contain 16 substances, of which 13 were identified; and the carotenoid complex of the peel of *Poncirus trifoliata* consists of nine identified individual substances.

In the peel of each type of fruit, characteristic carotenoids predominate and these are responsible for differences in the biological value and color of the fruit. Thus, in the peel of the citrange fruit the predominating carotenoid is cryptoxanthin (17.2%); in the peel of the sweet orange cryptoxanthin (37.9%) and trollixanthin (39.1%); and in the peel of the trifoliate orange η-carotene (47.3%) and hydroxy-α-carotene (19.8%).

Of the carotenoids identified in the peel of the fruit, cryptoxanthin, η-carotene, and hydroxy-α-carotene possess vitamin activity.

COMPONENTS OF *Acroptilon repens*

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We have continued an investigation of *Acroptilon repens* (L.) DC [1]. The plant collected in the stage of full flowering on September 5, 1980 in the environs of Tashkent was extracted with 60% ethanol. Aqueous ethanol solution was extracted with chloroform, and the extract was passed through a column of silica gel.

From the first benzene eluates crystals were isolated with mp 109-110°C (ethanol), composition $C_{16}H_{13}N$, M^+ 219 (I).

With tungstosilicic acid (I) formed a voluminous precipatate having a bright blue fluorescence in UV light, R_f 0.6 [hexane—ether (4:1)].

The IR spectra of (I) showed absorption bands at 3400 cm^{-1} (active hydrogen) and 1630, 1600, and 1510 cm^{-1} (C=C bonds of an aromatic system).

A mixture with an authentic sample [2] showed that (I) was phenyl-β-naphthylamine. Subsequent benzene fractions yielded a compound (II) with mp 138-139°C, which proved to be β-sitosterol.

When the column was eluted with ether, the eluates deposited crystals of repin and acroptilin. From the same plant, by extraction with acetone and treatment with 60% ethanol and then with chloroform, an extract was obtained which was chromatographed on a colum of alumina. The combined fractions were rechromatographed on silica gel. In this way, hyrcanin, repin, acroptilin, and a lactone with mp 155-156°C (hexane—acetone) were isolated. From the results of spectral analysis and a direct comparison, the last-mentioned compound was identified as elegin [3].

Phenyl-β-napthylamine, β-sitosterol, and the lactone elegin have not previously been detected in *Acroptilon repens*.

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