We used a natural isolate of the fungus V. dahlia Khl-1,3 obtained from the cotton-plant immunity laboratory of the Division of General Genetics of the Cotton Plant of the Academy of Sciences of the TadzhSSR. The cultivation of the fungus and the isolation and identification of the pentaketide metabolites were performed by methods described previously [3, 4]. The flavonoids were added to the medium in the form of ethanolic solutions, and the corresponding amount of ethanol was added to the control.

As is well known, as the result of the inhibition of melaninogenesis in the fungi imperfecti biosynthetic precursors of this biopolymer and the products of their transformations accumulate in the culture medium [5].

The treatment of the Khl-1,3 isolate with quercetin 3-rutinoside and kaempferol 3,7-dirhamnoside separately at concentrations of 0.1-0.5 μg/ml and a subsequent chemical study of the composition of the medium led to the isolation and identification as the main pentaketide metabolite of 2,5-dihydroxy-1,4-naphthoquinone. The accumulation of this substance indicated a blockage by the flavonoids tested of the biosynthesis of melanin similar in that produced by the systemic fungicide tricyclazole (5-methyl[1.2.4]triazole]3,4-b]benzothiazole) [5]. An increase in the concentration of quercetin 3-rutinoside to 1 μg/ml and of kaempferol 3,7-dirhamnoside to 5 μg/ml was accompanied by the appearance on the culture medium of the V. dahliae isolate of 2,5,7-trihydroxy-1,4-naphthoquinone.

We are the first to have detected an effect of the action of the biologically active substances used on the biosynthesis of melanin in the fungus V. dahliae. The results obtained are of value in the study of the molecular mechanisms of the phytoimmunity of the cotton plant to verticillium wilt.

LITERATURE CITED

1. B. Makhsudova, M. Agzamova, and S. Z. Mukhamedzhanov, Khim. Prir. Soedin., 791 (1984).
2. B. Makhsudova and M. Agalikova, Khim. Prir. Soedin., 97 (1979).
3. M. C. Tokosbalides and H. D. Sisler, Pestic. Biochem. Physiol., 11, 64 (1979).
4. L. N. Ten et al., Khim. Prir. Soedin., 393 (1980).
5. C. P. Woloshuk et al., Pestic. Biochem. Physiol., 14, 256 (1980).

FLAVONOIDS OF Anaphalis velutina

M. T. Ikramov, Kh. Kh. Khalmatov, É. Kh. Batirov, and V. M. Malikov

UDC 547.972

We have studied the flavonoids of the epigeal part of Anaphalis velutina H. Krask. (family Asteraceae) collected in the perios of mass flowering close to the village of Chingan Tashkent province. The dried and comminuted raw material was extracted repeatedly with chloroform. The solvent was distilled off and the residue was chromatographed on a column of silica gel with elution by petroleum ether and petroleum ether–diethyl ether with increasing concentrations of the latter. Rechromatography of the individual fractions on a column of silica gel led to the isolation of two individual flavonoids with mp 149-150°C (I) and 99-100°C (II).

Flavonoid (I) had the composition $C_{18}H_{16}O_7$, M^+ 344 (100%), $\lambda_{max}^{ethanol}$ 278, 325, 378 nm (log ε 4.36, 4.15, 4.01); ν_{max}^{KBR} 3335 (OH), 1648 (C=O), 1621, 1597, 1568 (aromatic C=C bonds).

The PMR spectrum of (I) ($CDCl_3$) contained the signals of the protons of three methoxy groups (3.86, 3.88, and 4.03 ppm, 3 H, s, each), of a monosubstituted benzene ring (7.38-7.62 ppm, 3 H, m, H-3',4',5'; 8.13-8.36 ppm, 2 H, m, H-2',6'), and of a hydroxy group at C_3 (6.91 ppm, s).

Tashkent Pharmaceutical Institute, Institute of the Chemistry of Plant Substances, Academy of Sciences of the Uzbek SSR, Tashkent.

Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 245-246, March-April, 1986. Original article submitted September 25, 1985.

0009-3130/86/2202-0230 $12.50

© 1986 Plenum Publishing Corporation

Flavonoid (II) had the composition $C_{19}H_{18}O_7$, M^+ 358, $\lambda_{max}^{ethanol}$ 282, 317, 366 nm (log ε 4.02, 3,91, 3.66); ν_{max}^{KBr} (cm^{-1}) 3320-3370 (OH); 1654 (C=O of a γ-pyrone); 1591, 1565 aromatic C=C bonds). The mass spectrum of (II) contained the peaks of ions with m/z 358 (M^+, 78.6%), 344 (3), 343 (100), 328 (1), 223 (1.2), 211 (1), 205 (1), 87 (1.2) 145 (15.7) 129 (23.6), 115 (18.6), 105 (25.4), 97 (30) and others.

The PMR spectrum of (I) ($CDCl_3$) showed the presence in it of four methoxy groups (3.78 ppm, 3 H, s; 3.85 ppm, 6 H, s; 4.05 ppm, 3 H, s) and of a monosubstituted benzene ring (7.37-7.60 ppm, 3 H, m, H-3',4',5'; 7.98-8.23 ppm, 2 H, m, H-2',6').

It follows from the facts given above that in both compounds ring B was unsubstituted, and flavonoid (I) contained three methoxy and two hydroxy groups while (II) contained four methoxy and one hydroxy groups.

On methylation with diazomethane, (I) was converted completely into (II) and further methylation of the latter with CH_3I in the presence of potassium carbonate in acetone led to 3,5,6,7,8-pentamethoxy flavone with mp 87-88°C [1].

The facts given above show that (I) had the structure of 3,5-dihydroxy-6,7,8-trimethoxyflavone and (II) that of 5-hydroxy-3,6,7,8-tetramethoxyflavone. Flavonoid (I) has been isolated previously from two species of Helichrysum [3, 4], while (II) has been obtained semisynthetically [3], but this is the first time that it has been detected in a plant.

LITERATURE CITED

1. E. Ali, D. Bagchi, and S. C. Parkashi, Phytochemistry, 18, 356 (1979).
2. T. T. Mabry, K. R. Markham, and M. B. Thomas, The Systematic Identification of Flavonoids, Springer, New York (1970), p. 41.
3. R. Hänsel, H. Rimpler, and R. Schwarz, Tetrahedron Lett., 735 (1967).
4. R. Hänsel and B. Cubukcu, Phytochemistry, 11, 2632 (1972).

ANTHOCYANINS OF THE FLOWERS OF PLANTS OF Tulipa GENUS

É. N. Novruzov and O. V. Ibadov

UDC 574.972/73.635.2

The anthocyanins of different varieties and species of the tulip have been widely studied [1-5]. We give information on the qualitative composition and amounts of anthocyanins in tulips cultivated on the Apsheron peninsula.

The freshly gathered tulip flowers were comminuted and were homogenized with glass powder. The anthocyanins were extracted with 80% ethanol containing 1% of HCl. The combined anthocyanins so obtained were investigated by chromatography on paper (FN-16) in various solvent systems: 1) butanol–acetic acid–water (4:1:2); 2) water–acetic acid–conc. HCl (82:15:3); 3) water–acetic acid–conc. HCl (10:3:30); and 4) water–formic acid–conc. HCl (3:2:5). The chromatographic analysis showed that the largest set of anthocyanins was present in the flowers of the tulip variety Prominikas. The combined anthocyanins of the variety Prominikas were chromatographed on a column of cellulose in system 2 and were separated into mono- and diglucosides. The group of anthocyanins was separated by preparative paper chromatography in system 2, [sic]. Clearly separated zones were cut out and the anthocyanins were eluted with methanol–acetic acid–water (90:5:5). In this way we obtained five individual anthocyanins. Some of their characteristics are given below:

Substance	R_f in system 1	R_f in system 2	λ_{max} in methanol	Aglycone	Sugar residue
I	0,27	0,19	534	Delphinidin	Glucose
II	0,39	0,27	524	Cyanidine	Glucose
III	0,42	0,39	505	Pelargonidine	Glucose
IV	0,29	0,40	524	Cyanidine	2 moles glucose
V	0,31	0,44	505	Pelargonidine	2 moles glucose

V. L. Komarov Institute of Botany, Academy of Sciences of the Azerbaidzhan SSR, Baku.

Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 246, March-April, 1986. Original article submitted August 21, 1985.

0009-3130/86/2202-0231 $12.50

© 1986 Plenum Publishing Corporation