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POLYPHENOLS FROM CERTAIN FRUITING PLANTS GROWING IN UZBEKISTAN

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The qualitative and quantitative compositions of phenolic compounds from certain species of fruiting plants of the Elaeagnaceae, Rosaceae, and Rosasaceae families were studied.

Key words: phenolic compounds, Elaeagnaceae, Rosaceae, Rosasaceae.

We studied the quantitative and qualitative compositions of phenolic compounds of certain species of fruiting plants growing in the Republic of Uzbekistan. Total polyphenols from the plants were separated by the method we developed previously [1]. Qualitative reactions (ammonia vapor, 5% Na_2CO_3 solution, 1% vanillin solution in conc. HCl) showed that the isolated phenolic compounds are flavonols, catechins, and proanthocyanidins. The qualitative compositions and quantitative contents of the separate polyphenol components were studied by a combination of chromatographic and spectral methods (Table 1).

It can be seen that the qualitative composition of polyphenols within a single plant genus is identical. The quantitative content changes insignificantly. The main factor determining the polyphenol composition is the plant species. Furthermore, a slight predominance of one compound or another (without taking into account flavonols and their glycosides in leaves) is characteristic of the organs of each plant species.

EXPERIMENTAL

Plant specimens collected during fruiting in 2001 were studied.

Total polyphenols (0.2 g each) isolated from the plants by the literature method [1] were dissolved in methanol (5 mL). The methanolic solutions (0.6-0.7 mL) were placed on chromatography paper (grade "M"), dried, and chromatographed using BAW (*n*-butanol:acetic acid:water, 40:12:28) for 24 h. The chromatograms were dried. Bands of substances were marked in UV light. They were accurately cut out, ground, and saturated with aqueous methanol (85%). After 1 h the extracts were filtered through a No. 4 Schott funnel and evaporated in vacuum under a stream of N_2 to a small volume. The amounts of catechins and proanthocyanidins were determined as before [2]; flavonols, by the literature method [3]. Calibration curves for catechins and proanthocyanidins were constructed using authentic specimens [4, 5]. The calibration curve for flavonol determination was constructed using an authentic specimen of quercetin [6].

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TABLE 1. Qualitative Composition and Quantitative Content of Polyphenols from Certain Fruiting Plants

Plant	Organ	Substance content, mass % of air-dried raw material					
		C	GC	EGC	PA	Fl	Σ polyphenols
Fam. *Elaeagnaceae*							
Elaeagnus angustifolia L.	Stems	0.3	0.32	0.28	0.6	0.3	1.8
(Russian olive)	Bark	1.5	2.7	1.3	5.5	1.0	12.0
	Fruit	1.2	0.2	0.8	1.6	0.7	4.5
	Leaves	0.3	0.28	0.32	0.5	0.8	2.2
E. orientalis L.	Stems	0.12	0.17	0.1	0.35	0.16	0.9
(Trebizond date)	Bark	1.88	2.4	2.02	6.2	1.1	13.6
	Fruit	0.25	0.31	0.16	1.2	1.28	3.2
	Leaves	0.3	0.2	0.18	0.52	0.6	1.8
Fam. *Rosaceae*							
Cerasus avium L.	Leaves	0.2	0.18	0.02	0.3	0.5	1.2
(Mazzard cherry)	Stems	0.33	0.12	0.08	0.15	0.12	0.8
	Bark	2.3	2.42	1.03	2.5	1.95	10.2
C. erythrocarpa	Leaves	0.15	0.13	0.09	0.2	0.63	1.2
(Wild cherry)	Stems	0.18	0.21	0.13	0.16	0.12	0.8
	Bark	3.1	2.2	1.8	4.5	0.2	11.8
C. amygdaliflora	Leaves	0.13	0.1	0.1	0.3	0.37	1.0
(Almond-leaved cherry)	Stems	0.2	0.15	0.1	0.35	0.2	1.0
	Bark	2.6	2.2	1.4	3.5	2.1	11.8
C. tianschanica	Leaves	0.18	0.12	0.18	0.22	0.4	1.1
(Tian-Shan cherry)	Stems	0.25	0.2	0.14	0.3	0.11	1.0
	Bark	2.5	2.7	2.0	3.2	0.5	10.9
C. vulgaris	Leaves	0.17	0.1	0.08	0.2	0.2	0.75
(Sour cherry)	Stems	0.21	0.24	-	1.5	0.15	2.1
	Bark	1.8	1.5	1.3	2.2	0.6	7.4
C. verrucosa	Leaves	0.2	0.12	1.08	0.2	0.5	1.2
(Bearded cherry)	Stems	0.3	0.32	0.28	0.6	0.3	1.8
	Bark	1.72	1.4	1.38	1.6	0.3	6.4
C. mahaleb	Leaves	0.13	0.15	0.1	0.33	0.4	0.88
(Mahaleb cherry)	Stems	0.9	0.32	0.24	1.6	0.24	3.3
	Bark	1.9	0.8	1.18	1.4	0.42	5.7
Malus Kudrjaschevii	Leaves	1.4	0.55	0.2	0.15	0.7	3.0
(Kudryashev apple)	Stems	0.35	0.2	0.15	0.1	0.1	0.9
	Bark	2.3	1.4	-	1.3	0.6	5.6
M. hissarica	Leaves	1.55	0.3	0.35	0.6	1.4	4.2
(Hissar apple)	Stems	0.52	0.38	0.42	0.28	0.2	1.8
	Bark	2.56	1.58	0.3	1.56	0.7	6.2
M. anisophylla	Leaves	0.84	0.28	0.24	0.76	1.68	3.8
(Uneven-leaved apple)	Stems	0.41	0.26	-	0.3	0.11	0.9
	Bark	3.02	1.89	0.24	0.62	0.13	7.0
M. Niedzweckiana	Leaves	1.07	0.33	0.24	0.46	2.0	4.1
(Niedzweck apple)	Stems	0.3	0.12	0.08	0.2	0.5	1.2
	Bark	1.66	0.9	1.14	1.5	0.6	5.8
M. Sieversii	Leaves	0.4	0.31	0.21	0.36	2.22	3.5
(Sievers apple)	Stems	0.42	0.3	0.14	0.4	0.24	1.5
	Bark	2.0	1.04	1.2	1.56	0.8	6.6
M. tianschanica	Leaves	1.2	0.22	0.25	0.16	1.37	3.2
(Tian-Shan apple)	Stems	0.66	0.2	0.17	0.35	0.15	1.53
	Bark	2.5	0.8	0.7	1.5	0.5	6.0
M. domestica	Leaves	1.02	0.38	0.2	0.5	1.7	3.8
(Domestic apple)	Stems	0.16	0.2	0.15	0.16	0.13	0.8
	Bark	1.72	1.4	1.6	1.6	0.48	6.8
M. persicifolia	Leaves	1.0	0.3	0.25	1.0	1.4	3.95
(Peach-leaved apple)	Stems	0.6	0.1	0.3	0.4	0.2	1.6
	Bark	2.12	0.8	1.3	1.54	0.36	6.12

TABLE 1. (Continued)

Plant	Organ	Substance content, mass % of air-dried raw material					
		C	GC	EGC	PA	Fl	Σ polyphenols
Fam. *Rosasaceae*							
Prunus domestica L.	Leaves	0.05	0.12	-	0.13	0.2	0.5
(Garden plum)	Stems	0.31	0.33	0.24	0.43	0.29	1.6
	Bark	1.5	1.4	0.3	2.3	0.3	5.8
P. sagdiana	Leaves	0.05	0.33	0.02	0.1	0.1	0.3
(Eastern plum)	Stems	0.7	0.28	0.52	1.3	0.1	2.0
	Bark	1.47	1.03	1.28	3.0	0.03	6.8
P. mirabilis	Leaves	0.02	-	0.03	0.05	0.08	0.18
(Miracle plum)	Stems	0.3	0.7	0.2	0.4	0.2	1.8
	Bark	1.8	0.70	0.1	2.6	0.3	5.5
P. nachichevanica	Leaves	0.3	0.03	0.05	0.32	0.4	1.1
(Nachichevan plum)	Stems	0.27	0.34	0.39	0.3	0.2	1.5
	Bark	-	2.1	2.0	1.4	1.0	6.5
P. Simonii	Leaves	0.05	0.15	-	0.2	0.4	0.8
(Simon plum)	Stems	0.2	0.18	0.12	0.3	0.5	1.3
	Bark	1.2	1.3	1.0	2.1	1.0	6.6
P. salicina	Leaves	0.05	0.02	0.09	0.14	0.1	0.4
(Japanese plum)	Stems	0.25	0.21	0.16	1.2	0.38	2.2
	Bark	2.5	1.2	1.8	1.3	0.3	7.1

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C, (+)-catechin; GC, (±)-gallocatechin; EGC, (-)-epigallocatechin; PA, proanthocyanidins; Fl, flavonols; stems are stems without bark; bark is bark of stems.

REFERENCES

1. S. M. Mavlyanov, Sh. Yu. Islambekov, F. G. Kamaev, and A. I. Ismailov, *Khim. Prir. Soedin.*, 40 (1994).
2. A. S. Sadykov, A. I. Ismailov, A. K. Karimdzhanov, and Sh. Yu. Islambekov, USSR Pat. No. 492,791 (1975); *Byull. Isobret.*, No. 45 (1975).
3. P. Feeny, *Anal. Chem.*, **10**, 1347 (1969).
4. S. M. Mavlyanov, Sh. Yu. Islambekov, F. G. Kamaev, U. A. Abdullaev, A. K. Karimdzhanov, and A. I. Ismailov, *Khim. Prir. Soedin.*, 238 (1997).
5. Sh. Yu. Islambekov, S. M. Mavlyanov, A. K. Karimov, A. R. Vakhidova, and A. K. Karimdzhanov, *Khim. Prir. Soedin.*, 757 (1988).
6. N. G. Abdulladzhanova, S. M. Mavlyanov, and D. N. Dalimov, *Khim. Prir. Soedin.*, 167 (2001).