

BRIEF COMMUNICATIONS

POLYPHENOLS OF CERTAIN PLANTS OF THE EUPHORBIACEAE FAMILY

N. G. Abdulladzhanova, S. M. Mavlyanov,
and D. N. Dalimov

UDC 547.982/83/84

Spurges are known to be a poisonous plants. However, most compounds occurring in them are biologically active. The polyphenol composition of various Euphorbiaceae species is under intense scrutiny abroad. They possess antitumor [1], antiviral [2], antioxidant [3], antidiuretic [4], antidiarrhetic [5], and other activities. Plants of the Euphorbiaceae family are also promising sources of high-quality tanning agents for the leather industry [6].

The Euphorbiaceae family includes about 160 species, of which 33 grow in Uzbekistan. We previously studied polyphenols from roots of *Euphorbia ferganensis* B. Fedtsch. [7] and found that their content in the roots reaches 9.1%. They include quercetin, quercetin-3-O-rhamnoside, kaempferol-3-glucoside, 1,2,3-tri-O-galloyl- β -D-glucose, 2,3-di-O-galloyl- β -D-glucose, 3-O-galloyl-4,6-hexahydroxydiphenoyl- β -D-glucose, 1-O-galloyl-4,6-trihydroxy-3,4,3'-trimethoxydiphenoyl- β -D-glucose, geraniin, and gallic acid.

We are now studying polyphenols from various *Euphorbia* species growing in the Fergan valley. Qualitative reactions and paper chromatography (PC) (BAW, *n*-butanol:acetic acid:water, 40:12:28) showed that the polyphenols from roots and leaves include hydrolyzed tanning agents {FeCl₃ (1%) + K₃[Fe(CN)₆] (1%)}. Tannins from stems are condensed tanning agents [vanillin (1%) in HCl (conc.)], mainly (+)-catechin, (-)-epicatechin, (\pm)-gallocatechin, and traces of proanthocyanidins.

Furthermore, two-dimensional PC using BAW and CH₃CO₂H (6%) found that flavonols are present in small quantities (up to 0.4%) in the aerial parts of the plants. Quercetin and its glycosides were observed in all studied species; myricetin and isomyricetin, in *E. lamprocarpus* Prokh., *E. glomerulans* Prokh., and *E. falcata* L.; kaempferol and its glycosides, in *E. jaxartica* Prokh., *E. lamprocarpus* Prokh., *E. inderensis* Less., *E. szovitsii* F. et M., and *E. turkestanicus* Rgl.

The observations showed that 3-O-galloyl-4,6-hexahydroxydiphenoyl- β -D-glucose, 1-O-galloyl-4,6-trihydroxy-3,4,3'-trimethoxydiphenoyl- β -D-glucose, and geraniin predominate in roots of *E. ferganensis* B. Fedtsch. Other plants contain other compounds, e.g., quercetin, quercetin-3-O-rhamnoside, kaempferol-3-glucoside, and geraniin in *E. szovitsii* F. et M.; quercetin-3-galactoside, kaempferol, gallic acid, and 2,3-digalloyl- β -D-glucose in *E. jaxartica* Prokh.; and quercetin, quercetin-3-O-glucoside, and 1,2,3-tri-O-galloyl- β -D-glucose in *E. helioscopus* L., etc. (Table 1).

The content of tanning agents in individual plant organs was determined colorimetrically [8]. It was found that the amount of tanning agents in the roots varies from 6.3 to 12.1%; in leaves, from 3.3 to 5.3%; in stems, from 0.6 to 1.4% (Table 2).

TABLE 1. Composition of Polyphenols from Plants of the Euphorbiaceae Family

Plant	Substances Found
<i>E. lamprocarpus</i> Prokh.	Quercetin, kaempferol and their glycosides; myricetin; isomyricetin; gallic acid; dehydroellagitannin; 1,6-di-O-galloyl- β -D-glucose; geraniin
<i>E. helioscopus</i> L.	Quercetin and its glycosides; brevifolin; protocatechuic acid; gallic acid; 1,2,3-tri-O-galloyl- β -D-glucose; corilagin; unidentified compound
<i>E. turkestanicus</i> Rgl.	Quercetin, kaempferol and their glycosides; protocatechuic acid; gallic acid; geraniin; terchebin; 1-O-galloyl-4,6-hexahydroxydiphenoyl- β -D-glucose; two unidentified compounds
<i>E. glomerulans</i> Prokh.	Quercetin and its glycosides; myricetin; isomyricetin; brevifolic acid; gallic acid; dehydrogallic acid; terchebin; 2,3-di-O-galloyl- β -D-glucose; unidentified compound
<i>E. jaxartica</i> Prokh.	Quercetin, kaempferol and their glycosides; gallic acid; protocatechuic acid; geraniin; corilagin; 1,2,3-tri-O-galloyl- β -D-glucose; two unidentified compounds
<i>E. falcata</i> L.	Quercetin and its glycosides; myricetin; isomyricetin; gallic acid; 1-O-galloyl- β -D-glucose; 1-O-galloyl-4,6-hexahydroxydiphenoyl- β -D-glucose
<i>E. indieriensis</i> Less.	Quercetin, kaempferol and their glycosides; gallic acid; 1,2,3-tri-O-galloyl- β -D-glucose
<i>E. szovitsii</i> F. et. M.	Quercetin, kaempferol and their glycosides; gallic acid; terchebin; corilagin; geraniin; 1,4,6-tri-O-galloyl- β -D-glucose

TABLE 2. Content (%) of Tanning Agents in Plants of the Euphorbiaceae Family

Plant	Roots	Leaves	Stems
<i>E. lamprocarpus</i> Prokh.	12.10	5.1	2.0
<i>E. helioscopus</i> L.	7.6	4.55	1.3
<i>E. turkestanicus</i> Rgl.	9.77	2.75	1.05
<i>E. glomerulans</i> Prokh.	9.1	5.62	3.0
<i>E. jaxartica</i> Prokh.	8.92	6.67	1.98
<i>E. falcata</i> L.	11.72	5.35	1.35
<i>E. indieriensis</i> Less.	13.22	6.0	2.12
<i>E. szovitsii</i> F. et. M.	8.05	6.24	2.45

REFERENCES

1. J. Bromser, D. L. Madhavi, K. Singletary, and M. A. Smith, *Planta Med.*, **62**, 212 (1996).
2. D. Hauser, Fr. Pat. 8715370 (1989); *Ref. Zh. Khim.*, 6 0209P (1989).
3. B. Petsiar and D. Koshtyalova, *Slovakofarma Revyu VIII*, **2**, 53 (1998).
4. T. Yoshida, L. Chen, T. Shingu, and T. Okuda, *Chem. Pharm. Bull.*, **36**, 2940 (1988).
5. I. Agata, T. Hatano, Y. Nakaya, T. Sugaya, T. Yoshida, S. Nishibe, and T. Okuda, *Chem. Pharm. Bull.*, **39**, 881 (1991).
6. N. G. Abdulladzhanova, S. M. Mavlyanov, D. N. Dalimov, and Sh. V. Abdullaev, *Dokl. Akad. Nauk Resp. Uzb.*, **9**, 47 (2000).
7. N. G. Abdulladzhanova, S. M. Mavlyanov, and D. N. Dalimov, *Khim. Prir. Soedin.*, 167 (2001).
8. N. G. Abdulladzhanova, S. M. Mavlyanov, and Sh. V. Abdullaev, *Uzb. Khim. Zh.*, No. 2, 41 (2001).