PHENOLIC COMPOUNDS OF *Glycine hispida*

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Glycine hispida (Moench) Maxim (soybean), family Fabaceae is an annual crop having great importance to the national economy [1].

Previously isoflavones, chalcones, aurones, and phenolcarboxylic acids have been isolated from soybeans [2-4]. The chemical composition of soybean herbage has been studied inadequately.

We have investigated the phenolic composition of the epigeal part of a number of varieties of the soybean belonging to the Slavyanka and Manchurian subspecies: Amurskaya 310, Kievskaya 48, Belosnezhka, Khar'kovskaya 80, Krasnodarskaya 16, Komsomolka, Khersonskaya, Peremoga, Iskra, Kuibyshevskaya 77, Timiryazevskaya 144. The plants were grown under the conditions of Khar'kov province in 1980-1982, and the raw material was collected in the flowering–incipient fruit-bearing period.

Two-dimensional paper chromatography in the ethyl acetate–formic acid–water (10:2:3) (direction I) and 2% acetic acid (direction II) systems using specific reagents showed the presence of from 17 to 20 substances of phenolic nature in the herbage of the soybean varieties studied. The herbage and ripe seeds of the variety Kievskaya 48 were taken for more profound chemical study. The isolation and purification of the complexes of phenolic compounds of the herbage was carried out by a known method [5]. When the ethereal and ethyl acetate extracts of the polyphenolic complex were separated by chromatography on polyamide columns and by preparative paper chromatography (Filtrak FN12) in systems 1) butanol–acetic acid–water (4:1:2) and 2) 2% acetic acid, nine substances were isolated.

Substance (I), $C_{16}H_{12}O_4$, mp 256-258°C, UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 249, 302 nm. By comparison with an authentic sample, (I) was identified as formononetin 6 .

Substance (II), $C_{15}H_{10}O_4$, mp 318-319°C, UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 249, 303 nm. This was daidzein.

Substance (III), $C_{15}H_{10}O_5$, mp 290-292°C. UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 262, 235 nm. Compound (III) was identified as genistein.

Substance (IV), $C_{15}H_{10}O_6$, mp 279-280°C. UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 266, 367 nm. (IV) was characterized as kaempferol.

Substance (V), $C_{15}H_{10}O_7$, mp 310-312°C. UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 256, 370 nm. Compound (V) was identified as quercitin.

Substance (VI), $C_{16}H_{18}O_9$, mp 202-204°C, R_f 0.66 (system 2) had a blue fluorescence. UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 242, 298, 325 nm. This was chlorogenic acid [7].

Substance (VII), $C_{16}H_{18}O_9$, mp 200-202°C, R_f 0.56 (system 1), had a blue fluorescence in UV light. UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 245, 298, 328. This was identified as neochlorogenic acid.

Substance (VIII), $C_{10}H_{10}O_4$, mp 168-169°C, R_f 0.32 (system 2), with a bright blue fluorescence in UV light. UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 235, 320 nm. This was identified as ferulic acid.

Substance (IX), $C_9H_6O_3 \cdot H_2O$, mp 212-214°C, R_f 0.49 (system 2). UV spectrum: $\lambda_{max}^{C_2H_5OH}$ 228, 310 nm. This was p-coumaric acid.

The structures of the compounds isolated were confirmed by the results of elementary analysis, UV and IR spectroscopy, and the results of a study of the products of acid and alkaline hydrolyses, and also by comparison with authentic samples.

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In ethyl acetate extracts from an aqueous methanolic extract of the defatted flour of the seeds by comparison with authentic samples, we identified daidzein and genistein, and also chlorogenic, neochlorogenic, ferulic, and p-coumaric acids.

This is the first time that substances (I-IV) and (IX) have been isolated from soybean herbage.

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POLYPHENOLS OF THE BARK OF *Betula pendula*

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We have investigated the bark of beech trees growing in the territory of Krasnoyarsk Krai (Predivinsk LPKh [forestry farm]). The resinous substances were removed from the bark sawdust by repeated extraction with benzene.

The polyphenols were extracted with 80% ethanol, the extracts were concentrated in vacuum, and the aqueous residue was treated successively with diethyl ether and ethyl acetate. The polyphenol preparations from the ethyl acetate solutions were isolated by precipitating them from concentrated solutions with dry chloroform. The residue after treatment with ether and ethyl acetate was freeze-dried, and the acetone-soluble fraction was precipitated with petroleum ether.

To analyze each fraction we used paper chromatography in the solvent systems butan-1-ol–acetic acid–water (40:12:28) and 2% acetic acid [1].

In an analysis of the ethereal fraction (8.9% of the total combined polyphenols) we detected four substances of catechin nature, which we designated as K-1, K-2, K-3, and K-4, and 15 phenolic acids.

Phenolic acids were identified by GLC in the form of their silyl derivatives. They were separated on a Tsvet-110 chromatograph with a flame-ionization detector. Stainless steel column (3000 × 3 mm); stationary phase SE-30 (5% of the mass of Chromaton N-AW-DMCS); programming of the temperature from 120 to 300°C at the rate of 3 degrees/min; rate of flow of carrier gas, helium, 50 ml/min, of hydrogen 45 ml/min, and of air 200 ml/min. The qualitative compositions of the phenolic acids were determined by the method of adding pure substances and from literature characteristics [2].

Among the acids we detected benzoic, p-hydroxybenzoic, o- and m-methoxybenzoic, m-hydroxybenzoic, cinnamic, salicylic, o-vanillic, veratric, vanillic, 2,5- and 3,4-dihydroxybenzoic, syringic, and 2,3,4- and 3,4,5-trihydroxybenzoic.

The ethyl acetate fraction amounted to 32.1% of the total combined polyphenols and contained 12 substances of phenolic nature. Qualitative reactions with differentiating reagents [3] and chromatographic analysis permitted two of them to be assigned to the catechins and three to the leucoanthocyanidins.

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