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AMINO-ACID, FATTY-ACID, AND MICROELEMENT COMPOSITIONS OF *Cuscuta campestris* SUBSTANCE

A. I. Zhusupova

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Herein we report for the first time the amino- and fatty-acid and microelement compositions of plant substance isolated as dry extract from *Cuscuta campestris* collected on *Medicago* in 2005 in Talgar Region of Almaty Oblast, Republic of Kazakhstan.

The amino-acid composition of substance (1 g) was established using hydrolysis in HCl (5 mL, 6 N) at 105°C for 24 h in ampuls sealed under Ar. The hydrolysate was concentrated to dryness. The solid was dissolved in sulfosalicylic acid (5 mL, 5%) and centrifuged. The supernatant liquid was passed through a column with ion-exchanger Dowex 50 H-8 (200–400 μm). Amino acids were eluted by NH_4OH solution (6 N). The effluent was concentrated; treated with freshly prepared $SnCl_2$, 2,2-dimethoxypropane (1 drop), and propanol (1–2 mL) saturated with HCl; heated to 110°C for 20 min, and concentrated again.

The concentrate was treated with freshly prepared acyl reagent (1 mL, acetic anhydride:triethylamine:acetone, 1:2:5), heated at 60°C for 1.5–2 min, and concentrated to dryness. The solid was treated with EtOAc (2 mL) and saturated NaCl solution (1 mL) and stirred. The EtOAc layer was chromatographed in a Carlo Erba chromatograph (USA-Italy) using a stainless-steel column (400 × 3 mm) packed with a polymeric mixture of carbowax (0.31%, 20 μm), silar 5 s. (0.28%), and lexan (0.06%) on Chromosorb WA-W-120-140 μm; flame-ionization detector (300°C); vaporizer (250°C); column (furnace) (110°C); final column (250°C); column program rate from 110 to 185°C at 6°C/min, from 185 to 250°C at 32°C/min [1]. A total of 20 α-amino acids with 28.1% essential was found (Table 1).

Total lipids were extracted from the studied substance by extraction (3×) using $CHCl_3$:CH_3OH (2:1 v/v) at room temperature.

TABLE 1. Amino-Acid Composition of *C. campestris* Substance

Amino-acid	Amino-acid amount, mg	Amino-acid	Amino-acid amount, mg
Alanine	1156	Phenylalanine*	415
Glycine	386	Glutamic acid	1826
Valine*	442	Ornithine	16
Leucine*	515	Tyrosine	415
Isoleucine*	296	Histidine	162
Threonine*	268	Arginine	419
Serine	707	Lysine*	326
Proline	602	Tryptophan*	228
Methionine*	115	Total amino acids	9273
Aspartic acid	857	Total *essential amino acids	2605
Cysteine	90	Content of essential in total amino acids, %	28.09
Hydroxyproline	32		

Al-Farabi Kazakh National University, Almaty, ul. Timiryazeva, 71, e-mail: aijan_jusupova@yahoo.com. Translated from Khimiya Prirodnykh Soedinenii, No. 5, pp. 645–646, September–October, 2009. Original article submitted December 25, 2008.

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TABLE 2. Fatty-Acid Composition of *C. campestris* Substance

Acid	Content, %	Acid	Content, %
12:0	1.2	18:3	2.2
14:0	2.2	20:0	1.7
16:0	8.3	20:1	2.4
16:1	0.8	20:2	1.5
18:0	4.2	21:0	1.4
18:1	50.4	22:0	1.0
18:2	22.7		

Extracts were combined, washed with aqueous $CaCl_2$ (0.04%) [2, 3], dried, and concentrated in vacuo. Fatty acids were analyzed as their methyl esters in a Carlo Erba chromatograph (USA-Italy) with a flame-ionization detector, steel column (2.5 m × 3 mm) packed with cellite 545 (0.20–0.25 mm) with 20% polyethyleneglycoladipinate at column temperature 190°C, vaporizer 230°C, He carrier gas flow rate 40 mL/min, air at 450 mL/min. Components were identified using internal standards. Table 2 lists the fatty-acid composition of the substance.

Table 2 shows that the studied substance had a high content of unsaturated acids, consisting of 80% of the total content in it. The monoene fraction of the total was 53.6%; polyene, 26.4%.

Microelement composition of the substance was determined by atomic-absorption spectral analysis [4]. Weighed portions of substance (1 g each) were ashed in porcelain crucibles placed in a muffle furnace at 450–500°C for 4 h. The ash was treated with conc. HNO_3 (1–2 drops) for complete ashing of the raw material. Then, the solid was dissolved in HNO_3 (1%), filtered into a 25-mL volumetric flask, and adjusted to the mark. The quantitative content of the 11 microelements listed below was determined in the resulting solutions.

Microelement	*Content, μg/g substance*	*Microelement*	*Content, μg/g substance*
Fe	76.24	Cd	0.67
Ni	6.21	Pb	19.87
Co	2.83	Mg	543.61
Mn	144.4	Na	4544.53
Cu	11.42	K	2878.42.
Zn	28.38		

The heavy-metal content, primarily lead and cadmium, did not exceed standard values for them in drug substance [5, 6].

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