Chemistry of Natural Compounds, Vol. 47, No. 6, January, 2012 [Russian original No. 6, November-December, 2011]

CHEMICAL COMPOSITION OF DRY EXTRACT OF *Arctium lappa* ROOTS

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UDC 547.917+577.156+611.35.35

Arctium lappa L. (Compositae) (burdock) is a large perennial herbaceous plant that has been known since antiquity for its useful properties [1].

Roots of burdock are used in folk medicine as a tincture, decoction, extract, and oil for gout, rheumatism, and several skin diseases and as a diuretic and pathogenic agent. It is used topically for eczema, ulcers, skin eruptions, festering wounds, furunculosis, sciatica, and radiculitis.

The useful properties of burdock are due to the components contained in it. These are up to 45% of the polysaccharide inulin, 12.3% protein, up to 0.2% essential oil, up to 3.9% fatty oil, organic acids, 13.2% carotinoids, 0.7% flavonoids, and tanning agents and bitter principles [2].

The goal of our work was to obtain the dry extract from burdock roots and to study its chemical composition. The raw materials for obtaining the dry extract were roots cultivated and collected in Parkent Region, Tashkent Oblast, Uzbekistan.

Biologically active substances were isolated from the roots by extraction with hot H_2O. Then the extract was filtered, condensed *in vacuo*, and dried in a drying cabinet at 60 ± 5°C to constant weight. The yield of dry extract was 28%. The dry extract was a freely flowing powder without aroma and with a slightly mucilaginous and sweetish taste and moisture content 7-8%. In contrast with starch, it did not give a color with I_2 and did not reduce Fehling solution. It turned red on treatment with resorcinol and HCl. The analysis was carried out using methods for dry extracts [3]. The inulin content (40.5%) in the dry extract of burdock roots was determined by the literature method [4].

The majority of trace elements affects hematopoiesis and protein and electrolyte exchange *in vivo*. Trace elements in turn exhibit a definite physiological action. A deficiency or excess of them *in vivo* leads to the development of several diseases. Atomic absorption spectrometry on a Unicam 929 Solar Systems spectrometer (England) was used to study the trace-element composition and to quantify their contents in the dry extract. The dry extract of burdock roots contained eight trace elements. The results are given below:

Element	*Content, mg/g*	*Element*	*Content, mg/g*
Cu	0.0112	Pb	0.0239
Zn	Not detected	Cd	0.0128
Na	0.5520	Fe	0.0270
K	7.4700	Mg	0.3910.
Mn	0.0035		

The amounts of K, Mg, Na, and Fe were the greatest of all observed trace elements; Mn, the least. This is important for patients with diabetes mellitus [5]. It should be noted that the content of K, which plays an important role in *in vivo* exchange processes, was high in burdock roots.

Thus, the results indicated that the contents of certain trace elements can be an indicator that the plants assimilate from the soil the elements required for their metabolism. The variations in their contents depend on the habitat conditions.

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 0009-3130/12/4706-1038

The protein content was determined by the literature method [6] and was 12.1% in the dry extract of roots. The amino-acid composition of the protein was determined after acid hydrolysis (5.7 N HCl for 24 h at 110°C). A total of 15 amino acids was observed (on a T-339 amino-acid analyzer, Czech Rep.). The list appears below (without tryptophan determination Σ23.5%):

Amino acid	*Content, wt%*	*Amino acid*	*Content, wt%*
Asp	2.5	Ile*	0.8
Thr*	0.8	Leu*	1.6
Ser	1.1	Tyr	0.8
Glu	6.7	Phe*	1.2
Pro	0.9	His*	0.7
Gly	1.0	Lys*	0.9
Ala	1.0	Arg*	2.5.
Val*	1.0		

Proteins of the dry extract contained essential amino acids such as threonine, valine, isoleucine, leucine, phenylalanine, histidine, lysine, and arginine. This defined the value of the protein and its nutritional significance in addition to medicinal properties. Glutamine, asparagine, and arginine dominated the amino-acid content.

Thus, the study of the chemical composition of dry extract of *A. lappa* roots found mono- and oligosaccharides, inulin, trace elements, and proteins. The principal functionally active ingredient was inulin. Inulin is known to have a favorable effect on the whole human body. The results allow the dry extract of burdock roots to be standardized. Pharmacological investigations of the dry extract showed a significant reduction of the sugar content in animal blood.

Burdock is considered to be a source of inulin that is converted into fructose and short fructose chains that penetrate into the circulatory system upon entering the gastrointestinal tract. The remaining uncleaved part of inulin and cellulose are capable of absorbing a significant amount of dietary glucose and preventing it from being assimulated into blood. This helps to reduce the sugar level in the blood after meals.

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