



STUDY OF THE CHEMICAL COMPOSITION OF THE INULA HELENIUM PLANT

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Article history:	Abstract:
Received: 11 th February 2021 Accepted: 28 th February 2021 Published: 16 th March 2021	Elecampane tall (<i>Inula helenium</i> L.) is a medicinal plant and its rhizomes and roots are used in pharmaceutical production. Funds based on them have expectorant, astringent and anti-inflammatory properties. This article discusses the chemical composition of inula helium.
Keywords: <i>Inula helenium</i> , plant, component, root, flower, inulin, essential oil, alantonic, chemical composition.	

Elecampane tall is well known primarily as a valuable medicinal plant with a wide range of medicinal effects. Elecampane is also known as a high-yielding large-herb fodder plant, the green mass of which is used mainly for silage. Elecampane is a fairly tough plant with a stem that grows to about 90–150 cm (35–59 in) in height. Leaves are large, toothed, lower petiolate, the rest cover the stem; blades are ovoid, elliptical, or spear-shaped, measuring 30 cm (12 inches) long and 12 cm (4.7 inches) wide. The leaves are green above with light, scattered hairs, and whitish below due to a thick layer of wool. Flower heads up to 5 cm (2 inches) wide, each head containing 50-100 yellow flowers and 100-250 yellow discs. The root is thick, branchy and sticky, has a bitter taste and camphor smell with sweet floral (violet-like) undertones. The demand of inula helenium for medicinal plants in all centuries remains constantly high. Elecampane (*Inula helenium*) is one of the popular medicinal plants. From them, a decoction and the drug "Alanton" are obtained. The main groups of active substances of rhizomes with roots of elecampane are sesquiterpene lactones - alantolactone, isovalantolactone and the polysaccharide inulin. However, the anthropogenic impact of man on nature and, in connection with this, significant environmental changes lead to a sharp reduction in the reserves of plant materials, including high elecampane. This problem can be solved by attracting the potential of other types of elecampane, in particular elecampane willow, which is widespread in the Central Black Earth regions. Before citing the chemical composition of the *Inula helenium* plant, I would like to mention its botanical aspect.

Plants of this genus are represented mainly by perennial, rarely biennial and annual herbaceous plants. The stem is evenly leafy. Leaves are simple, whole: alternate leaf arrangement. Flower baskets are hemispherical, solitary or mostly numerous, collected in corymbose or sometimes capitate inflorescences. The wrapper consists of numerous tiled leaves, mostly unequal, gradually increasing inward, rarely equal, acute: the outer leaves are herbaceous lanceolate, linear-lanceolate, ovate, ovate-triangular or oblong, sometimes with rhombic, or oblong-ovate, or rounded spatulate top; middle - often leathery, oblong-lanceolate, lanceolate, spatulate, spoon-shaped, linear-lanceolate, rarely linear; inner - filmy, linear, linear-lanceolate, subulate or filiform, occasionally purple or reddish at the end; outer and middle leaves over the entire surface, and inner ones in the upper part or only from the middle, for the most part pubescent white, brown or blackish hairs or ciliated, sometimes covered with glands; the receptacle is flat or can be convex, pitted or cellular, glabrous or fringed. The middle flowers (disc flowers) are funnel-tubular, bisexual, yellow, (brownish in *I. vulgaris*), multi-row. The marginal flowers (ray flowers) are pistillate, ligulate, yellow (reddish in *I. vulgaris*), arranged in one row, one and a half to two times longer than the wrapper, mostly with long tongues, which are rarely slightly longer than the wrapper or equal to it, or with small tongues, or tongues do not develop and the marginal flowers are then filiform tubular. Peduncles are arrow-shaped at the base with two long, less often short filiform dissected-ciliate appendages. Ligulate flowers are very rare with three to four staminodes. The lobes of the stigma are widened at the end, obtuse, villous. Achenes are all identical, prismatic or cylindrical, tetrahedral or ribbed, smooth or covered over the entire surface or only in the upper part with short upwardly pressed straight hairs, or rarely in the upper part with scattered glands. Pappus of uniseriate, mostly numerous, slightly unequal setae, finely serrated upwards, often fused at bases.

Chemical composition of *Inula helenium* L.

In addition to the storage polysaccharide inulin ($C_6H_{12}O_6[C_6H_{10}O_5]_n$), a polymer of fructose, the root contains helenin ($C_{15}H_{20}O_2$), stearoptene, which can be obtained in the form of white needle-like crystals, insoluble in water, but easily soluble in alcohol. When released from the accompanying inula-camphor by repeated crystallization from alcohol, helenin melts at 110 ° C.

Rhizomes and roots of *I. helenium* L. contain up to 4.3% essential oil, it is called alanth, after the name of a plant in Germany. At room temperature, the essential oil is a crystalline mass - helenin; at a temperature of 30-45 ° C - a brown liquid. The oil is readily soluble in organic solvents, poorly in water. The crystalline part of the oil consists of a mixture of sesquiterpene lactones: alantolactone 25% ($C_{15}H_{20}O_2$), ° melting 76 ° C.

Alantolactone isovalantholactone 15% ($C_{15}H_{20}O_2$ (II), 1 ° melting 115 ° C), dihydroalantholactone ($C_{15}H_{22}O_2$ (III), 1 ° melting 174 ° C), alantonic acid, 1 ° melting 94 ° C (Kurgan, 2004). It also contains α -pinene 27.6%, myrcene 1.1%, α -terpinene 2.2%, limonene 2.0%, linalool 1.5%, camphor 12.1%, α -terpineol 2.4%, alantol ($C_{15}H_{23}O_2$), inulin ($C_6H_{10}O_5$)_n (quantitative and qualitative composition - 19.80-43.58%) (Oleinikov et al., 2008), pseudoinulin, inulin, proazulene, organic acids (acetic, benzoic, polyene, cinnamic, myristic, palmitic, amber, tartaric), resins, tannins, P-sitosterol, stigmasterol, polar and triterpene saponins, bitterness, acetylene compounds, coumarins (xanthotoxin, isopimpinellin, isoberhaptin), mucus, quercetin (rutin), rutin, wax, a small amount of alkaloids, glucose, rhamnose, mannitol, sorbitol, xylose, arabinose, galactose, ketosugar, aglycones of the tetra- and pentacyclic triterpene series (Matasova et al., 1999), shikimic acid 8.35% (Barandl, 2009) ... Korzhom A.P. et al (2011) found that the total content of acidic polysaccharides in the polysaccharide complex from rhizomes with roots is 55.6%.

Found in the roots: ash - 6.23%; macronutrients (mg / g): K - 14.50; Ca - 7.40; Mg - 1.90; Fe - 0.50; trace elements (μ g / g): Mn - 0.11; Co - 0.11; Cr - 0.04; Al 0.40; C - 0.38; Bb - 0.27; V - 0.15; Se - 10; No. - 0.14; Pb - 0.05; I 0.13; B - 14.40. Mo, Ba, Syo, I, Ag, Au, Br were not found.

SUMMARIZE

The chemical composition of *Inula helenium* was studied and the general results showed the following. Rhizomes and roots contain inulin (up to 44%) and other polysaccharides, bitter substances, essential oil (up to 4.5%), saponins, resins, gum, mucus, a small amount of alkaloids, and helenin. The essential oil contains alantolactone (proazulene, helenin), resins, mucus, dihydroalantholactone, Fridelin, stigmasterol, phytomelan, pectins, wax, gum, vitamin E. Essential oil (up to 3%), ascorbic acid, vitamin E are found in the grass; flavonoids, vitamins (ascorbic acid, tocopherol), bitter substances, tannins (9.3%), lactones, fumaric, acetic, propionic acids were found in the leaves; the seeds contain more than 20% fatty oil.

With regard to the aforementioned useful composition, the article can indicate a number of important therapeutic properties of *Inula helenium*:

Preparations from rhizomes of elecampane have an expectorant and anti-inflammatory effect, improve appetite, reduce intestinal motility, and reduce gastric acid secretion. It is believed that the main biologically active substance of elecampane is alantolactone and related terpenoids. Traditional medicine, in addition, notes a diuretic and antihelminthic effect.

REFERENCES

1. Kovalevsky, A.JI. Biogeochemistry of plants. - Novosibirsk: Science. Siberian branch, 1991. -- 294 p.
2. Kozhanova, ON. Physiological role of metals in the life of plant organisms / ON. Kozhanova, A.G. Dmitrieva // Physiology of plant organisms and the role of metals. - M.: Moscow State University, 1989. - S. 7-55.
3. Kozarenko, OM The entry of heavy metals on the surface of plant leaves during the growing season in deciduous forests of the Kaluga region / O.M. Kozarenko, A.E. Kozarenko // Heavy metals in the environment. - Pushchino, 1996. -- S. 85.
4. Kolesnikov, S.I. The influence of heavy metal pollution on the ecological and biological properties of ordinary chernozem / S.I. Kolesnikov, K.Sh. Kazeev, V.F. Valkov // Ecology and Industry of Russia. - M.: Kalvis, 2000. No. 3. - S. 193-201.
5. Korzh, A.P. Determination of the content of uronic acids in polysaccharides of coltsfoot, clover, elecampane / A.P. Korzh, A.M. Guryev, M.V. Belousov, M.S. Yusubov // Chemistry of vegetable raw materials. - Barnaul: Altai State University, 2011. - No. 4. - P. 259-264.
6. Korolyuk, E.A. Dyeing plants of Altai and adjacent territories // Chemistry of vegetable raw materials. - Barnaul: Altai State University, 2003. - No. 1.-S. 101-135.
7. Kochetkov, B.JI. Medicinal plants in traditional Chinese medicine. - M.: Miklos, 2002. -- 50 p.
8. Red Data Book of the Republic of Bashkortostan. Vol. 1: Plants and fungi / edited by B.M. Mirkin. 2nd edition. - Ufa: MediaPrint, 2011. -- 384 p.
9. Kreminskaya, L.V. Investigation of the antiseptic properties of essential oils // Chemistry at school. - M.: Limited Liability Company "Tsentrkhimpres", 2010. - No. 9. - S. 58-62.
10. Kuznetsov, V.V. Plant physiology / V.V. Kuznetsov, G.A. Dmitrieva. - M.: Higher school, 2005. -- 736 p.
11. Kuznetsov, V.V. Plant physiology. 2nd edition / V.V. Kuznetsov, G.A. Dmitrieva. - M.: Higher school, 2006. -- 742 p.
12. Kuznetsova, M.A. Medicinal herbal raw materials and preparations. -M.: Higher school, 1987.- 191s
13. Dudchenko L.G., Koz'yakov A.S., Krivenko V.V. Spicy-aromatic and spicy-flavoring plants: Handbook / Otv. ed. K. M. Sytnik. - K.: Naukova Dumka, 1989. -- 304 p. - 100,000 copies - ISBN 5-12-000483-0.
14. Universal encyclopedia of medicinal plants / comp. I. N. Putyrsky, V. N. Prokhorov. - M.: Makhaon, 2000. - S. 115-116. - 15,000 copies. - ISBN 5-88215-969-5.

15. Gubanov I. A. et al. 1380. *Inula helenium* L. - Elecampane high // Illustrated guide to plants of Central Russia. In 3 volumes - M. : T-in scientific. ed. KMK, Institute of technologist. issl., 2004. - T. 3. Angiosperms (dicotyledonous: dicotyledonous). - S. 444 .-- ISBN 5-87317-163-7.