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Phytochemical Investigation of the Roots of Rumex Confertus W. Grown in the Culture

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Abstract: The Republic of Kazakhstan has rich plant resources but only a small portion is used medicine and economy. Currently over 30% of medicines made from plants and for the treatment of several diseases many herbal remedies are essential. According to forecasts of specialists XXI century will be a century of phytotherapy sparing treatment with herbs.

Key words: Kazakhstan · Medicine · Plant · Treatment

INTRODUCTION

Due to the fact that the resources of medicinal plants from year to year due to a number of reasons undergo reduction of its stocks or limited there is a need for a source of raw materials.

According to modern views the sustainable raw materials pharmaceutical industry can provide in particular the introduction of the culture of officinal species. In connection with this the work was carried out on the cultivation of medicinal plants such as *Rumex confertus Willd*, in the foothills of the Zailiysky Alatau in the Almaty region in the educational-industrial complex "Ekos" at Kazakh National University named after al-Farabi. After the completion of field cultivation, were collected roots studied species of medicinal plants then which are subjected to a more careful chemical study in order to conduct a comparative analysis of component composition of plants growing in the wild and grown in culture.

Chemical analysis of medicinal plants materials (rhizome) of the analyzed species was conducted at the Center for Physical and Chemical methods of investigation and analysis.

In this context of great theoretical and practical interest in cultivated plants of the family *Polygonaceae Juss.* (Buckwheat) which are widespread in Kazakhstan some of which are endemic found only in the territory of our country. Genus of the *Rumex L*. (Sorrel) in the world's flora includes about 150 species of plants of which 49 species are described in the Flora of the USSR and 23 species grow in Kazakhstan [1-3]. Of the 49 species of sorrel USSR Flora is only one kind sorrel horse used officinal medicine. Four other species of sorrel: Tien Shan, Pyramidal, Russian and Marshall introduced into medicine by the results in the Department of Organic Chemistry and Chemistry of Natural Compounds. All sorrel may be a source of tannins of the catechol and pyrogallol groups. In addition many species of sorrel contain flavonoids, anthraquinone derivatives and other biologically active substances, so it is promising as sources of hemostatic preparation, diuretic, astringent, anti-inflammatory, antiseptic, cholagogue, laxative, analgesic, diaphoretic, sedative, antiseptic and other actions [4]. *Rumex confertus Willd*. part of Zdrenko mixture applied for papillomatosis of the bladder and antotsidnyh gastritis [5]. In folk medicine *Rumex confertus Willd.* popular as vitamins, nutritional, medicinal plant, used in scurvy it treats gout, rheumatism, topically applied in scabies,

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herpes, eczema, burns. Leafy tops of this kind sorrel collected during flowering are used as an astringent, hemostatic, antirot remedy for colitis, enterocolitis, hemorrhoids [6-9]. Leucoanthocyans and catechins extracted from the roots and rhizomes in animals experimental have shown antitumor activity [6, 8]. Extracts lower blood pressure in hypertension stage I and II and have a calming effect [10-11].

The infusion of the rhizomes and roots with alcohol 40% in the form of drops used for hoarseness and rheumatism [12]. Dry extract from the roots which contains tannins has a pronounced P-vitamin, actively strengthen capillaries [13]. The rhizomes are used for tanning leather. The extract of the roots, rhizomes and leaves - for the yellow and black colors for fabrics on iron mordant [14]. According to the literature in the roots of sorrel horse detected and isolated in individual form anthraquinones, flavonoids and its glycosides, catechins, tannins, carbohydrates (glucose, fructose, sucrose), phenolic acids (caffeic, chlorogenic acid, citric acid, lactic acid, gallic), vitamins K and C, macro-and micronutrients, essential oils, resins, steroids, carotenoids, amino acids, phenols [14]. Studies of the chemical composition of the genus *Rumex* and experience with different types of plants in the officinal and folk medicine in different countries show the viability and feasibility of the research.

As stated above the object of the study were the roots and rhizomes of sorrel horse *Rumex confertus Willd*. described in the Flora of Kazakhstan. One aspect of this problem was the chemical study of plants. As you know medicinal plants taken from one soil and climatic environmental conditions and raised in the other may undergo changes in the phytochemical composition.

MATERIALS AND METHODS

In this work we used conventional methods phytochemicals plant material [15-20]. Optimum extractants for the species studied were 50% aqueous acetone, 50% ethanol and 50% isopropyl alcohol. The most optimal ekstragenom was 50% aqueous acetone as it removes up to 30% of all biologically active substances (BAS) from raw materials. Assessment of the major groups of BAS was based on the quality specific reactions for the main groups of BAS.

RESULTS AND DISCUSION

In materials found 12 groups of BAS: anthraquinones, flavonoids, tannins, carbohydrates, polysaccharides, phenols, amino and phenolic acids, catechins, saponins, coumarins, alkaloids. Lipophilic components presented carotene, chlorophyll, resins are minor components investigated the roots and rhizomes of plants so its quantitative content was not determined. Study the composition of the components was performed by one-dimensional paper chromatography in comparison with the known compounds taps largest mobility in the system n-butanol - acetic acid-water (40:12,5:29) using specific developers. Quantitative determination of the major groups of biologically active substances in the roots of sorrel horse determined by conventional methods [15-20] (Table 1). Table 1 presents summary data on the quantitative content of the main groups of BAS.

So, as can be seen from the table the results indicate about little difference of experimental and literature data the number of members *Rumex confertus Willd*, which gives reason for the introduction of the species in culture. Also conducted a study of macro-and microelement composition of the zonal balance studied species by atomic-absorption spectroscopy method on the device «ASSIN» company "Carl Zeiss" [21]. In the zonal balance defined macro-and microelements. The data are presented in Table 2.

So, from the Table 2 shows that on the microelement composition of the plants has a direct influence of natural and anthropogenic factors areas of growth that is places of growth (areas of soil), which should be considered in the cultivation of plants and preparation of raw materials

Table 1: Quantitative content of the main groups of BAS in the roots of *Rumex confertus Willd.* collected in the culture,%

Name of the species	Moisture of the raw	Extractives with 50% acetone	Tannins	Anthraquinones	Amino acids	Flavonoids	Carbohydrates	Polysaccharides	Phenolic	Phenols
Rumex confertus Willd	8.96	28.78	22	2.86	1.56	2.96	1.65	0.32	4.29	2.10

Table 2: Content of macro and microelements in the roots of *Rumex confertus Willd*. collected in the culture, mg / g

	Macroelements					Microelements					
Named of the species	Potassium (K)	Sodium (Na)	Magnesium (Mg)	Calcium (Ca)	Iron (Fe)	Zinc (Zn)	Nickel (Ni)	Manganese (Mn)	Copper (Cu)	Lead (Pb)	Cadmium (Cd)
Rumex confertus Willd.	396.90	42.52	130.356	2818.44	30.545	1.7539	0.1909	1.5701	0.9341	0.2023	0.0475

[21-22]. Currently necessary for life activity found 14 macro-microelements such as iron, copper, manganese, zinc, cobalt, iodine, fluorine, molybdenum, vanadium, nickel, strontium, silicon and selenium. It increases the activity of enzymes that catalyze biochemical processes, that promote the synthesis of carbohydrates, proteins and vitamins and are also involved in metabolism. In addition these results are consistent with the general regularities according to which the mineral content affects the accumulation of the certain groups of biologically active compounds.

So, plants producing cardiac glycosides, selectively absorb manganese, molybdenum and chrome; producing alkaloids - copper, manganese and cobalt; saponins - molybdenum and vanadium; terpenoids - manganese, coumarins, vitamins and polyphenolic compounds - copper, zinc and manganese, polysaccharides - manganese and chromium; carbohydrates - zinc respectively [22]. Accumulation of the microelements in plants is based on the type of soil its physical properties and chemical status, geographical location of the area, of the climatic conditions, the type, grade and stage of vegetation plant, irrigation sources and other factors [23-26]. Apparently in the plant of the genus sorrel the active principle are polyphenolic compounds, coumarin, vitamins, carbohydrates, polysaccharides as it is in a lot of soil extracts copper, zinc, manganese and iron which is in good agreement with literature data on the biosynthesis and properties of the polyphenols.

From the Tables 1 and 2 show that the qualitative composition and quantitative content of the main groups of BAS roots of the sorrel horse grown in culture and harvested as a wild plant in Almaty region did not significantly differ in content. So, the work has helped to address the following issues: a qualitative study conducted phytochemical composition and content of the main groups of BAS roots of the sorrel horse found the prospect of further practical implementation of this species in culture and use it to produce pharmaceutical products with a wide range of biological activity.

CONCLUSIONS

The Republic of Kazakhstan has rich plant resources. It is found 12 groups of BAS in the roots and rhizomes of plants. Study the composition of the groups was investigated. So, the work has helped to address the following issues: a qualitative study conducted phytochemical composition and content of the main groups of BAS roots of the sorrel horse found the prospect of further practical implementation of this species in culture and use it to produce pharmaceutical products with a wide range of biological activity.

REFERENCES

1. Mickael, Z., 1966. Flora of the Palestina the Israel. Jerusalem. T., 1: 51-59.
2. Komarov, V.A., 1936. Flora of the USSR, Leningrad: AN USSR. T., 5: 444-482.
3. Pavlova, N.V., 1960. Flora of the Kazakhstan. Alma-Ata: ÀN KazSSR. T., 3: 92-102.
4. Schroeter, A.I., 1975. Medicinal flora of the Soviet Far East. Moscow: Medicine, pp: 78-83.
5. Kuramysova, I.I., V.F. Aksenov and N.G. Tatimova, 1998. Medicinal plants (harvesting, storage, processing, application). Alma-Ata: Kaynar, pp: 183-186.
6. Minayeva, V.G., 1991. Medicinal plants of Siberia. Novosibirsk: Science, pp: 214-216.
7. Muzychkina, R.A., 1998. Antineoplastic some higher plants. Physiological and biological aspects of the study of medicinal plants. Novosibirsk, Russia, pp: 135-136.
8. Maksyutina, N.P., N.F. Komissarenko and A.P. Prokopenko, 1985. Herbal Remedies, Ed. N.P. Maksyutin. Kiev, Health., pp: 239-240.
9. Chikova, P.S., 1976. Atlas of areas and resources of medicinal plants of the USSR, Moscow, Sciences, pp: 332.
10. Kukenov, M.K., 1996. Medicinal plants of Kazakhstan and their use. Almaty, Sciences, pp: 217-218.
11. Zuzuk, B.M., R.V. Kutsik and N.K. Feduschak, 2004. Sorrel thick *Rumex confertus Willd* (Analytical review), Pharmacist, 2: 32-37.
12. Seizing, L.V., A.R. Gritsik and O.I. Romanchuk, 1996. Application genus sorrel in medicine. Lvov., pp: 19.
13. Fedorov, A.A., 1985. Plant Resources of the USSR / Leningrad: Sciences, pp: 277-290.
14. State Pharmacopoeia of the USSR, 1987. XI Ed. Moscow: Medicine, Part, 1: 283-295.
15. State Pharmacopoeia of the USSR, 1990. XI Publ. M: Medicine, Part, 2: 24-25.
16. Esimova, O.A. and G.S. Burasheva, 1991. Phytochemical determination of amino acids in plant material, Chemistry of Natural. Comp., 3: 453.
17. Koleva, M.N., 1981. Quantitative determination of carbohydrates in plant material, Pharmacy. T., 31(1): 32-36.

18. Pashinina, L.T., 1979. Methodical instructions for the workshop on qualitative and quantitative analysis of natural polyphenols and carbohydrates. Almaty, Kazakhstan: Kazakh State University, pp: 47.
19. Grinkevych, N.I. and L.I Safronich, 1983. Chemical analysis of medicinal plants. Moscow: Science, 51: 148.
20. Ermachenko, L.A., 1997. Atomic absorption analysis in hygienic studies, Ed. L.G. Podunovoy. Moscow: Chuvashia, pp: 208.
21. Grinkevych, N.I. and A.A. Sorokina, 1983. Role geochemical factors in the production environment plants biologically active substances. Biological role of microelements. Moscow: Sciences, pp: 283.
22. Rakhmetova, A.A., T.T. Meldehanov and A.G. Muhametgaliev, 1989. Modern problems of pharmacy. Alma-Ata, Kazakhstan: Sciences, pp: 102.
23. Mahesh, B. and S. Satish, 2008. World Journal of Agricultural Sciences, 4(S): 839-843.
24. Moses, A.G.M., E. Glatebe, L. Gitu and H. Rotich, 2012. Global Journal of Pharmacology, 6(3): 245-251.
25. Satish, S., M.P. Raghavendra and K.A. Raveesha, 2008. Advances in Biological Research, 2(3-4): 44-48.
26. Darinka, G., T. Kadifkova-Panovska, B. Katerina and T. Stafilov, 2011. Middle-East Journal of Scientific Research, 7(1): 109-114.