Phytochemistry of Leguminous Species

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Abstract*: The paper considers the legume family at Kapchagay Reservoir, including camel thorn (Alhagi pseudalhagi (M. B.) Desv.), silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze.), salt tree (Halimodendron halodendron (Pall.) Voss.), the vegetative organs, flowers and fruits of the plants. The dosage forms of these plants and their importance are identified. As a result of the phytochemical study, it has been found that the species in the herbaceous family are similar to the phytochemical composition of camel thorn and salt tree.

***Keywords*: medicine, carotene, caramel, essential oils, glycoside.**

I. INTRODUCTION

It is necessary to know how to gather, dry and store plants for efficient practical use. It is necessary to recognize the plants to gather them. The varieties of plants belonging to the same species are very similar to each other. One must be able to distinguish them [1].

Plants are gathered due to their beneficial properties. People use them to make drugs, food, paint and raw materials. The necessary substances are found either throughout the whole plant or in its leaves, stems, roots, fruits, seeds, leaf buds, shells, underground root crops, as well as tubers [2, 3].

II. PROPOSED METHODOLOGY

A. Block diagram

This research considers plants growing in sandy and desert areas, for example, five species of common camel thorn growing in Kazakhstan. The most widespread of them is common camel thorn (Alhagi pseudalhagi (M. B.) Desv.). It is found in sandy soils, steppe zones (Fig. 1). The lower radicle part of the stem is thick and the upper part is pointed and thin [4].

It grows in the south of the European part of Russia, Western Siberia, Kazakhstan, except for the northern regions, Central Asia and the Caucasus. It is widespread in the vicinity of the Irtysh, the Caspian and the Karatau Mountains [5].

Fig. 1. Common camel thorn (*Alhagi pseudalhagi* (M. B.) Desv. – camel thorn).

The infusion made from leaves and branches of camel thorn is used to treat cough and kidney stones. The roots of the plant are used to cure hemorrhoids, external injuries, tumors and deterioration of cardiac activity [6]. Tea is made from a camel thorn flowers in Central Asia and Azerbaijan. This tea satisfies thirst [7].

Sand acacia of the legume family includes six species; among them the following species were chosen for the research: silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze.) (Fig. 2). It blooms very beautifully in spring and in winter it falls off so that there are only naked branches [8]. It grows on sand, sandy hills, in the sandy zone of Kazakhstan. Bees sip from flowers, tanning substances necessary for the production of paint are made from the root. The flowers of silver sand acacia are very beautiful, so they are grown for beauty as well. It is also used to stop sand [9].

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Fig. 2. Silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze.

Reed or salt tree (Halimodendron halodendron (Pall.) Voss.) is a shrub specific to the desert (Fig. 3). It grows throughout Kazakhstan, except for the northern and northwestern regions. It grows in sandy and clay deserts, steppes, river valleys, channel coasts, near springs, often in salt marshes [10].

Fig. 3. Salt tree (Halimodendron halodendron (Pall.) Voss. – salt tree).

The roots of salt tree are dug in the autumn for medicinal purposes. Roots of salt tree have sweating, laxative and diuretic properties. In this regard, in folk medicine, brucellosis, gout and rheumatism are treated with roots of salt tree. Its roots are used as a drug, in particular, to treat kidney and bladder stones.

B. Algorithm

To perform the experiments, vegetative organs, flowers and fruits of the following plants growing near Kapchagay reservoir of the Almaty region were gathered: common camel thorn (Alhagi pseudalhagi (M. B.) Desv.), silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze.), and salt tree (Halimodendron halodendron (Pall.) Voss.). In accordance with the requirements, the plants were dried.

During the general quantitative study, an analysis of moisture, ash content, carotenoids, vitamin C and mineral elements was carried out (Table 1).

Table 1. The varieties of the studied species (leaves)

№	Quality of raw materials and amount of biologically active substances, %	Plant species			
		Common camel thorn (*Alhagi pseudalhagi* (M. B.) Desv.)	Silver sand acacia (*Ammodendron argenteum* (Pall.) O. Ktze.)	Salt tree (Halimodendron halodendron (Pall.) Voss.)	Type of a specific method
1	**Moisture**	8.54±0.05	6.22±0.05	6.33±0.05	GOST 24027.2-80
2	**Ash content**	4.24±0.5	4.29±0.05	2.63±0.02	GOST 24027.2-80
3	**Carotenoids, mg/g**	0.208±0.06	0.128±0.01	0.178±0.04	Spectrophotometry analysis of acetone extract of pigments
4	**Vitamin C, %**	0.0037±0.0012	0.058±0	0.0124±0	GOST 24556-89

III. RESULTS

The following indexes were found in regards to moisture: silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze.) – 6.22 ± 0.05, salt tree (Halimodenron halodendron (Pall.) Voss.) – 6.33 ± 0.05, common camel thorn (Alhagi pseudalhagi (M. B.) Desv.) – 8.54 ± 0.05. Vitamin C, a biologically active substance of ascorbic acid, is a water-soluble vitamin. It has a great impact on the development, growth and restoration of tissue, blood and bone cells. In addition, this acid contributes to the proper absorption of ferrum and positively affects general health [11]. Depending on the diet and the organism, mineral substances are divided into macro and microelements.

Macroelements containing in large amounts in the human body and food include calcium, phosphorus, magnesium, potassium and sodium. Microelements are found in very small amounts. In particular, 14 microelements, such as ferrum, copper, manganese, zinc, cobalt, iodine, fluorine, chrome, molybdenum, nickel, strontium, silicon and selenium are necessary for the organism. They increase the activity of enzymes that catalyze (accelerate) biochemical processes, participate in the synthesis of carbohydrates, proteins and vitamins and also take part in the metabolism [12, 13]. As it is known, microelements in the composition of herbal drugs contribute to their activity [14].

In the studied species, the following macro and microelements were determined (Table 2).

Table 2. Composition of mineral elements of the studied species (leaves) (µg/g)

№	Mineral elements µg/g 1 g=1,000 g=1,000,000 µg-ppm	Camel thorn (*Alhagi Pseudalhagi* L.)	Silver sand acacia (*Ammodendron argenteum* (Pall.) O. Ktze.)	Salt tree (*Halimodendron halodendron* (Pall.) Voss.)	Type of a specific method
1	Na	255.88±2.02	181.75±1.56	228.45±2.28	AAC method
2	K	0.33±0.01	0.29±0.009	0.58±0.017	
3	Ca	0.052±0.002	0.036±0.001	0.070±0.002	
4	Mg	0.84±0.017	1.07±0.021	1.39±0.028	
5	Cd	not found	not found	not found	
6	Fe	38.07±0.76	16.40±0.33	24.01±0.48	
7	Cu	0.30±0.006	0.21±0.004	0.22±0.004	
8	Ni	1.30±0.02	1.58±0.03	2.95±0.06	
9	Zn	not found	not found	not found	
10	Pb	not found	not found	not found	

Potassium is involved in enhancing the functioning of the nervous system, muscles and heart, regulating the concentration of gastric juice, removing excess water and sodium chloride from the body, forming acetylcholine and regulating blood pressure.

Calcium takes part in the processes of muscle stimulation, acceleration of enzymes function, heart muscle performance and blood coagulation. The required amount in the body is 1 g per day. Sodium in large amounts leads to an increase of blood pressure and kidney disease. With a lack of calcium, bone and nerve tissue is degraded, and the general ability of the organism to resist diseases decreases.

Magnesium takes an active part in the processes of nervous irritation, metabolism of carbohydrates and phosphorus, prevention of heart diseases, such as ischemia, angina pectoris and heart attack. The lack of this element results in the disruption of the nervous and cardiovascular systems and kidney disease.

Ferrum is one of the elements necessary for the human body. Ferrum contains many acidic enzymes. It performs the functions of hemoglobin in the circulatory system. It is necessary to take 15-20 mg of ferrum per day. The human body gets this amount of ferrum with food.

Magnesium is found in all plants. The required amount for human is 400 mg per day. It regulates the proper functioning of bones, teeth and nervous system.

Copper gets into the body with food. If the body lacks copper, ferrum cannot bind to hemoglobin in the liver. The indicator of a lower or higher copper content is human hair. With a decrease or lack of copper, the hair quickly turns gray. Copper provides oxygen permeability to the blood. Copper is a part of many enzymes and accelerates the oxidation reaction in tissues.

Zinc regulates the functions of the genitourinary system and insulin. With a lack of zinc, metabolism, sexual development and adolescent growth are disrupted. A healthy person needs 0.9 mg of zinc per day.

IV. CONCLUSION

The analysis of moisture, ash content, carotenoids, vitamin C and mineral elements in the following plants was carried out: common camel thorn (Alhagi pseudalhagi (M. B.) Desv.), silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze) and salt tree (Halimodendron halodendron (Pall.) Voss.). The moisture content of two species selected for the study is the same: silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze.) and salt tree (Halimodendron halodendron (Pall.) Voss.).

If the highest index of vitamin C for species Ammodendron argenteum (Pall.) O. Ktze. was 0.058±0, then in other species, it was as follows: Halimodendron halodendron (Pall.) Voss. – 0.0124±0 and Alhagi pseudalhagi (M. B.) Desv. – 0.0037±0.0012 (the smallest index).

In all studied types of raw materials, three microelements from ten known were not found: Cd, Zn and Pb.

The most important elements such as Na, Fe and Ni were found in large amounts in three plant species. In the species Alhagi pseudalhagi L, a large amount of elements such as Na and Fe was found. According to the results of the study, it is characteristic that although the habitat of these plants is similar, the composition of mineral elements, depending on the features of the species, is characterized by diversity. In common camel thorn (Alhagi pseudalhagi L.), unlike in silver sand acacia (Ammodendron argenteum (Pall.) O. Ktze.), the content of mineral elements is 1.5-2 higher, including in terms of the content of elements, such as Na and Fe.

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