FEATURES OF COSSACK JUNIPER (JUNIPERUS SABINA)

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Abstract

The article presents the study and investigation of the features of the morphological structure of the vegetative organs of Juniperus sabina growing in the territories of Karaganda (Karaganda city, Karkaralinsk and Zhanaarka districts) and Ulytau regions (Ulytau district). Juniperus sabina is a widespread coniferous tree in Kazakhstan, belonging to the cypress family. A comprehensive study of Juniperus sabina growing in natural conditions is considered, bioecological features of the coenopopulation are revealed. A study of the morphological indicators of Juniperus sabina growing in various ecological and geographical conditions is carried out. Regional individuals of Juniperus sabina are identified. The research results are based on comprehensive field and experimental materials, scientifically based methods and modern statistical analyses that evaluate the reliability criterion.

Keywords: cossack juniper, morphology, cross-section, reliability criterion, conducting beam size, biometric indicators, coefficient of variation, bioecology.

It is very difficult to imagine a park or garden in nature without juniper. This is probably the best decoration of any garden or park, an integral part of the modern garden. The advantages of juniper include their durability and unpretentiousness, and of course, its color. Tall junipers can also be used as tapeworms to create alleys, large compositions [1]. Junipers today have become perhaps the leading visual component in landscape design, due to their properties and beauty. Their most valuable quality is year-round decorative effect. In addition, juniper enriches the air with oxygen, restrains strong gusts of wind, softens the microclimate in the area, absorbs noise coming from busy streets, and effectively absorbs dust [2].

Juniper, veres, yalovets, juniper, brudevelnik, mozhevel, grouse berries, grouse bush, can be called differently. There is no consensus among researchers about the origin of the Russian name for the plant. Most often, it is associated with the words "inter-spruce", "brain" - because of the strong vigorous wood, and the old Russian word "mozhzha" - a knot [3].

Juniper belongs to the family Cupressaceae Bartl. - cypress, subfamily Juniperoideae Endl. - juniper. This is the largest genus in the family, uniting, according to most taxonomists, about 70 species distributed on almost all continents of the northern hemisphere. This genus differs from other representatives of the family in significant polymorphism, which gave the taxonomists grounds to distinguish several subgenera, sections and series in it. The main distinguishing feature for this genus is the presence of a berry-like cone, called a coneberry, which is formed as a result of the fusion of scaly megasporophylls [4-6].

Juniper berries are credited with volatile, anti-inflammatory properties. They are able to produce an expectorant effect and a tonic effect. In case of disruption of the digestive system and intestines, juniper can be used as a strong laxative. There is a rather impressive list of diseases in which this amazing plant has brought great benefits [7, 8].

Mature (black with a bluish bloom) seedlings of common juniper are used. Although they are usually called berries, in fact they are fleshy cones, which are built from three fleshy scales, each containing one hard yellow-brown seed. The fruit pulp is greenish-brown, resinous and sweet, with a peculiar aroma [9].

The use of juniper also has a long history in folk medicine and household sanitation, perfumery. Juniper products retain all the properties of this noble tree [10].

Juniper berries, like the juniper tree, are currently presented mainly as a folk remedy. Moreover, juniper berries are the most commonly used and are also used in scientific medicine as a diuretic, but they are contraindicated in inflammation [11].

A huge amount of empirical and scientific knowledge has been collected about the Cossack juniper. This plant has attracted the attention of healers, botanists and ordinary people since ancient times.

All of the above emphasizes the well-deserved multilateral interest of mankind in plants of the genus Juniperus L. and determines the relevance of its further study from the standpoint of pharmacognosy and pharmacy in general.

Systematics of the genus Juniperus L.

All representatives of the genus Juniperus L. are small evergreen aromatic trees or shrubs, sometimes creeping, adapted to a dry climate and poor soils. Juni-

per is a dioecious plant, i.e. male and female reproductive organs are on different specimens. Occasionally, monoecious plants come across (one individual has both female and male organs). Male cones (microstrobili) almost sessile, yellowish. Female cones are numerous, indehiscent cones, with tightly closed fleshy scales, 5-9 mm in diameter, oblong-ovate or spherical, at first pale green, when ripe they are black-blue with or without a blue wax coating. They ripen in the second or third year in autumn, consist of three or six scales, sit on very short legs. In a cone there are three (sometimes 1-2) trihedral separate seeds, elongated-ovate or ovate-conical, yellow-brown. The first seed-bearing in open places in 5-10 years. Abundant harvests in 3-5 years (in these years, the yield of cones is over 50 kg/ha) [3, 4, 12].

The taxonomy of the genus is based on differences in the structure of vegetative organs - leaves (needles) and generative organs - cones [13].

S. Endlicher in 1847 singled out the juniper subfamily (Juniperoideae Endl.), section Oxycedrus Spach. he split into two: Caryocedrus Endl. and Oxycedrus Endl., gave them names and elevated them to the rank of independent sections. The section Sabina Spach. defined by E. Spach was left unchanged by S. Endlicher [14].

According to the generally accepted classification [4, 6, 13], the genus Juniperus L. is divided into three sections (subgenera) according to the following morphological features:

Section 1. Oxycedrus Endl. - about 20 species. Leaves in whorls of 3, needle-shaped, not descending at the base. Cones with a single apical ovule, located in the axils of the leaves, have 3 unfused seeds, buds with kidney scales. This includes species such as J. communis L., J. sibirica Burgsd., J. oxycedrus L., J. oblonga Bieb. and etc.

Section 2. Caryocedrus Endl. Leaves in whorls of 3, needle-shaped, not descending. Cones with 3 seeds fused together. The only representative is J. drupace-ae Labill.

Section 3. Sabina Endl. - about 50 species. Leaves in young plants and sometimes in adults are needle-shaped, in whorls of 3; in adults, most leaves are scaly, opposite in pairs, less often in 3 whorls, fused at the base. Cones without apical ovule, located at the ends of twigs, with 1-12 ununited seeds. This section is represented by -J. sabina L., J. excelsa Bieb. and others [4, 6, 13].

Subsequently, many different classifications of the genus Juniperus L. were proposed, one of the largest over the past 30 years is presented in the monograph by M.I. Ismailova (1974). The subgenus Juniperus L. is divided into 3 sections: section Oxycedroides Gauss. - Mediterranean mesothermal large trees (3-5 species), leaves with two white stomatal stripes, red or red-brown cones; section Regioides Gauss. - Eurasian-East Asian microthermal trees and shrubs (4-6 species), leaves with one white stomatal stripe, dark blue cones; Recurvoides Gauss section. - Central Asian microthermal shrubs and dwarf shrubs (6-8 species), leaves are needle-shaped, short, pressed to the shoots, cone berries are black, one-seeded. Subgenus Sabina Spach. is also divided into three sections, each of which, in turn, is divided into two series: Folia denticulatae Engelm. - finely toothed leaves and Folia integrae Engelm. - entire leaves. Section Poli-carpoides Ant. - mesothermic and oligothermal tall trees (20-25 species), multi-seeded junipers; section Virginoides Gauss. - North American meso- and olgiothermal trees (18-20 species), multi-seeded junipers; section Pseudosabinoides Ant. (Monospermae) - Central Asian microthermal trees, shrubs and elfins (18-20 species), one-seeded with black cones.

Representatives of the genus Juniperus L. are distributed exclusively in the northern hemisphere. Due to ecological fragmentation, some of its representatives grow in the arctic zone and the alpine belt of the southern mountains, others at different heights of the mountain ranges of the subtropical and tropical zones. Here, different species are distributed from the foot of the ridges up to 4000 m above sea level. and higher [4, 5, 12].

On the territory of Russia, 14 species of junipers grow. They are found in the Urals, in the mountains of Siberia and the Far East, and in the lowland forests of the North of the European and Asian parts as undergrowth and related species [3, 5, 15].

J. oblonga Bieb. (J. communis var. oblonga BiebJ is a typical representative of the Oxycedrus section. This is a low tree or large shrub 3-5 m tall, has long needle-like leaves (16 - 20 mm long), collected in whorls of three, with one white stomatal strip, cones are black, spherical or elliptical in shape, with a bluish bloom.There is a form with drooping branches, but without any features, which has been described as J. Wittmanniana Stev. or J. communis var. reflexa Parl. [16, 17].

Information about the systematic position of M. longconiferous is contradictory. Some researchers of the flora of the Caucasus m. long-coniferous are interpreted as an independent species. The largest researcher of the Caucasian flora A.A. Grossheim points out that the long-coniferous m. is a separate species, although it is very close to the common m. [15, 17, 18]. A.I. Galushko in 1950 transferred m. long-coniferous into a subspecies - J. communis L. subsp. oblonga (BiebJ Galushko, however, not considering it as such in his later works, like other Caucasian and foreign botanists, for example, the authors of the processing of the genus Juniperus L. "Flora of Turkey", in which, along with the common m. [19] Some works of the staff of the V.L. Komarov Botanical Institute, concerning the systematic processing of the Caucasian representatives of the genus Juniperus L., classify M. longconiferous as a subspecies of the polymorphic species J. communis L. long-coniferous and differs in its typical expression quite clearly morphologically and is more or less isolated geographically, and also has certain differences in the altitudinal distribution in the mountains of the Caucasus, however, it is associated with numerous, difficult to identify transitional forms and therefore is sometimes interpreted as a subspecies [19-21].

The area of growth of m. long-coniferous: Northern Iran, Northern Turkey, Crimea. This species is widely distributed throughout the Caucasus, especially

in the eastern and southern regions [22, 16-18]. Places of greatest growth: the upper and middle mountain belts of the Apsheron, Maikop, Mostovsky regions of the Krasnodar Territory; Piedmont, Zelenchuksky and Karachaevsky regions of Karachay-Cherkessia; Elbrus, Zolsky, Chereksky regions of Kabardino-Balkaria; in North Ossetia along the middle and upper reaches of the rivers Urukh, Ardon, Fiagdon, Gizeldon, the regions of Upper Mizur, Sadon, Matsuta, in the vicinity of Zaramag, Zgid, Zaki [20, 23]. Rising from sea level to the subalpine zone (2500 m above sea level), it grows on all soils, without avoiding open rocky slopes, in thickets of shrubs, less often in forests. It is comparatively rare in Western Transcaucasia, almost absent in Abkhazia and Adzharia [24-26].

J. sabina L. belongs to the subgenus Sabina Spach. This is a creeping dioecious shrub, with lying and ascending branches, leaves are needle-shaped, lanceolate with prickly tips, tiled, rhombic, cone berries are black single, small, with 2 seeds [16, 17].

General distribution: Caucasus, Crimea, mountains of Southern Europe, steppe part of Siberia, Altai, Central Asia and Mongolia [18, 26]. It grows on calcareous, clayey soils and loose sands; in the foothills and mountainous regions of the Caucasus it rises up to 2500 m above sea level [18, 20, 25, 26].

Standardization of plant materials by morphological features

For the introduction of new medicinal plant materials into scientific medicine, it is necessary, among other things, to establish its morphological and anatomical features.

We have proposed the main morphological features of the fruits of m. ordinary and long coniferous, which are presented in the table.

Table 1

Morphological features of the fruits of common juniper and dark coniferous juniper

Common juniper fruits	Dark coniferous juniper fruits
Fruits 6-9 mm in diameter, spherical, often depressed on the sides, smooth, shiny, rarely matte, almost black or purple. At the apex there are three converging grooves; at the base of the fruit are two three-leaved whorls of brown scales. In the pulp of the fruit 3 (sometimes 1 or 2) seeds. Seeds are oblong-trihedral, convex outside and flat on adjoining sides 4-5 mm long. The seed coat is hard. The color of the pulp is greenish-brown, the seeds are yellowish-brown.	Fruits are 8-10 mm in diameter, spherical or oval, often depressed on the sides, smooth, shiny, rarely dull, almost black or purple with a bluish bloom. At the top there is a three-beam seam, often with prominent tips turned back. At the base of the fruit are two three-leaved whorls of brown scales. In the pulp of the fruit 3 (sometimes 1 or 2) seeds. Seeds oval-oblong, obtusely trihedral, brownish, convex outside and flat on contiguous sides, 5-7 mm long. The seed coat is hard, the color of the pulp is greenish-brown.

The fruit powder of both species is brown with numerous black inclusions. The smell is peculiar, fragrant. The taste of water extract is bitter.

To determine the characteristic anatomical diagnostic features of raw materials, cross sections of the fetus, preparations of the epidermis and seed of m. long coniferous were studied. Information about the microscopic signs of M. vulgaris is taken from the literature [27].

When examining a preparation of the epidermis of cones from the surface of its cells, they are round-polygonal with strongly thickened walls, penetrated by many plasmodesmata. There are pores in the side walls (Fig. 1).

On the transverse section of the cone berry, it can be seen that the epidermal cells are covered with a thick layer of cuticle, under the epidermis there are two rows of hypodermal cells, which are larger than the epidermal ones. The cells of the epidermis and hypodermis are filled with red-brown contents.

In the fruit powder preparation, fragments of the seed peel are visible, consisting of layers of stony yellowish cells, rounded or 5-6-coal in shape; fetal epidermal cells with brown contents; the fruit pulp consists of loose thin-walled parenchyma. Rarely there are cells with slightly thickened walls, fragments of collenchyma of the fetal wall, fragments of endosperm and embryo with drops of fatty oil and aleurone grains.

The results of determining the macro- and microscopic features of the fruits of juniper longiferous were compared with those of common juniper [27]. No fundamental difference in their main diagnostic elements was found.

The results of determining the microscopic features of the fruits of juniper longiferous were confirmed and refined using scanning electron microscopy, which concentrated all the achievements of transmission electron microscopy.

Every year, consumer interest in natural medicines and medicinal products is continuously growing. According to various sources, the number of medicinal plants reaches 17-20 thousand, but about 300 are still used by official medicine. In recent decades, due to the emergence of a new nosological form - "drug disease" - the possibility of using drugs from plant materials has increased exorbitantly. In this regard, the study of plants of the genus juniper continues to be relevant. In the future, getting medicines from juniper will hopefully be affordable. For this, important experimental studies are being done, and analyzes are being carried out.

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