

## Pharmacognostic study of leaves and herbs of *Caragana jubata* (Fabaceae)

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### Pharmacognostic study of *Caragana jubata* (fabaceae) leaves and grass

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#### SUMMARY

Decoctions from raw *caragana maned* in Tuvan ethnomedicine are used as antimicrobial, anti-inflammatory and hypolipidemic agents. In this regard, it seems relevant to comprehensively study the morphological and anatomical structure of the entire medicinal plant for the use of plant materials in official medicine. In the course of commodity analysis, the numerical indicators of raw materials were determined. The revealed features of the morphological and anatomical structure can serve as diagnostic indicators of the authenticity of raw materials, leaves and grass of *caragana maned* and be used in the preparation of a pharmacopoeial monograph (FS).

Key words: *caragana maned*, leaves, grass, *Caragana jubata* Lam., Microscopic analysis.

#### RESUME

Decoctions of raw *Caragana jubata* in Tuva ethnomedicine are used as anti-bacterial, anti-inflammatory and lipid-lowering agents. In this regard, it is relevant to make a comprehensive study of morphological structure of medicinal plant for the use of plant materials in the conventional medicine. During the product analysis, the numerical parameters of raw materials were determined. The features of morphological structure may serve as diagnostic indicators of the authenticity of *Caragana jubata* raw leaves and grass and be used in the preparation of pharmacopoeial monograph (PhM).

Keywords: leaves, grass, *Caragana jubata* Lam., microscopic analysis.

Herbal medicinal preparations, possessing a mild pharmacological effect, the ability to be used both for the prevention of a number of diseases and for the treatment of slowly developing chronic diseases, have always aroused great interest in official medicine. The search for new sources of raw materials and the expansion of the range is relevant in connection with the growing demand for herbal preparations. One of these plants is *Caragana jubata* Lam., belonging to the legume family (Fabaceae). To prepare the broth, use the aboveground part plants - leaves, grass. *Caragana maned* is a shrub up to 5 m in height, peculiar in appearance. Blossoms in June-July; bears fruit in August-September.

It is found in the European part of Russia, in Eastern Siberia, in the Far East and in Central Asia. *Caragana maned* grows throughout Tuva, preferring high-mountain tundra, dwarf birch forests, and is also a part of valley phytocenoses (valley shrubs and forests). It is most widespread in the southeast of Tuva (Sangilensky mountain taiga-meadow-steppe and East Tannuolsky natural regions), sporadically occurs in the West Sayan mountain taiga-steppe (Alash and Kurtushibinsky subregions), East Sayan mountain goltsovo-taiga and East -Tuva goltsovo-mountain-taiga regions of the republic [3]. It grows on dry, stony, clayey slopes, in high-mountainous steppes up to an altitude of 3700 m above sea level. Contains in its composition such groups of substances as: flavonoids, tannins, organic acids, saponins, coumarins, sterols, sugars,

In folk medicine, decoctions of the roots and branches of *caragana* are used for acute respiratory diseases and influenza. Due to the slight irritating effect of the saponins present, the secretion of the glands is increased, which leads to liquefaction of sputum and facilitates its evacuation. In addition, the presence of saponins stimulates the absorption of some other medicinal substances.

Decoction and infusion of the branches are used for gastrointestinal diseases, stomatitis, laryngitis, inflammatory diseases of the mucous membranes and skin diseases. Due to

given action presence ethereal oils, possessing antimicrobial and anti-inflammatory properties. Collect the entire aerial part of the plant from the maned caragana, cutting it off at some distance from the ground. Maned caragana is harvested all year round, including in winter, but preference is given to raw materials from spring or autumn harvests [4].

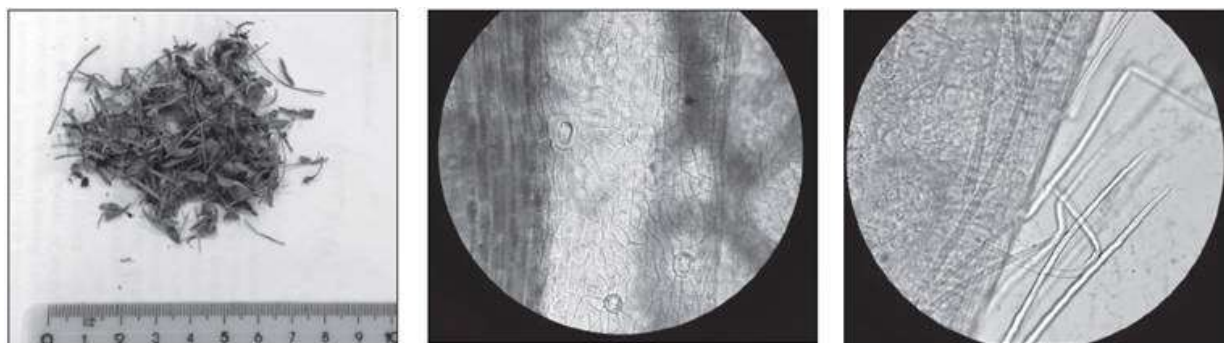
Purpose of the work: a comprehensive study of the morphological and anatomical structure and description external signs of raw caragana maned (leaf and grass).

#### Materials and methods

The object of the study was raw material - leaves and grass of caragana maned (Fig. 1, 6). Raw materials were procured in the Republic of Tuva, in the Kungurtugsky region in 2010, in the spring in places of natural growth. The collected raw materials were processed: they were dried in ventilated warm rooms and under sheds, tied in small bundles and hung on stretched ropes, under conditions of intensive ventilation. The study of external signs, microscopy, the determination of numerical indicators was carried out in accordance with the requirements of the State Pharmacopoeia XI (GF XI) and GF XII [1, 2]. Anatomical and diagnostic signs of whole raw materials were studied on cross sections, the structure of the epidermis - on preparations from the surface.

Micrographs were obtained using a LOMO 4820 microscope with x40, x100, x400, x1000 objectives with x10 and x40 eyepieces for 2-3 series of 10. The photographs were processed on a computer using Adobe Photostop 7.0 software.

Determination of moisture content, total ash content, ash insoluble in HCl, was carried out according to the methods of State Pharmacopoeia XI [1, 2].



Rice. one

Rice. 1. Leaves *Caragana jubata*.

Rice. 2

Rice. 2. Sheet *Caragana jubata*. Cells located at the base of the hair. Uv.x40.

Rice. 3

Rice. 3. Sheet *Caragana jubata*. Simple unicellular hairs. Uv.x40.

#### Research results and their discussion

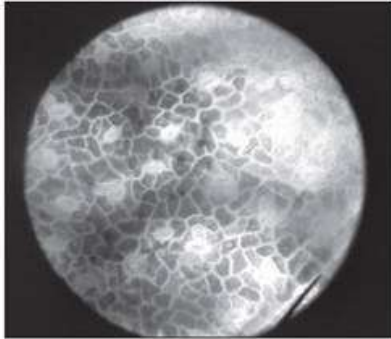
Study of the external signs of the leaves of the maned caragana External signs. Whole raw materials. Separate leaves and petioles of a complex pair-pinnate leaf, buds. Leaflets are elongated oval or lanceolate-elliptic, dense, entire with a very short petiole, semi-appressed long-haired or shaggy. The length of the leaf is 0.5-1.5 cm, the width is 0.3-0.7 cm. The color of the leaves on both sides is dark green, matte, and the buds are yellow (Fig. 1). The smell is weak. The taste is slightly bitter. Shredded raw materials. Pieces of raw materials of various shapes passing through a sieve with holes in diameter 7 mm. The color is dark green. The smell is weak. The taste is slightly bitter.

#### Study of the anatomical and diagnostic features of the leaves of caragana maned

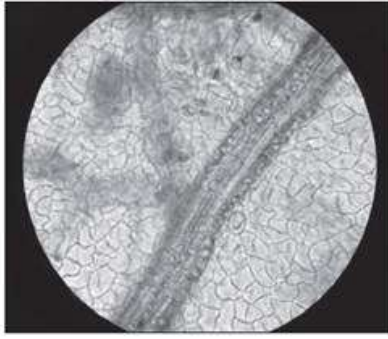
When examining the leaf from the surface, epidermal cells with polygonal straight walls are visible. Cells located at the base of a hair, arranged radially, form an angular six to eight-rayed rosette (Fig. 2). The hairs are short, simple, unicellular, often bent, with thin walls (Fig. 3). The hairs often fall off, and a rounded ridge is visible in the center of the rosette. The stomata are surrounded by 4-6, rarely 3 cells of the epidermis (anomocytic type), located only on the underside of the leaf (Fig. 4). The mesophyll contains calcium oxalate crystals. The main and larger lateral veins of the leaf are surrounded by a crystalline sheath (Fig. 5).

### The study of external signs of the grass caragana maned

External signs. Whole raw materials. Whole or partially chopped stems with leaves, flowers and thorns. Stems are simple, covered with gray or blackish bark. The diameter of the stems is from 0.5 to 3 cm, the length is 3 cm. The leaves are elongated-oval or lanceolate-elliptical, dense, whole-edged with a very short petiole, half-pressed long-haired or shaggy. Leaflet length - 0.5-1.5 cm, width - 0.3-0.7 cm. Petioles 1.5-4 cm long, long-haired, hardening and remaining in the form of straight thorns. Stipules are large, with dense white pubescence, triangular-lanceolate, soft-skinned and hairy, ending in a thorn, hardening, non-falling. The flowers are single, large (up to 3.5 cm in diameter). The calyx is campanulate, five-toothed with teeth unequal in length, pubescent with appressed hairs, 0.15-0.2 cm long, deep and narrow neckline; two side petals (wings) are only slightly shorter than the flag; the lower fused petals (boat) are slightly wider than the wings. The fruit is a pod, brownish-brown, small, hairy, ending in a rigid styloid acumen. 3-4 cm long, 0.5-0.7 cm wide. The color of the stems and leaves is grayish-green with black spines, the flowers are yellow (Fig. 6). The smell is weak. The taste is slightly bitter. Shredded raw materials. Pieces of stems, leaves and flowers of various shapes, passing through a sieve with holes with a diameter of 7 mm. The color of pieces of stems and leaves is grayish-dark green, flowers are yellow. The smell is weak, peculiar. Bitter taste. The color of the stems and leaves is grayish-green with black spines, the flowers are yellow (Fig. 6). The smell is weak. The taste is slightly bitter. Shredded raw materials. Pieces of stems, leaves and flowers of various shapes, passing through a sieve with holes with a diameter of 7 mm. The color of pieces of stems and leaves is grayish-dark green, flowers are yellow. The smell is weak, peculiar. Bitter taste. The color of the stems and leaves is grayish-green with black spines, the flowers are yellow (Fig. 6). The smell is weak. The taste is slightly bitter. Shredded raw materials. Pieces of stems, leaves and flowers of various shapes, passing through a sieve with holes with a diameter of 7 mm. The color of pieces of stems and leaves is grayish-dark green, flowers are yellow. The smell is weak, peculiar. Bitter taste.



Rice. 4



Rice. 5



Rice. 6

Rice. 4. Sheet *Caragana jubata*. Anomocytic stomatal complex. Uv.x40.

Rice. 5. Sheet *Caragana jubata*. Crystalline vein lining. Uv.x40. Rice. 6.

Grass *Caragana jubata*.

### Study of the anatomical and diagnostic signs of the herb caragana maned

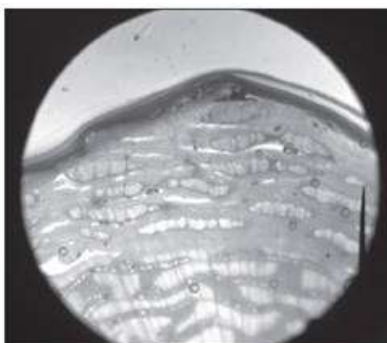
When examining the leaf from the surface, epidermal cells with polygonal straight walls are visible. The cells located at the base of the hair, arranged radially, form an angular six to eight-rayed rosette. The hairs are short, simple, unicellular, often bent, with thin walls. The hairs often fall off and a rounded ridge is visible in the center of the rosette. The stomata are surrounded by 4-6, rarely 3 cells of the epidermis (anomocytic type), located only on the underside of the leaf. The mesophyll contains calcium oxalate crystals. The main and larger lateral veins of the leaf are surrounded by a crystalline sheath.

In the cross section of the stem, the central axial cylinder is clearly expressed (Fig. 7). The integumentary tissue is represented by a cork, with elongated, even cells. There is a visible separation of the primary and secondary cortex by cambium (Fig. 8). Air cavities are formed towards the center. Tangent-elongated bast fibers are clearly visible in the bark. Wood has a peculiar ring-vascular structure. The parenchyma is expressed around the vessels. In the cells of the parenchyma and the core there is a lot of brown dye. The arrangement of the conductive elements of the wood creates a kind of specific picture for the identification of a given plant. The cells of the epidermis of the petals are weakly sinuous with clearly visible thickenings. In the mesophyll of the petals, inclusions of calcium oxalate and a crystalline sheath are found (Fig. 9, 10).



Rice. 7

Rice. 7. Stem *Caragana jubata*. Cross section. Uv. x40.



Rice, 8

Rice. 8. Stem *Caragana jubata*. Cross section. Uv. x10.

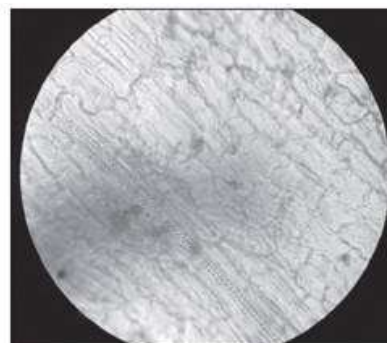
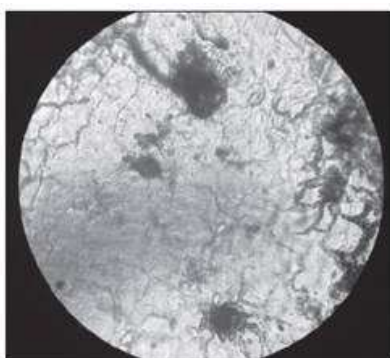


Fig 9

Rice. 9. Petal *Caragana jubata*. Crystalline lining. Uv.x40.



Rice. 10. Petal *Caragana jubata*. Calcium oxalate inclusions. Uv.x40.

#### Standardization of the aboveground part of *Caragana jubata*

According to the requirements for regulatory documents for plant raw materials, a pharmacopoeial monograph should contain standardization of numerical indicators. The studies carried out revealed that the moisture content of the studied raw materials was  $4.5 \pm 0.5\%$ . The total ash content in raw *Caragana jubata* maned is  $4.00 \pm 0.1\%$ . The ash content insoluble in HCl is  $3.51 \pm 0.1\%$ . The data obtained correspond to the norms of the State Pharmacopoeia [1, 2].

#### conclusions

The study was carried out in the laboratory of biologically active compounds of the Research Institute of Pharmacy and the laboratory of pharmacognosy of the I.M. Sechenov in May 2013. During the study of the ground part of the maned *Caragana jubata* Lam., Fam. Fabaceae for the first time carried out its morphological and microscopic analysis. Established morphological and anatomical diagnostic signs. In the course of commodity analysis, the numerical indicators of raw materials were determined.

The results obtained can be used in the development of a draft FS for raw materials of *Caragana jubata* maned leaves and grass.

#### Literature

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