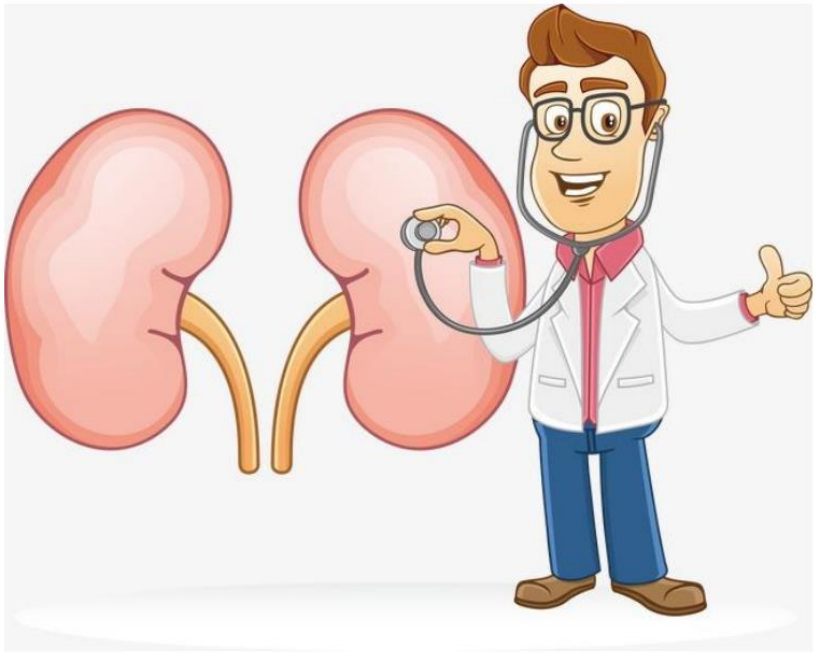
Medicinal plant raw materials and phytopreparations of diuretic action.

Diuretics affect water and salt metabolism, preventing the formation of edema or promoting its elimination. Diuretics increase the excretion of water and salts from the body; in the case of poisoning, increased diures is contributes to the removal of poisons.

The mechanism of diuretic action is diverse. Increase in diures is may come as a result of inhibition of the activity of the enzyme carboaehydrase; in the formation of acidic products in the body, due to osmotic pressure, weakening the processes of reabsorption in the renal tubules; atinfluence on hormonal regulation of water metabolism, etc.



The advantages of diuretic plants are that they usually have a wide range of pharmacological activity, providing anti-inflammatory, antispasmodic, stony loosening, immunomodulatory and other effects indicated in various diseases of the kidney and urinary tract Plant diuretics have a milder effect, practically do not remove potassium, but remove sodium and chlorine salts (salurea) from the body.

Various diseases of the kidneys and urinary tract Plant diuretics have a milder effect, practically do not remove potassium from the body, but remove sodium and chlorine salts (saluretics), which is very important in the treatment of glomerulonephritis.

An important fact is that diuretics of plant origin are used in edema of cardiac and renal origin, diseases of the bladder and urinary tract, in the presence of kidney stones. In nephritis and nephrosis is allowed to use only those drugs that do not irritate the renal parenchyma.

Plants containing diuretic substances are often prescribed in ain combination with each other in the form of a kidney medicinal tea collections, which can be consumed for long periods of time, intermittently.

1. birch - Betula pendula and downy birch - B.pubescens
2. Cornflower blue - Centaurea cyanus
3. Orthosiphon stamineus - Orthosiphon stamineus
4. horsetail - Equisetum arvense

The leaves of the shrub Arctostaphylos uva-ursi (Ericaceae), widely known as Uva Ursi or bearberry, are used to treat cystitis and urethritis, although their use is not supported by evidence from randomized controlled trials.

Constituents. The main constituents are hydroquinone derivatives, notably the glycoside arbutin. This compound is hydrolysed in vivo by the enzyme b-glucosidase to give the diphenol, hydroquinone. Other constituents include terpenoids such as a- and b-amyrin, flavonoids and tannins.

Therapeutic uses and available evidence.
Hydroquinone is the main active component of this material and is a potent phenolic antiseptic. This compound is very active against many bacteria, but in particular those that are liable to cause urinary tract infections such as Escherichia coli and Pseudomonas aeruginosa. Activity has also been demonstrated against other species such as Bacillus subtilis and Staphylococcus aureus. Arbutin is hydrolysed by b-glucosidase to yield the active principle hydroquinone, which has antiseptic and astringent properties. Uva-ursi is also mildly diuretic and antilithuric. Uvaursi preparations such as Arctuvan require that the urine is alkaline for it to have antiseptic properties and, as such, acidic foods including cranberry juice (see below) should be avoided during treatment. Hydroquinone is a very reactive and biologically active compound and is cytotoxic and mutagenic. High doses and prolonged usage of bearberry products should be avoided and it should not be used during pregnancy or by anyone who has a kidney infection.

birch buds – Betulae gemmae

Birch leaves - Betulae folia

silver birch (European white birch) - Betula pendula Roth.

downy birch - B.pubescens Ehrh.

Family Betulaceae.

Betula pendula, commonly known as **silver birch**, **warty birch**, **European white birch** is a medium-sized deciduous tree that owes its common name to the white peeling bark on the trunk. The twigs are slender and often pendulous and the leaves are roughly triangular with doubly serrate margins and turn yellow and brown in autumn before they fall. The flowers are catkins and the light, winged seeds get widely scattered by the wind.

The silver birch typically reaches 15 to 25 m tall (exceptionally up to 31 m), with a slender trunk usually under 40 cm in diameter. The bark on the trunk and branches is golden-brown at first, but later this turns to white as a result of papery tissue developing on the surface and peeling off in flakes, in a similar manner to the closely related paper birch (B. papyrifera). The bark remains smooth until the tree gets quite large, but in older trees, the bark thickens, becoming irregular, dark, and rugged. Young branches have whitish resin warts and the twigs are slender, hairless, and often pendulous. The buds are small and sticky, and development is sympodial – the terminal bud dies away and growth continues from a lateral bud. The species is monoecious with male and female catkins found on the same tree. Some shoots are long and bear the male catkins at the tip, while others are short and bear female catkins. The immature male catkins are present during the winter, but the female catkins develop in the spring, soon after the leaves unfurl.

The leaves have short, slender stalks and are 3 to 7 cm in long, triangular with broad, untoothed, wedge-shaped bases, slender pointed tips, and coarsely double-toothed, serrated margins. They are sticky with resin at first, but this dries as they age, leaving small, white scales. The foliage is a pale to medium green and turns yellow early in the autumn before the leaves fall. In midsummer, the female catkins mature and the male catkins expand and release pollen, and wind pollination takes place. A catkin of Silver birch could produce an average of 1.66 million pollen grains. The small, 1- to 2-mm winged seeds ripen in late summer on pendulous, cylindrical catkins 2 to 4 cm in long and 7 mm in broad. The seeds are very numerous and are separated by scales, and when ripe, the whole catkin disintegrates and the seeds are spread widely by the wind.

Betula pubescens (syn. *Betula alba*), commonly known as **downy birch** and also as **moor birch**, **white birch**, **European white birch** or **hairy birch**, is a species of deciduous tree, native and abundant throughout northern Europe and northern Asia, growing farther north than any other broadleaf tree. It is closely related to, and often confused with, the silver birch (B. pendula), but grows in wetter places with heavier soils and poorer drainage.

It is a tree growing to 10 to 20 m tall (rarely to 27 m), with a slender crown and a trunk up to 70 cm (exceptionally 1 m) in diameter, with smooth but dull grey-white bark finely marked with dark horizontal lenticels. The shoots are grey-brown with fine downy. The leaves are ovate-acute, 2 to 5 cm in long and 1.5 to 4.5 cm in broad, with a finely serrated margin. The flowers are wind-pollinated catkins, produced in early spring before the leaves. The fruit is a pendulous, cylindrical aggregate 1 to 4 cm in long and 5 to 7 mm in wide which disintegrates at maturity, releasing the individual seeds; these seeds are 2 mm in long with two small wings along the side.

The silver birch grows naturally from western Europe eastwards to Kazakhstan, the Sakha Republic in Siberia, Mongolia, in China, and southwards to the mountains of the Caucasus and northern Iran, Iraq, and Turkey. It is also native to northern Morocco and has become naturalised in some other parts of the world. In the southern parts of its range, it is mainly found in mountainous regions.

Betula pubescens has a wide distribution in northern and central Europe and Asia. Its range extends from Newfoundland, Iceland, the British Isles and Spain eastwards across northern and central Europe and Asia as far as the Lake Baikal region in Siberia. The range extends southwards to about 40°N, its southernmost limit being Turkey, the Caucasus and the Altai Mountains. It is a pioneer species which establishes itself readily in new areas away from the parent tree. This allows other woodland trees to become established and the birch, a short-lived tree, eventually gets crowded out as its seedlings are intolerant of shady conditions.

Chemical composition. Birch buds contain 5 - 8% of essential oil of yellow color with a pleasant balsamic odor. Its main components are bicyclic sesquiterpenes - betulene and the alcohol betulinol. The latter is found both in free form and as an ester with acetic acid.The oil is also rich in resinous substances, there are flavonoids, alkaloids and higher fatty acids.
In the leaves of birch bark found essential oil (up to 0.1%), in the composition of which sesquiterpene oxides, a triterpenoid of the dhammaran series - betulafolientriol, phenolcarboxylic acids, flavonoids, saponins, ascorbic acid (up to 2.8%).

According to Russia State Pharmacopeia XIV in the whole raw material the sum of flavonoids in theconverted to luteolin should be at least 2.5%; essential oil - not less than 0.2%.

The buds are harvested in January - April before they blossom (before the cover flakes at the top of the bud). spreading of the covering scales on the top of the bud). Cut branches with buds, tie them into bundles (brooms). Dry for 3 - 4 weeks on the open air or in a well-ventilated room. After drying buds are threshed, then cleaned of impurities on sieves or screens.

External features. Elongate-conical, pointed orblunted buds, often sticky. Covering scales slightly ciliated,shingle-shaped, tightly appressed at the edges. Color of budsbrown, sometimes greenish at the base. The odor is balsamic,pleasant. The flavor is slightly astringent, resinous.

The young leaves are harvested in May and June. Dry in the shade or in attics. Allowed heat drying at a temperature of heating raw materials 30 - 35 ° C.

External features. Leaves are ovate-rhombic, triangular-ovate or oval-ovate. Their base is broad wedge-shaped or truncated, the apex is acuminate. The edge of the leaf is bilaterally toothed, the tips of the teeth are dark brown. Leaves are slightly leathery. Color is brownish-green, odor is weak, specific. The flavor is bitter, resinous.

Used buds and leaves in the form of infusions as diuretic(mainly in edema of cardiac origin), choleretic and bactericidal. Birch leaves have a wider range of biological activity, possessing along with diuretic properties mild choleretic effect.

Buds and leaves of birch are included in the composition of the diuretic collections. From the leaves of birch produce a dry extract, which used as a choleretic, anti-inflammatory agent.

Dry extract is part of the hepatoprotective drug "Sibektan". Birch leaves are part of a diuretic drug "Becvorin".

In functional kidney failure to use infusions of kidneys and birch leaves are not recommended, as they contain resinous substances that have an irritating effect.

From the wood of birch trees are obtained activated charcoal and tar.

cornflower flowers –Centaureae cyani flores
cornflower (bachelor's button) - Centaurea cyanus L.
Family Asteraceae

Centaurea cyanus is an annual plant growing to 40–90 cm tall, with grey-green branched stems. The leaves are lanceolate and 1–4 cm long. The flowers are most commonly an intense blue colour and arranged in flowerheads (capitula) of 1.5–3 cm diameter, with a ring of a few large, spreading ray florets surrounding a central cluster of disc florets. The blue pigment is protocyanin, which in roses is red. Fruits are approx. 3.5 mm long with 2–3 mm long pappus bristles. It flowers all summer.

Centaurea cyanus is native to temperate Europe, but is widely naturalized outside its native range.

Widespread in the European part as a weed of rye and wheat fields, except for the Far North and arid southern regions. In Central Asia, Kazakhstan and the Far East it occurs only sporadically. It occurs only sporadically in Western Siberia, penetrating only into the southern regions.

Chemical composition.

The main active substances of the flowers are anthocyanins - diglucosides of cyanidin and pelargonin – and flavonoids, represented by derivatives of apigenin, luteolin, quercetin and kaempferol.

In addition, coumarins (chicoryin) are present, tannins, some essential oil.

The quality of raw materials is regulated by the requirements of Russian Pharmacopeia XIV. Quality control quality provides the determination of the content of the sum of anthocyanins in recalculation of the main component - cyanidin - 3,5 - diglycoside. It should be at least 0.60%.

Collect a flower heads in full bloom, plucking the marginal and partially middle tubular flowers, the peduncle with the wrapper is discarded. To avoid change (loss) of blue coloring, flowers are dried in a sun-protected place, under sheds or in attics with good ventilation. After drying from the raw material remove the flowers that have lost the natural color, as well as organic and mineral impurities.

External features. The raw material consists of a mixture of marginal and median flowers. The marginal flowers are funnel-shaped, up to 2 cm in long, corolla-shaped, irregular, with 5 to 8 deeply in cised. lanceolate lobes of the bend. The middles are tubular, about 1 cm long, five-toothed along the margin, stamens with fused anthers. The color of the marginal flowers is blue, and that of the median flowers is blue-purple. The odor is weak. The flavor is slightly spicy.

Uses. Infusions and decoctions are used in complex therapyin chronic inflammatory diseases of the kidneys and urinary tractpathways, with edema associated with kidney disease and cardiovascular system.

From cornflower flowers are prepared 10% aqueous infusion, which used as a mild diuretic in diseases of the kidneys and bladder.

They also have a choleretic effect, improve the digestive function.

cat's whiskers leaves – Orthosiphonis staminei folia
cat's whiskers - Orthosiphon stamineus Benth.
Family Lamiaceae

It is a herbaceous shrub that can grow up to 1.5 m high. The stem is quadrangular, erect, branching profusely and reddish-coloured. The leaves are arranged in opposite pairs, simple and green; the leaf lamina is oval to lanceolate, glabrous and has serrated margin; the leaf apex is acuminate with acute leaf base; the petioles are short and reddish purple. The inflorescences are campanulate in shape, white or purple in color with long exerted filaments that look like cat's whiskers.

The plant is a medicinal herb found mainly throughout southern China, the Indian Subcontinent, South East Asia, and tropical Queensland, Australia.

Chemical composition.

Triterpene saponins (up to 3%), derivatives of α-amyrin, mesoinositol. Accompanying substances includeflavonoids, potassium salts, bitter glycoside orthosiphonin, tannins.substances.

According to Russian State Pharmacopeia XIV in whole, crushed raw materials, powder content extractive substances extracted with water should be at least 22%.

Harvesting, primary processing and drying. Leaves and tops of shoots with a stem no thicker than 2.5 mm and up to 120 mm long are harvested by hand 5-6 times during the summer.

They are placed in the shade for wilting and fermentation for 1 to 1.5 days, and then quickly dried in the sun or in dryers at 30-35°C.

External features. Whole raw material consists of leaves whole or broken, stems and shoot tops. Throughout the leaf lamina there are pinpoint glands (visible in a magnifying glass). The color of leaves is green, grayish-green or violet-brown, stems - greenish-brown or violet-brown, yellowish-white at the break. Faint odor. The flavor is bitter, slightly astringent.

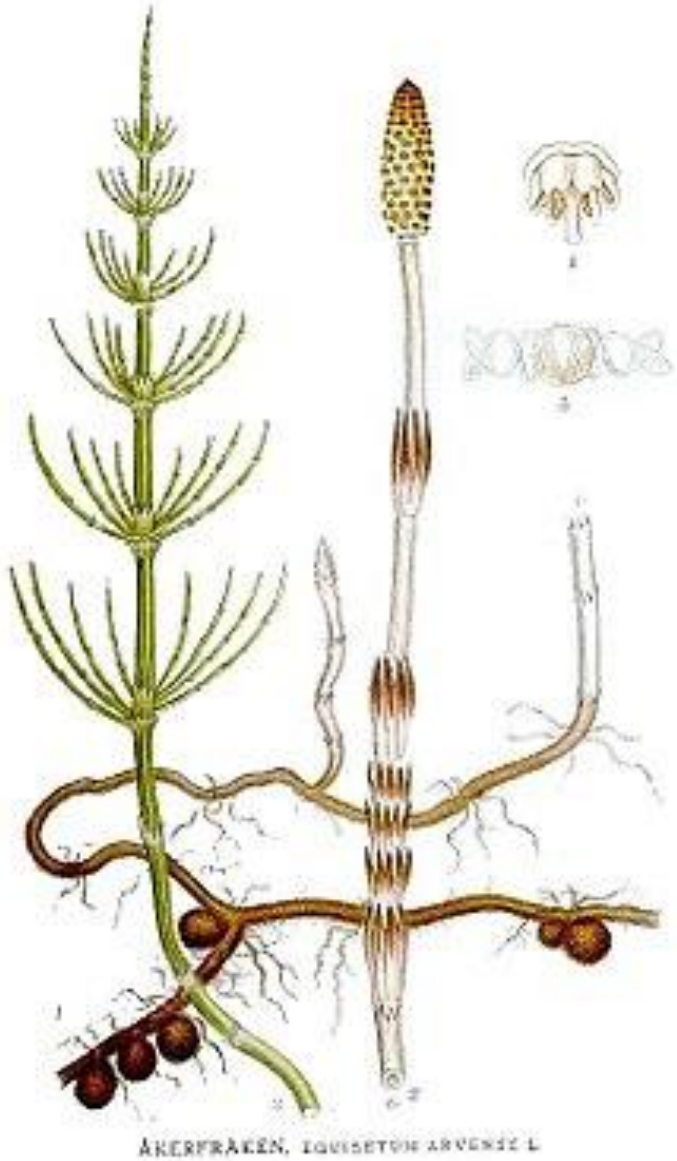
As a medical herb, it is used for increasing excretion of urine, lowering uric acid, protecting kidney, reducing oxidative stress, reducing inflammation, protecting liver, protecting stomach, lowering blood pressure, ameliorating diabetes, ameliorating hyperlipidemia, fighting microorganisms and fighting anorexia.

Infusion of leaves is used asmoderate diuretic, with urolithiasis, cholecystitis,gout. Diuretic effect is accompanied by increased excretion of urea, uric acid and chloride.

common horsetail herb- Equiseti arvensis herba
common horsetail - *Equisetum arvense* L.
Family *Equisetaceae*

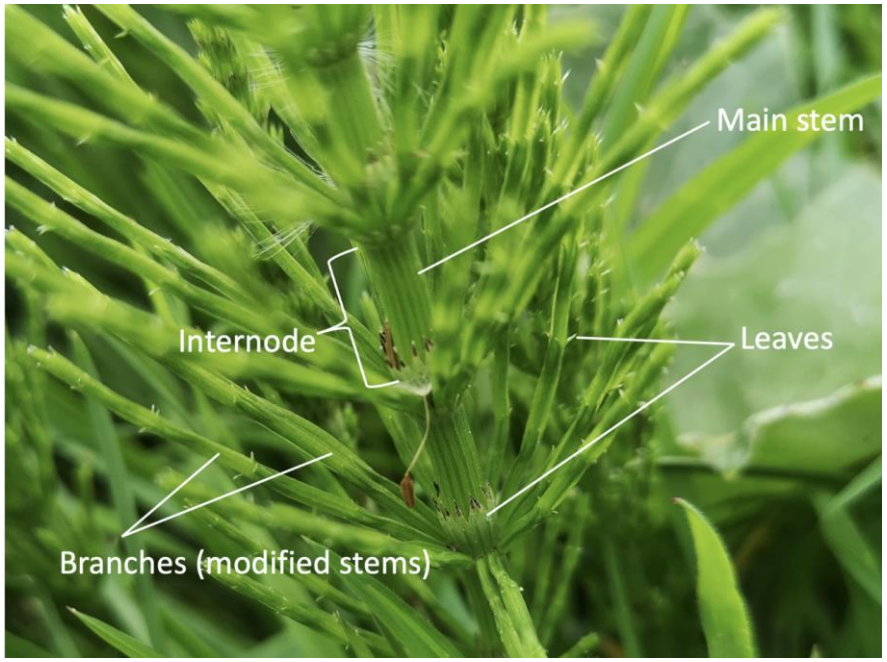
Equisetum arvense, the **field horsetail** or **common horsetail**, is an herbaceous perennial plant in the Equisetidae (horsetails) sub-class, native throughout the arctic.

Equisetum arvense creeps extensively with its slender and felted rhizomes that freely fork and bear tubers. The erect or prostrate sterile stems are 10–90 cm in tall and 3–5 mm in diameter, with jointed segments around 2–5 cm in long with whorls of side shoots at the segment joints; the side shoots have a diameter of about 1 mm. Some stems can have as many as 20 segments. The solid and simple branches are ascending or spreading, with sheaths that bear attenuate teeth.



The off-white fertile stems are of a succulent texture, 10–25 cm tall and 3–5 mm diameter, with 4–8 whorls of brown scale leaves and an apical brown spore cone. The cone is 10–40 mm long and 4–9 mm broad. The fertile stems are typically precocious and appear in early spring.

Fertile shoots



A sterile stem of Equisetum arvense, showing its leaves, stems and internodes

Horsetail has a cosmopolitan type of habitat, occurring in the temperate zones of all continents. In Russia it is widespread almost everywhere in Russia, except for deserts and semi-deserts of Central Asia and Kazakhstan, as well as the Arctic zone of the Far North.

It grows in meadows, riverbanks, among shrub thickets. As weed is often found in fields and vegetable gardens, is common along roadsides, on the slopes of railway embankments. slopes of railway embankments, near ditches, in sandy and clay quarries.

Chemical composition.

The main components of horsetail herb are flavonoids - derivatives of apigenin, luteolin, kaempferol and quercetin (including horsetail characteristic equisetrin, which is a disaccharide of flavanol kaempferol).

Phenolic acids and tannins have also been found,triterpene saponins (the main of which is equisetonin), some alkaloids (nicotine, palustrine), a significant amount of derivatives of silicic acid (up to 25%), which is in a soluble form bound to organic compounds.

The quality of raw materials is regulated by the Russian State Pharmacopoeia XIV edition. In whole, crushed raw materials, powder, the sum of flavonoids in terms of quercetin should be at least 0.3%.

Green vegetative shoots are harvested in summer by cutting them at a height of about 5 cm from the soil surface with sickles or knives.about 5 cm above the soil surface with sickles or knives, and in case of dense stands - by mowing with scythes.standing - mowing with scythes. When harvesting carefully look at the raw material anddiscard the grass of other species of horsetail or other plants.

Drying is carried out outdoors in the shade or in dryers with artificial heating at a temperature of artificial heating, spreading looselayer no more than 5 cm thick on paper or cloth.

External features.

These are whole or partially crushed stemsup to 30 cm long, stiff, segmented, furrowed, with 6 - 18 longitudinalribs, whorled and branched almost from the base. Herb colour is greyish-green, odourless, taste sour.

As impurities, there may be shoots of other horsetail species growing in areas where horsetail is harvested, among which there may bepoisonous. Such as *Eguisetum palustra*, *Eguisetum pretense*, *Eguisetum silvaticum*, *Eguisetum fruviatile* and *Eguisetum hiemale*.

Eguisetum palustra

Eguisetum pretense

Eguisetum fruviatile

Used as a diuretic (diuretic),possessing stone loosening, anti-inflammatory properties.The herb is used in infusions, decoctions and extracts.

It is included in the composition of anti-asthmatic mixture Traskova, in diuretic collections andcollection Zdrenko. Preparations of horsetail used as a diuretic foroedema due to heart failure, as well as inflammatoryprocesses of the bladder and urinary tract.Infusions are used as haemostatic agents and prescribedin haemorrhoidal and uterine bleeding.

Horsetail extract is included inHorsetail extract is part of a complex drug "Marelin", used forrenal stone disease. Horsetail should not be used in nephritis and nephrosis, as it can cause kidney irritation.can cause irritation of the kidneys. Take preparations of horsetailfield horsetail should be under the supervision of a doctor, strictly following the prescribed regimen.

Thank you for your attention