ANATOMICAL STRUCTURE OF THE RHIZOME AND ROOTS OF GEUM URBANUM L.

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Abstract: An important task of modern phytotherapy is to find promising tannin-containing plants in order to create new drugs. Promising for this group are drugs based on plant material. Substances that cause plant antimicrobial activitiy include, in particular tannins. Therefore, the search and investigation of an antimicrobial medicinal plant containing tannins in order to create new herbal remedies are timely and urgent problem today. These include Geum urbanum L., a perennial herbaceous plant of the Rosaceae family that grows as a weed in shrubs, gardens, parks, orchards, and light forests. According to the literature, tannins accumulate in all organs of the plant in an amount of 3 to 40%. Previous studies of aboveground and underground organs of Geum urbanum L. on the content of tannins, depending on the phase of vegetation and place of growth, was found that the most promising raw materials are rhizomes and roots collected during fruiting. In folk medicine, phytomedicines from the rhizome and roots of Geum urbanum L. are recommended for diseases: gastrointestinal, bronchopulmonary and oral, as anti-inflammatory, antimicrobial, hemostatic, astringent. The aim of the study was investigation of the anatomical structure of rhizomes and roots of Geum urbanum L. in order to identify them. The object of the study were the roots and rhizomes of Geum urbanum L. collected in August - September on the outskirts of Burgas (Bulgaria). The studies were performed on fresh and fixed material by conventional methods using an ICBM-1P microscope. The micrographs were taken with a UFO DC-5207 digital camera. The anatomical structure of the rhizome with one-, two- and three-year increments was studied. The annual growth of the rhizome was determined by the number of layers of wood fibers in the leading bundles. Regardless of the age of the rhizome, its cross-sectional structure is visible in cross section. The primary structure of Geum urbanum L. root is typical of dicotyledonous plants. Secondary structure of the root and rhizome of the beam type was located and periderm - secondary integumentary tissue is located in the middle zone of the primary cortex in both the roots and rhizomes. There are no mechanical fibers in the cortex of the organs. At the root of the vessel of primary origin are placed opposite the core rays. The mechanical part of the xylem section of the rhizome consists of thick-walled wood fibers. The obtained results will allow to standardize medicinal plant raw materials with its subsequent use in the creation of phytomedicines.

Keywords: Geum urbanum L., phytotherapy, tannins.

1. INTRODUCTION

An important task of modern phytotherapy is to find promising tannin-containing plants in order to create new drugs. These include Geum urbanum L., a perennial herbaceous plant of the Rosaceae family that grows as a weed in shrubs, gardens, parks, orchards, and light forests. According to the literature, tannins accumulate in all organs of the plant in an amount of 3 to 40%. Previous studies of aboveground and underground organs of urban gravity on the content of tannins depending on the phase of vegetation and place of growth, we found that the most promising raw materials are rhizomes and roots collected during fruiting. In folk medicine, phytomedicines from the rhizome and roots of urban gravity are recommended for diseases: gastrointestinal, bronchopulmonary and oral, as anti-inflammatory, antimicrobial, hemostatic, astringent.

2. MATERIALS AND METHODS

The object of the study were the roots and rhizomes of urban gravity collected in August - September on the outskirts of Burgas.

The studies were performed on fresh and fixed material by conventional methods using an ICBM-1R microscope. The micrographs were taken with a UFO DC-5207 digital camera.

3. RESULTS

Root. The primary structure of Geum urbanum L. root is typical of dicotyledonous plants. Secondary structure of the beam-type root (Fig. 1). Externally, the root is surrounded by a 6-8 row layer of thick-walled, subernized, polygonal-shaped cells of the primary cortex of dark brown color, which in some places are almost completely exfoliated. The root periderm is mostly 5-7 rows, laid deep in the primary bark, dividing it into almost half. Its cells are large, tangentially elongated, alternating with cells of smaller size. The cells of the primary cortex, which are located under the periderm are thicker, oval to conical-elongated with porous walls and arranged irregularly, which is characteristic of cells of non-cambial origin. The phloem in the root occupies a small area, approximately 1/5 of

the diameter of the root, its cells are tangentially elongated, thin-walled, arranged in regular dense rows. The outer cells of the phloem are slightly larger than the inner ones located above the cambium. It is important to note that the root phloem does not contain mechanical tissues, and their function is performed by a thick-walled parenchyma of the primary cortex. In the parenchyma of the secondary cortex, in addition to starch grains - round and oval-elliptical shape, other inclusions are not found. The cambium lies in a solid closed line. The xylem of the root consists of vessels and a thin-walled tree parenchyma. Vessels of wood are different in size and stacked several together. The vessels, in the vast majority, are porous, and in some of them there are lateral perforations. Wide core rays are multi-row, their thin-walled cells are arranged in regular rows. These rays from the center to the periphery expand wedge-shaped between 3-5 conductive beams. In the wooden part in front of the core rays are small groups of primary vessels. The central part of the root is represented by the primary xylem, the parenchyma of which consists of polygonal cells with starch grains.

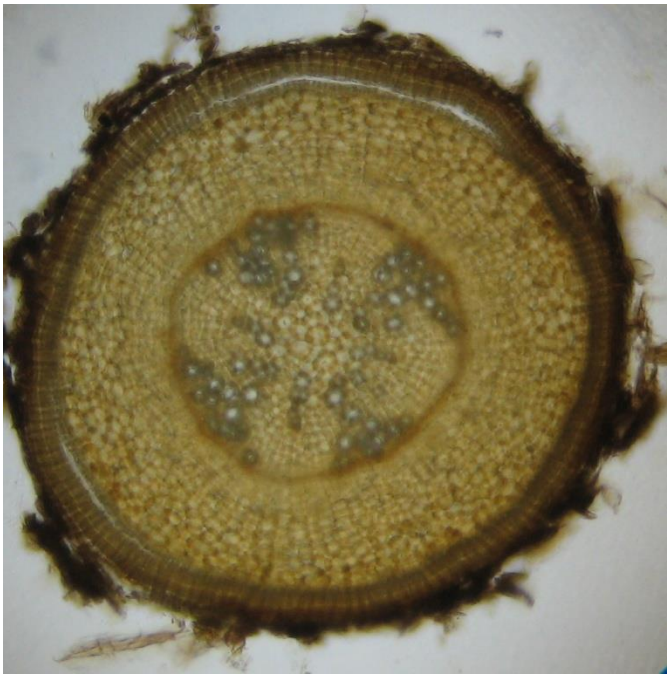
Rhizome. The anatomical structure of the rhizome with one-, two- and three-year increments was studied. The annual growth of the rhizome was determined by the number of layers of wood fibers in the leading bundles. Regardless of the age of the rhizome, its cross-sectional structure is visible in the cross section (Fig. 2). The difference in anatomical structure is that after each annual increase, the number of vascular bundles decreases due to their fusion with each other. In the first year of plant life, the number of leading bundles is 8-10, and in the third and subsequent annual increments, they form semi-rings with a solid line of cambium. External dark brown cells of the primary cortex, which are located above the periderm are thick-walled, subernized, oval. The periderm is located at a fairly large distance from the surface of the rhizome, its cells are thin-walled, rectangular, elongated in the tangential direction. Cells of the inner parenchyma of the primary cortex, which are located under the periderm of a polygonal shape with unevenly thickened walls and various shapes of intercellular spaces. Thin-walled phloem cells of rectangular shape, arranged in radial rows, indicating their cambial origin. Groups of sieve-like tubes are observed only in the bast part of the rhizome near the cambium. The cambial ring of cells runs in a solid line throughout the rhizome and is not interrupted even at the location of the core rays and the interbundle parenchyma. Tree parenchyma cells are almost indistinguishable in shape, size, and wall thickness from bast parenchyma cells. Vessels of rhizome wood are surrounded by tracheids and thick-walled wood fibers. Core rays, which separate the conducting bundles are wide, their cells are thin-walled, polygonal in shape with a large number of drusen of calcium oxalate. Core cells are polygonal, filled with starch grains and crystals of calcium oxalate.

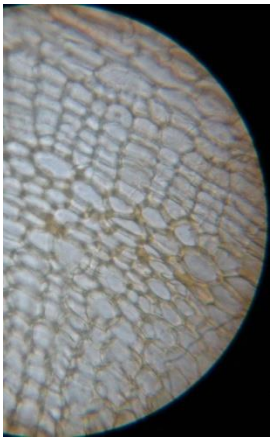
4. DISCUSSIONS

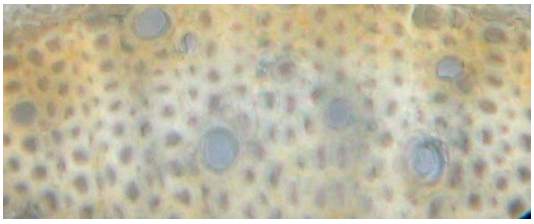
The obtained results will allow to standardize medicinal plant raw materials with its subsequent use in the creation of phytomedicines.

5. CONCLUSIONS

1. Secondary structure of the root and rhizome of the beam type.
2. Periderm - secondary integumentary tissue is located in the middle zone of the primary cortex in both the roots and rhizomes.
3. There are no mechanical fibers in the cortex of the organs.
4. At the root of the vessel of primary origin are placed opposite the core rays.
5. The mechanical part of the xylem section of the rhizome consists of thick-walled wood fibers.
6. Crystals of calcium oxalate are found only in the rhizome.





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