

Anatomical structure of vegetative organs of *Potentilla erecta* L

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Abstract

There are 35 species of *Potentilla* in Azerbaijan. *Potentilla erecta* L. is a perennial plant. Rhizome is tuberous, woody. Stems up to 20-25 cm in height, straight, thin, rather thinly leafy, at the top are repeatedly forked-branched, short hairy, like leaf petioles. Lower leaves on long petioles, trifoliate, soon dying off; middle and upper stem leaves are sessile, always trifoliate with large leaf-like stipules; leaflets sessile or on very short petioles, obovate or lanceolate, coarsely toothed, hairy along the veins below, almost glabrous above.

Flowers - single, small (1 cm in diameter); the number of sepals and petals, 4 each; the sepals are hairy, the petals are golden yellow, longer than the calyx; anthers are small, rounded. The receptacle is hairy. The fruits are ovoid.

It has a very diverse application in the national economy, in scientific and folk medicine. The roots contain a pleasant smelling essential oil. In medicine, it is used as a constrictor of blood vessels, and also due to the content of tannins in the rhizome (14-31%), it is used as an astringent. It is also known as a raw material for dyeing and dyeing fabrics red.

Keywords: xylem, parenchyma, epidermis, phloem, sclerenchyma

Introduction

The root is covered with multi-layered peridermis. The parenchyma of the cortex is well developed, consists of 16-18 layers of densely spaced cells. In the cells of the

parenchyma of the cortex and core, tannins, starch and other storage substances accumulate. Xylem of triarch type. The xylem vessels are surrounded by libriform, which in turn increases the mechanical strength of the root.

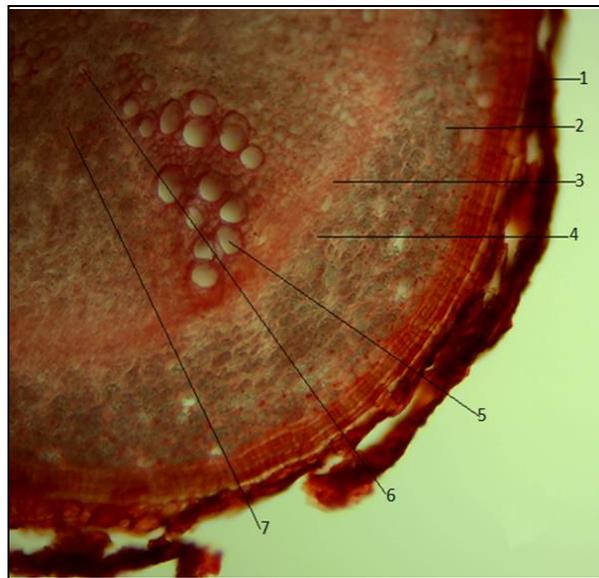


Fig 1: Anatomical structure of the root of *Potentilla erecta* 1. Peridermis, 2. Cortex parenchyma, 3. Cambium, 4. Phloem, 5. Xylem, 6. Primary xylem, 7. Pith

Material and Methods

In cross-section, the stem has a rounded shape. The epidermis is single-row. Epidermal cells are round and densely located, their outer walls are thickened. A 2-3-layer chlorenchyma is developed internally, as an adaptation to organic insufficiency.

The parenchyma of the cortex is represented by 5-6 rows of densely spaced round cells.

The stem has a bundle structure. The number of collateral-type conducting bundles is 8-10. The xylem elements are well developed, in which the vessels form rows. Each

Bundle contains 2-8 vessels. The mechanical tissue is well developed. Mechanical tissue - sclerenchyma is located in a continuous ring above the phloem of the conducting bundles.

Parenchymal cells form pith rays between the vascular bundles. The center of the stem is occupied by large pith cells. Starch, tannins and other reserve substances are accumulated in the parenchyma of the bark and core.

These substances protect the plant from frost, and in early spring serve to nourish the plant and ensure its normal development.

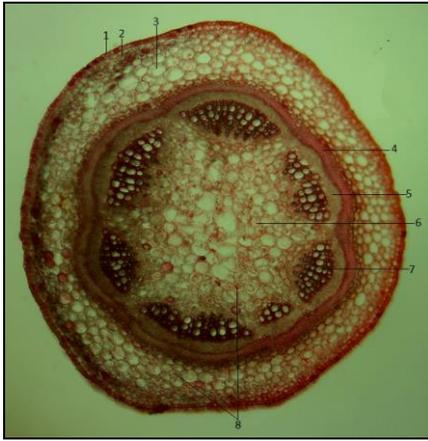


Fig 2: Anatomical structure of the stem of *Potentilla erecta*
 1. Epidermis, 2. Chlorenchyma, 3. Cortex parenchyma, 4. Sclerenchyma, 5. Phloem, 6. Pith, 7. Xylem, 8. Parenchyma cells accumulating tannins and other reserve substances

Both the external structure and the internal structure of the sheet are adapted to the functions performed.

The leaf has a dorsoventral structure. The epidermis is single-row. A thick cuticle layer has formed over the epidermis. Inside of the epidermis is a two-layer palisade tissue. This structure is typical for xerophytic plants.

Palisade tissue cells are densely packed, with numerous chloroplasts. An active process of photosynthesis takes place in them. The spongy parenchyma is represented by 5-6 rows of loosely located cells, which are involved in the process of gas exchange and transpiration. Due to the presence of chloroplasts, cells of the spongy parenchyma are also involved in the assimilation process.

The leaf conducting system, especially the xylem elements, is highly developed. A large collateral bundle is located in the center of the leaf. The vessels are numerous (30-35), surrounded by parenchymal cells. The phloem faces the abaxial side of the leaf. 3-4 rows of parenchyma cells and 2-3-layered collenchyma are located under the phloem. Collenchyma cells give elasticity and strength to the leaf. The stomata are observed only on the lower epidermis.

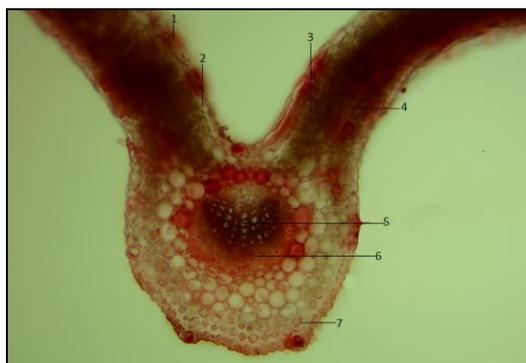


Fig 3: Anatomical structure of the leaf of *Potentilla erecta*
 1. Cuticle, 2. Epidermis, 3. Palisade parenchyma, 4. Spongy parenchyma Sclerenchyma, 5. Xylem, 6. Phloem, 7. Collenchyma.

The petiole in cross-section has a rounded shape from the abaxial side and an angular shape from the adaxial side. The petiole is covered with a single layer of epidermis, its cells are rounded, densely located, the outer walls are thickened. A cuticle layer is observed above the epidermis. Chlorenchyma is 3-4-layered. Tangential collenchyma is located directly under the epidermis. The main area of the petiole is occupied by the parenchyma. The cells of the

parenchyma have a rounded shape, they carry out metabolic reactions and have a high physiological capacity. The conducting system of the petiole is represented by one large main central and two additional lateral bundles. The bundles are collateral, open. Xylem elements are powerfully developed.

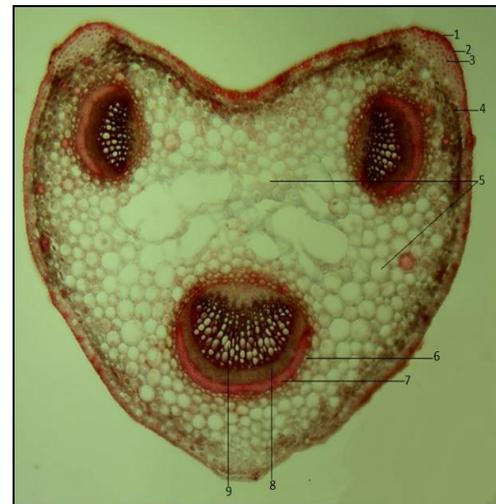


Fig 4: Anatomical structure of the petiole of *Potentilla erecta*
 1. Cuticle, 2. Epidermis, 3. Collenchyma, 4. Chlorenchyma, 5. Petiole parenchyma, 6. Sheathing cells, 7. Sclerenchyma, 8. Phloem, 9. Xylem

Conclusion

The anatomical structure of the stem is characterized by the powerful development of conductive and mechanical tissues, thickening of the outer walls of epidermal cells, the development of chlorenchyma, etc. The formation, shape and structure of conductive bundles are characteristic features of this type and are diagnostic in nature.

Anatomical studies of the leaf have shown that *Potentilla erecta* is a cryoxerophyte plant. This is due to a thick cuticle layer, small cells and dense arrangement of epidermal cells, the formation of stomata only on the lower epidermis, the development of mechanical tissue in the mesophyll, dense arrangement of histological elements of the leaf, etc.

Thickening of the outer cells of the epidermis, dense arrangement of parenchymal cells, well-developed vascular bundles in the leaf petiole are an anatomical sign indicating the xerophytic origin of this species.

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