Rhodiola rosea L.

Rhodiola Rhizome and Root

Rhodiolae Rhizoma et Radix

Pinyin: Hong jing tian

Crassulaceae

Rhodiola is native to parts of Europe and the former Soviet Union. In recent years, it has been researched and popularly used for its tonifying and adaptogenic activity. The underground parts consist of numerous vertically growing rhizomes that unite at their base into a long taproot. Both the rhizome and root exhibit secondary growth, with the typical arrangement of primary and secondary xylem expected in these organs. However, a variety of irregular secondary growth (additional vascular bundles) and irregular cork formation are possible. Two species of rhodiola are generally traded: *R. rosea* and *R. crenulata*.

A. Rhizome

Transverse section: Narrow portions of the rhizome have the typical structure of a secondary stem, with vascular bundles in a ring around a broad parenchymatous pith; cork is narrow to broad, depending on sample, and cells may be dark brown, greenish, or nearly colorless; secondary phloem and cortex are parenchymatous and sclerenchyma is absent; cortex of large, slightly thickened, loosely arranged cells; secondary xylem consists largely of loosely arranged parenchyma; small narrow vascular bundles occur in a ring; vessels are usually solitary, roundish in outline, up to 60 µm in diameter; in the pith, scattered amphiphloic (amphicribral) vascular bundles appear as irregularly scattered vessels running in every direction; wider portions of the rhizome have numerous vascular bundles that run in every direction, making their detailed description difficult; anomalous, frequently circular cork cambia may be present in various tissues.

Longitudinal section: Vessels with annular, helical, or scalariform wall thickening.

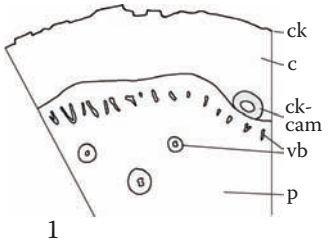
Starch: Solitary, roundish granules, up to 15 µm in diameter, hilum (if present) appears as only a small dot.

B. Root

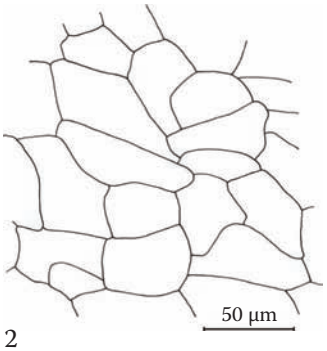
Transverse section: Cork is narrow to broad; underlying parenchyma may contain orange-brown tannin ducts (in old roots also found embedded in the cork); secondary phloem has small groups of sieve tubes and companion cells, and sclerenchyma is absent; secondary xylem consists largely of parenchyma with vessels arranged in radial cuneiform strands; primary xylem of vessels scattered in loosely arranged parenchyma; additional irregular cork cambia, either straight or circular, may be present in various tissues, including but probably not limited to the pith, the border between the primary and secondary xylem, and between the cortex and secondary phloem.

Starch: Solitary, roundish, granules up to 15 µm in diameter; as in rhizome.

Powder: Numerous fragments of cork; orange parenchyma; few vessels; starch (water).



1



2