

Centella asiatica* (L.) Urb.*Gotu Kola Aerial Parts***Folium Centellae asiaticae*

Pinyin: Ji xue cao

Sanskrit: Manduka-parni

Apiaceae

Gotu kola is predominantly used in traditional ayurvedic herbal traditions to support the nervous system and to treat diseases of the skin and connective tissue (e.g., leprosy). It is also widely used in Western herbal medicine for a putative ability to enhance memory. Traditionally, flowering aerial parts with some fruit are included in gotu kola aerial parts, so fragments of reproductive parts may be found in commercial material. Gotu kola, most commonly known by the common Sanskrit name *mandukaparni*, also shares the common Sanskrit name of *brahmi* with *Bacopa monnieri*. Therefore, the two have the potential to be mixed up in trade. This is primarily due to regional nomenclature in that Indian communities in southern regions, as well as the ayurvedic pharmacopoeia, consider *Bacopa* as the “true” brahmi, while those in the northern regions consider *Centella* as the true brahmi. These can be clearly identified microscopically and care should be taken to distinguish between these two species. The differentiation between the two species is provided.

A. Leaf Blade

Surface view: Upper and lower epidermis of polygonal, slightly elongated cells having fine, dense, cuticular striations; anisocytic and paracytic stomata are more frequent on the lower epidermis, $\sim 25 \mu\text{m} \times 18 \mu\text{m}$; uniseriate covering trichomes occur on both surfaces, up to 2 mm long, bent, thick walled, and tapering toward the apical cell; most trichomes are broken off in processing.

Transverse section: Bifacial; palisade parenchyma of short, broad cells in one or two rows; spongy mesophyll of irregular, more or less spherical to elongated cells in three or four cell layers with large intercellular spaces; idioblasts containing large calcium oxalate cluster crystals up to 35

μm diameter are present in the mesophyll; larger veins are associated with collenchyma.

B. Leaf Petiole

Transverse section: Sulcate on the adaxial surface with a broad furrow and lateral wing on each side; outer cortex of lamellar collenchyma; secretory ducts are arranged in a loose ring in the cortical parenchyma; vascular bundles are arranged in a semicircle, with a small one in each wing; central pith has a cavity.

C. Stem (including pedicels and stolons)

Surface view: Epidermal cells have a striated cuticle; anisocytic stomata up to $40 \mu\text{m} \times 25 \mu\text{m}$; covering trichomes resemble those on the leaves.

Transverse section: Epidermis; outer cortex of lamellar collenchyma cells with thickened tangential walls; secretory ducts are arranged in a loose ring in the cortical parenchyma, often opposite the collateral vascular bundles; 6–12 vascular bundles are arranged in a ring; phloem bundles are often capped by groups of lignified fibers; in older stems, fibers form a concentric ring between the vascular bundles and cortex; pith is large, cells are short, cylindrical, and thin walled, with occasional calcium oxalate cluster crystals; pith may be crushed and colorless, with numerous small intercellular spaces.

Powder: Fragments of epidermis with cuticular striations and anisocytic and paracytic stomata; uniseriate covering trichomes, often contorted or broken; calcium oxalate cluster crystals; fibers and vessels; parenchyma from the palisade and spongy mesophyll of the leaf; collenchyma from the stem; yellowish brown secretory duct tissue is infrequent; fragments of corolla with wavy-walled epidermis and warty-walled covering trichomes may be present; fragments of fruit showing layers of cells in a parquetry arrangement and parenchyma cells containing a single calcium oxalate prism crystal.