Matricaria recutita L.

Chamomile Flower (German Chamomile)

Matricariae recutitae Flos

Asteraceae

German chamomile is one of the most popular herbal teas worldwide. It is used as a mild sleep aid and painkiller; a digestive bitter to settle an upset stomach; for colic, fever, restlessness, and teething in infants; and topically as an antimicrobial, to name only a few of its primary uses. German chamomile may be mixed or substituted with Roman chamomile, *Chamaemelum nobile*. The two flowers can be readily distinguished from each other (see *Chamaemelum nobile*).

A. Phyllaries

Surface view: The chlorophyll-containing central part is several cell layers thick, and the scarious margin is one cell layer thick and has no chlorophyll; abaxial epidermal cells have sinuous anticlinal walls and obvious cuticular striations; anomocytic stomata approximately 30 µm long are present in the central portion of the bract only; adaxial epidermal cells are inconspicuous, stomata and cuticular striations are absent, and frequently pitted sclereids, fibers, and vascular bundles with very narrow vessels are embedded in the central portion; biseriate glandular trichomes may be present on both surfaces; covering trichomes are absent.

B. Receptacle

Surface view: Very thin-walled parenchymatous tissue; circles of sclereids indicate the scars of detached florets.

Longitudinal section: Parenchyma; vascular bundles with short, narrow vessels having various types of wall thickenings (e.g., annular, helical, scalariform) between bundles, elongated secretory ducts with yellow-orange oil droplets are located.

C. Disk Florets

Surface view: Hermaphroditic; epidermal cells of corolla tube are elongated with straight anticlinal walls and common biseriate glandular trichomes up to approximately 50 µm long; abaxial epidermal cells of the corolla lobes have slightly sinuous anticlinal walls; adaxial epidermal cells are papillose with cuticular striations; small calcium oxalate cluster crystals are occasionally in the mesophyll; in the base of the corolla tube, the tissue changes during flower development from parenchyma to rectangular, pitted sclereids; sagittate anthers are connate around the style; the filament adjacent to the anther consists of conspicuous quadratic, slightly thickened cells; apical appendages of the connective are triangular in outline, with somewhat elongated, slightly thickened cells; endothecial cells are scalariform or reticulate; pollen grains are triporate and spheroidal, with a spiny exine, diameter of ~30 µm; the inner side of the bilobed stigma has elongated papillae; cypsela has two types of epidermal cells: (1) rectangular cells, sometimes with sinuous anticlinal walls and frequently with biseriate glandular trichomes; (2) large elongated cells filled with densely folded layers of mucilage. The mucilage swells with water, so when a cypsela is viewed in chloral hydrate solution, the cell walls are ruptured and the layers of mucilage protrude, surrounding the fruit in a birefringent corona; a circle of quadratic or rectangular pitted sclereids is located at the cypsela base; small calcium oxalate cluster crystals are abundant, diameter ~8 µm; pappus and covering trichomes are absent.

D. Ligulate Floret

Surface view: Pistillate; short corolla tube, with limb prolonged on one side into a three-toothed ligule; abaxial epidermal cells are slightly elongated with sinuous anticlinal walls; adaxial epidermal cells more or less quadratic in outline, papillose; obvious cuticular striations on both sides; biseriate glandular trichomes frequently on corolla tube; style and cypsela are similar to those of disk florets.

Powder: Intact disk florets; numerous pollen grains with spiny exine; fragments of involucral bracts and disk florets (e.g., corolla lobes, anthers); parenchymatous tissue of the receptacle; biseriate glandular trichomes; small cluster crystals of calcium oxalate.