Illicium verum J. D. Hook.

Star Anise Fruit (Chinese Star Anise)

Fructus Anisi stellati

Illiciaceae

Star anise fruits are used in herbal teas in different parts of the world for the treatment of colic and appear to be relatively safe. However, *I. verum* is sometimes adulterated with a Japanese species of *Illicium*—*I. anisatum*—that is also known as Japanese star anise or shikimi. *I. anisatum* has been associated with seizures in infants to whom the tea was given. This adulteration has occurred at least since 1881.

A. Fruit

Surface view: Epicarp is composed of dark brown polygonal cells with distinct cuticular striations; occasional anomocytic stomata.

Paradermal section: Endocarp cells are irregularly rounded with thickened walls.

Transverse section: Mesocarp of brown parenchyma cells, with abundant large, spherical, thin-walled oil cells; astrosclereids and very small crystals may rarely be present in the mesocarp; small vascular bundles; near the ventral suture, elongated sclereids may resemble fibers; endocarp consists of a layer of palisade cells, 400–600 µm in length; where the seed attaches to the wall, the palisade cells have thin radial walls; toward the suture, they are replaced by macrosclereids; a brown pigment is found in the interior end walls of the palisade cells.

B. Columella

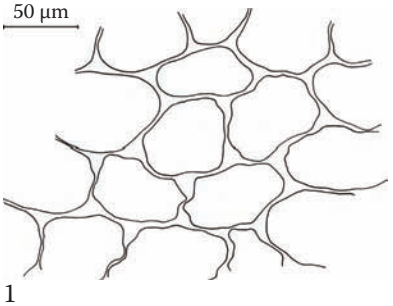
Longitudinal section and powder: At the top of the pedicel, where the individual follicles attach, brown parenchyma and characteristically large, branched astrosclereids (up to 400 µm long and 150 µm wide) are found.

Note: The columella refers to the central axis to which the follicles attach and is an extension of the pedicel. The astrosclereids are found in both the columella and the pedicel.

C. Seed

Surface view (from exterior to interior): Epidermis of testa is composed of a single layer of highly characteristic yellow macrosclereids with thick, striated, lignified walls, anastomosing pits, and a branched, star-shaped lumen filled with dark brown pigment; when the macrosclereid layer is seen in surface view, the radial cell walls appear sinuous with numerous narrow pits; upon focusing down, the walls become almost straight and the lumen smaller and less branched; in the middle of this layer, pit channels are only occasionally present, but at the interior end, they are once again numerous; beneath the macrosclereid layer is a single layer of large, slightly thickened cells with numerous pit channels and conspicuous triangular intercellular spaces in the anticlinal walls; in transverse section, these cells appear narrow, with a slightly convex outer wall; interior to that layer lies dark brown parenchyma with partially thickened walls and often conspicuous roundish intercellular spaces that may occur in rows between cells; interior to that lies one layer of collapsed cells that may contain cuboidal crystals of calcium oxalate, embedded oil cells, and small intercellular spaces; endosperm of polygonal, colorless cells, with slightly thickened walls and containing oil droplets and aleurone grains.

Powder: Oil droplets; numerous and conspicuous astrosclereids; large colorless fragments of endosperm; palisades of endocarp in transverse section and surface view; sclereids of testa in surface view; few brown fragments of mesocarp, some with secretory cavities; sclereids from the mesocarp; fragments of testa with calcium oxalate prisms; sclereids of the columella are too rare to find with certainty. Adulteration with *I. anisatum* cannot be detected in powder.



1