Pharmacognostic Characterization of *Illicium verum* Hk. f. for Dental Application

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ABSTRACT

Illicium verum Hk. f. (Illiciaceae), well-known in Thailand as "Chan paet kleep", has been used as food flavor and Thai traditional medicine. It possesses strong antibacterial activity, particularly against pathogens in tooth cavity. The dried powder of this plant distributed locally has always been contaminated with some other plants. Hence, the knowledge on pharmacognostic characters is necessary for quality control of its raw material. The aim of this study is to identify I. verum Hk. f. as standard voucher specimen. The macroscopic results showed that its fruits formed woody follicles arranged in radiate whorl around short central column with short pedicel. Outer surface was reddish brown while inner surface was pale yellowish-brown and shiny. Seeds were compressed-ovoid, shiny, smooth and brown. Microscopic characters revealed that the dried fruit powder showed sclerenchyma fiber, elongated, thick-walled cell with simple to slightly-branched pore canals; stone cells with thick walls, reddish-brown parenchyma of mesocarp; thin-walled cells of endocarp; thickened, porous walls of pericarp (epidermis) etc. similar to microscopic description of transverse section of the fruit. These results established the standard characters of I. verum Hk. f. for quality control of the plant material prior to further experiment in formulation development for dental application.

Key words : *Illicium verum,* Star Anise, Pharmacognostic, Dental Application

INTRODUCTION

Illicium verum Hk. f. (Illiciaceae) is well-known in Thailand as "Chan paet kleep". Fragrant wood is used for houses, pillars and furniture as well as fruit, leaves and seeds which have essential oil are used in Thai traditional medicine, for example, stimulant, carminative and spices (Backer et al., 1963). This study focused on using Chan paet kleep fruits which are valuable adding for innovative and alternative ingredient of this plant for dental applications.

MATERIALS AND METHODS

Illicium verum Hk.f. were collected and identified (Gagnepain, 1938; Nguyen et al., 1996; Putiyanan, 2004) as voucher specimen and standardized for phar-

macognostic characters for quality controlling of material before the formulation process. Chan paet kleep were identified by the method of taxonomic identification as authenticated specimen and pharmacognostic identification. Collect enough samples for studies in antimicrobial activities to further experiment in formulation development for dental application.

RESULTS

Taxonomic Identification

Herbarium specimen of Chan paet kleep was identified by taxonomic evaluation and deposited in the medicinal plant herbarium, Faculty of Pharmacy, Chiang Mai University for authenticated specimen (voucher specimen).

Description of species *Illicium verum* Hk.f. (Nguyen et al., 1996)

A small tree, 6-8 m in height, bark grey-brown, branchlets green, glabrous; crown conical to globose. All parts of tree have an agreeable aromatic smell. Leaves simple, usually clustered at branch-tips. Leaves entire, oval, tapering towards both ends, apex acute, base cuneate. Leaf-blade thick and brittle, dark green above, paler beneath, petiole glabrous. Flowers pink-white, solitary and axillary, pedicel stout and short. Sepals 6, pink at margin, petals 16-20, broad-elliptic, smaller than sepals, white outside, red inside, dark red at the middle of flower. Stamens numerous, shorter than petals, anther elliptic. Carpels 8, forming a conical mass, spreading into a rosette when ripe. Fruit consists of 8 follicles, spreading, woody and brown when mature, dehiscent by the ventral side. Seed solitary in each follicle, brown, glossy and glabrous.

Pharmacognostic Identification

The macroscopic character studies showed that fruits formed woody follicles arranged in radiate whorl around short central column with short pedicel. Outer surface is reddish brown and inner surface is pale yellowish-brown and shiny. Seeds compressed-ovoid, shiny, smooth and brown. And microscopic characters of transverse section of Chan paet kleepís fruit were compared with the fruit powders for standardization of sample. The reddish-brown powdered drug showed sclerenchyma fiber, elongated, thick walled with simple to slightly branched pore canals; sclereids thick walls, reddish-brown parenchyma of mesocarp; thin-walled cells of endocarp; thickened, porous walls of pericarp (epidermis) etc., which were similar to microscopic description of transverse section.

Figure 1a. Macroscopic characters of *Illicium verum* Hk. f.:-1. Entire fruit with stalk; 2. Dry fruit: star-shape follicle cluster; 3. A single carpel (follicle) : open with seed inside; 4. shining brown seed.

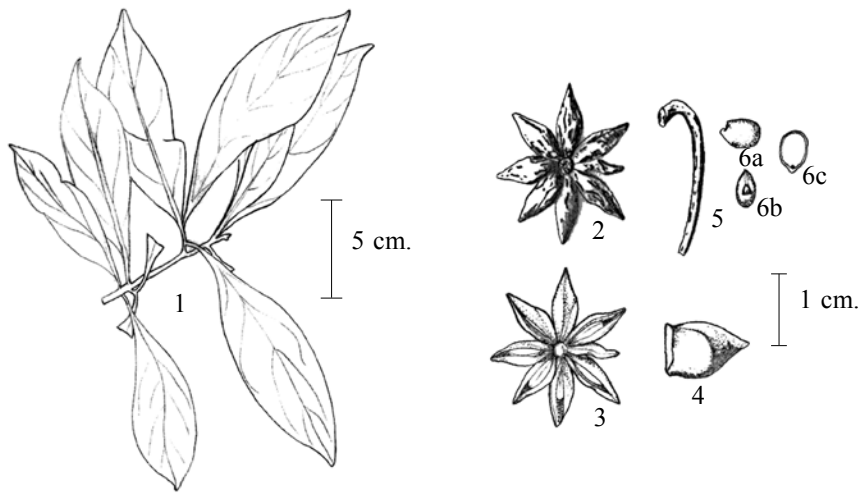

Figure 1b. Macroscopic characters of *Illicium verum* Hk. f. :- 1. Twig ; 2.- 3. Entire fruit: star-shape follicle cluster; 4. A single carpel (follicle) ; 5. Stalk; 6.Seeds : 6a. side view, 6b.seed with hilum, 6c. seed with crustaceous testa, cut vertically.

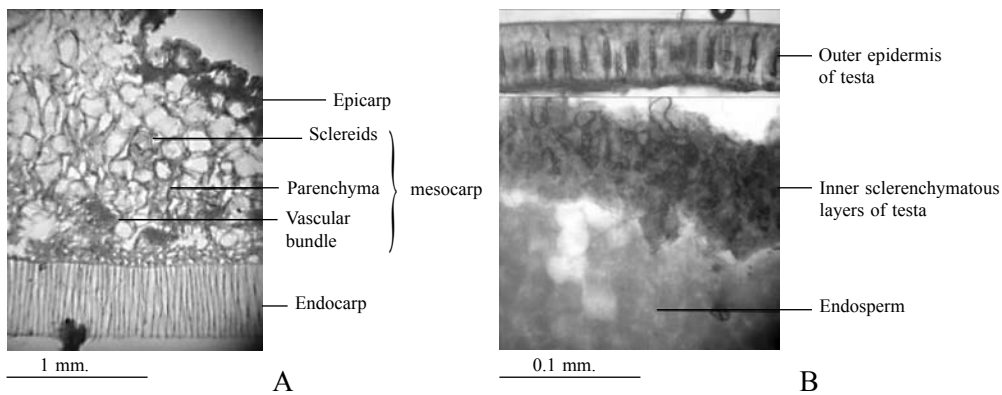

Figure 2. Microscopic characters of transverse section of *Illicium verum* Hk. f. Fruit :-A.Pericarp B. Seed.

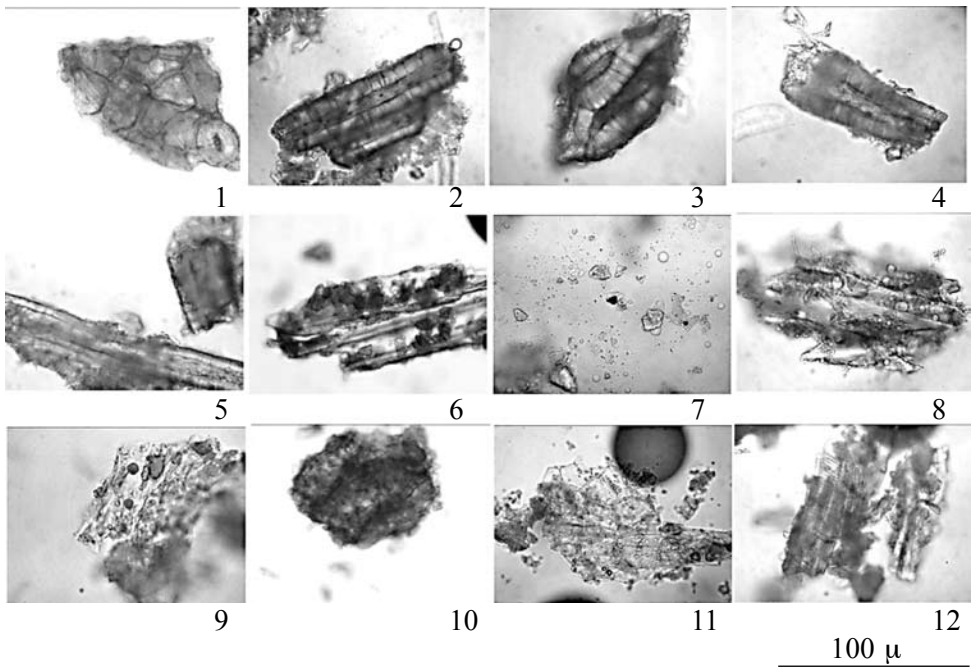

Figure 3. Microscopic characters of *Illicium verum* Hk. f. :- 1. epicarp with stoma 2. fibrous sclereid of mesocarp 3. epidermis of testa in surface view 4. epidermis of testa in sectional view 5. fibrous sclereid of mesocarp and epidermis of testa in sectional view 6. thin-walled cells of endocarp 7. oil droplets 8. parenchyma with oil droplets 9. parenchyma with oil droplet dyeing with Sudan III 10. sclereid of hilum 11. endosperm 12.vascular tisuue with spiral vessel.

CONCLUSION

Pharmacognostic study, using macroscopic and microscopic characterization of Chan paet kleep demonstrated the differences in the cell shape, detail and size of each cell/tissue after detecting by microscope. This technique could be applied in the systematic identification of the fruits. Subsequent study on antimicrobial activity of the fruit extracts will be reported in the upcoming part.

The results established the standard characters of *Illicium verum* Hk. f., which can be used to produce fruit extract preparation for dental application.

Botanical name : *Illicium verum* Hk.f. (Family Illiciaceae)

Local name : Cheen paet kleep, Pooi kak (Chinese), Star Anise (general)

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