

## มะขาม, เนื้อในเมล็ด (MAKHAM, NUEA NAI MALET)

บกขาม, เนื้อในเมล็ด (BAKKHAM, NUEA NAI MALET)

Tamarindi Indicae Kernel

Tamarind Kernel

**Category** Antidiarrheal, anthelmintic.

**Tamarind Kernel is the dried kernel of *Tamarindus indica* L. (Family Leguminosae-Caesalpinoideae), Herbarium Specimen Number: DMSC 5303, Crude Drug Number: DMSc 1264.**

**Constituents** Tamarind Kernel contains proteins, fatty acids, and polysaccharides.

**Description of the plant** (Fig. 1) Tree, up to 30 m tall; bark thick, rough, dark ashy or brown, longitudinally fissured; crown rounded, dense; branchlets spreading, pubescent when young, becoming glabrous when aged. Leaves paripinnate, alternate or spiral; stipule minute, caducous; leaflets sessile, opposite, 6 to 20 pairs, oblong or oblong-linear, 0.8 to 3 cm long, 3 to 9 mm wide, apex rounded, mucronate, or emarginate, base oblique, margin entire, chartaceous, glabrous. Inflorescence raceme, lax, terminal or axillary, 2 to 16 cm long, drooping; peduncle up to 1 cm long; bract caducous. Flower: flower bud turbinate; sepals 4, petal-like, creamy yellow, elliptic-lanceolate, 0.6 to 1.2 cm long, about 5 mm wide, imbricate; petals 3, unequal, yellowish orange or yellow tinged with purplish red stripes, obovate, 0.8 to 1.3 cm long, 2 to 6 mm wide, apex acute, base attenuate, margin repand, curled, median lobe smaller, lateral lobes fairly larger; fertile stamens 3(–4), about 1 cm long, monadelphous; ovary superior, linear, about 7 mm long, slightly incurved, 1-loculed, pubescent, with numerous ovules; stigma nearly capitate. Fruit a pod, indehiscent, brown, oblong or terete-oblong, 5 to 20 cm long, 1 to 3 cm wide, straight or incurved, often irregularly constricted. Seeds 3 to 14, obovate-orbicular or rhomboid, compressed, 1 to 2 cm long, about 1 cm wide, dark brown, glossy, embedded in soft and sticky, sweet or sour, blackish brown pulp.

**Description** Odour mild; taste, bland.

**Macroscopical** (Fig. 1) Mostly half-kernels, flat, ovate, elliptic, obovate, or oblong in shape; base cordate, apex rounded; about 1.2 cm long and 0.8 to 1 cm wide. Outer surface smooth, matte or glossy, occasionally exhibiting alternating light and dark concentric rings. Inner surface smooth with a distinct raised margin; cream to pale yellow or light brown, sometimes with concentric ring patterns of varying intensity.

**Microscopical** (Figs. 2a, 2b) Transverse section of the kernel shows embryo. Embryo: cotyledon, an epidermal layer, numerous thick-walled parenchyma containing starch grains; parts of epicotyl and hypocotyl.

Tamarind Kernel in powder possesses the diagnostic microscopical characters of the unground drug. Thick-walled parenchyma containing starch grains is characteristic.



1



2



3



4



5



6

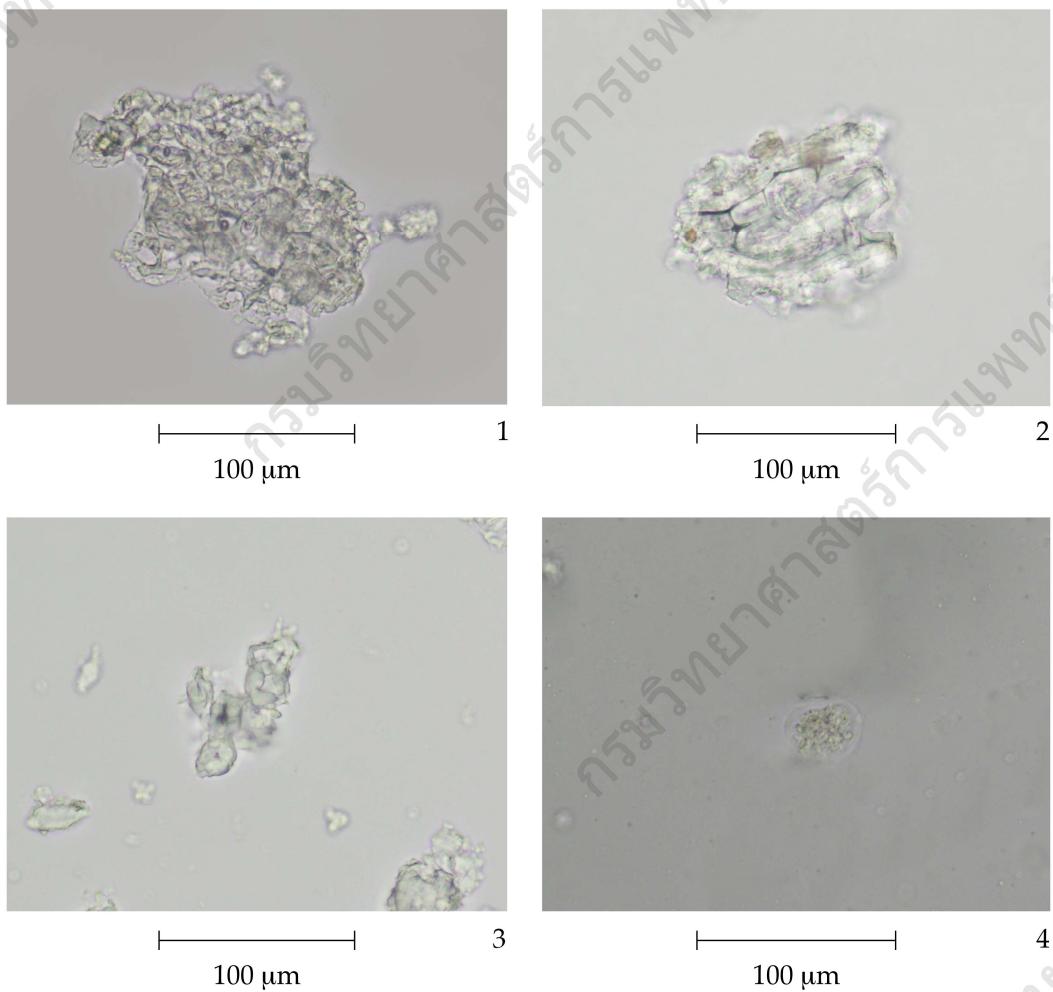
**Fig. 1** *Tamarindus indica* L.

1. habit
2. flowering twig
3. flower
4. fruiting branches showing pods
5. pods showing part of shells, fresh pulp, fibrous strands, and seeds
6. crude drug



**Fig. 2a** Photomicrographs of Transverse Section of the Kernel of *Tamarindus indica* L.

1. epidermis of cotyledon	4. vascular tissue
2. thick-walled polygonal	5. cotyledon
parenchyma	6. part of embryo showing epicotyl and
3. parenchyma containing	hypocotyl
starch grains	



**Fig. 2b** Photomicrographs of Powdered Drug of the Kernels of *Tamarindus indica* L.

1. parenchyma of epicotyl	3. part of thick-walled parenchyma of
2. parenchyma of cotyledon containing	cotyledon
starch grains	4. parenchyma containing starch grains

**Packaging and storage** Tamarind Kernel shall be kept in well-closed containers, protected from light, and stored in a dry place.

**Before carrying out the physico-chemical tests, Tamarind Kernel shall be treated by stir-frying, cracking, and removing their shells in order to obtain their kernels.**

### **Identification**

- A. Heat 1 g of the sample, in powder, with 25 mL of methanol in a water-bath for 15 minutes and filter. To 2 mL of the filtrate, add a few drops of *ninhydrin* TS and warm on a water-bath for a few minutes: a violet colour develops.
- B. Heat 500 mg of the sample, in powder, with 25 mL of *water* in a water-bath for 15 minutes and filter. To 2 mL of the filtrate, add 4 to 5 drops of a 1 per cent w/v solution of *iodine*: a blue colour develops.
- C. Carry out the test as described in the “Thin-Layer Chromatography” (Appendix 3.1), using *silica gel GF254* as the coating substance and a mixture of 35 volumes of *n-butanol*, 35 volumes of *acetone*, 20 volumes of *water*, and 10 volumes of *glacial acetic acid* as the mobile phase and allowing the solvent front to ascend 10 cm above the line of application. Apply to the plate as a band of 7 mm, 15  $\mu$ L of the test solution prepared by heating 1 g of the sample, in powder, with 25 mL of *methanol* in a water-bath for 15 minutes and filtering. After removal of the plate, allow it to dry in air. Examine the plate under ultraviolet light (254 nm), marking the quenching bands. Subsequently examine the plate under ultraviolet light (366 nm); one blue fluorescent band is observed. Spray the plate with *ninhydrin* TS and heat at 110° for 5 minutes; one purple and three brown bands are observed (Fig. 3).

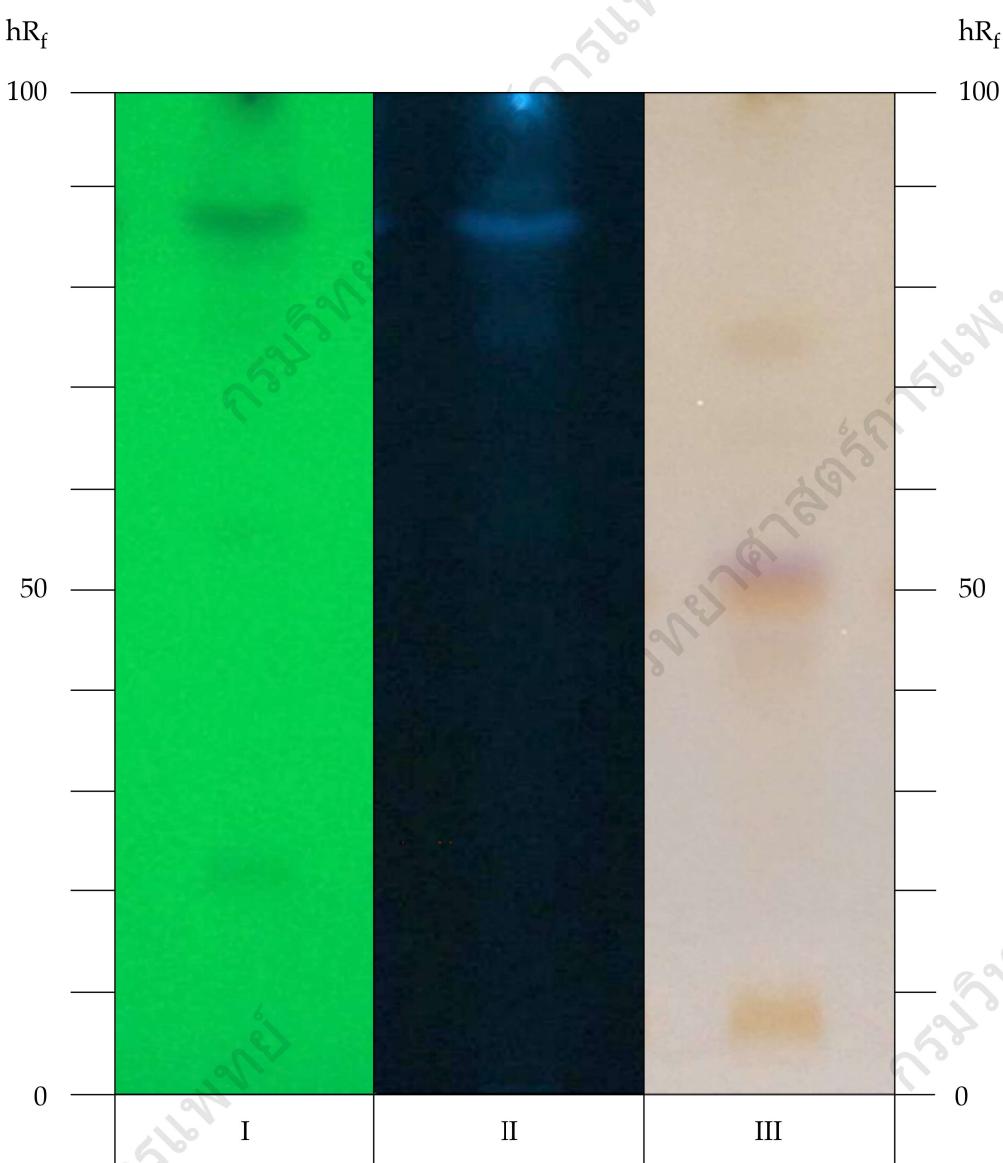
**Loss on drying** Not more than 8.0 per cent w/w after drying at 105° to constant weight (Appendix 4.15).

**Foreign matter** Not more than 2.0 per cent w/w (Appendix 7.2).

**Total ash** Not more than 3.0 per cent w/w (Appendix 7.7).

**Ethanol-soluble extractive** Not less than 5.0 per cent w/w (Appendix 7.12).

**Water-soluble extractive** Not less than 33.0 per cent w/w (Appendix 7.12); use 1.0 g.



**Fig. 3** Thin-Layer Chromatogram of Methanolic Extract of the Kernels of *Tamarindus indica* L.

- I = detection under UV light (254 nm)
- II = detection under UV light (366 nm)
- III = detection with ninhydrin TS