11. Ethnomedicinal plants popularly used in Thailand as laxative drugs

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Abstract. Laxative drugs are usually organized according to their mode of action, i.e. bulk forming agents, stool softeners, lubricants, saline laxatives, stimulants including some combined formulations. Among them, bulk forming laxatives promote the mildest laxation. The popular bulk forming herbal laxatives in Thailand and Southeast Asian countries are dry fruits of hairy basil (Ocimum americanum) and Scaphium scaphigerum both of which contain high amounts of mucilage substances. Ripe fruits of banana and papaya which contain pectin, and the rhizome of Amorphophallus spp. containing high amounts of glucomannan polysaccharides, are also popularly used as bulk laxatives. Several plants containing anthraquinone glycosides, i.e. leaves and pods of Senna (Cassia angustifolia), pods of C. fistula, young leaves and flowers of Senna siamea, leaves and seeds of S. tora have been used for stimulant laxatives. The leaves of Senna alata, listed in the List of Herbal Medicinal Product of Thailand A.D. 2006, are recommended as a herbal laxative drug showing astringent properties, attributed to the presence of both anthraquinones and tannins as active components.

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Castor oil, containing high content of ricinoleic acid, is a safe and effective herbal drug for treating constipation. Moreover, pulp from the ripe fruits of tamarind, which contains several organic acids, also promotes mild laxative action. Although these plants have been used as laxatives since ancient days, some of them have not been evaluated in terms of modern pharmacological techniques and also needed to be validated with appropriate clinical studies. Besides being consumed as drug preparations, the described laxative plants can also be consumed in forms of foods and drinks.

**Introduction**

Laxatives are classified as agents which cause a more or less normal evacuation of the bowel without irritation or griping effects. They are most often taken for treating constipation [1]. Drugs in this category were formerly classified on their relative potency based on the amount of cramping they produced and the relative consistency of the stool. The order of potency is from drastic purgative > cathartic > laxative [2]. Well known laxatives are Senna, Psyllium seed and mineral oil. At present, the laxative products are usually organized according to their mode of action which are bulk forming agents, stool softeners, lubricants or emollients, hydrating agents (saline laxatives and hyperosmotic agents), stimulants, and combinations [3,4]. Laxatives may be used as oral or suppository forms.

Bulk forming or bulking laxatives contain dietary fibers. They promote the mildest effect among laxatives. These agents cause the stool to be bulkier and to retain more water, as well as forming an emollient gel, making it easier for peristaltic action to move it along [3]. Bulking laxatives should be taken with plenty of water to prevent choking. This kind of laxative adds bulk and water to the stool. The larger stools help trigger the bowel to contract and move the stool out. Ethnomedicinal plants which have been popularly used in Thailand and Southeast Asian countries as bulk forming laxative drugs are dry fruits of hairy basil and of Scaphium scaphigerum (G. Don) Guib.& Planch. which contain high content of mucilage substances that can swell in water to a large volume in the same manner with Psyllium seed [5]. Other bulking laxatives are ripe banana, ripe papaya, rice bran, rhizomes of Amorphophallus spp. Bulking laxatives can be used every day to help ease symptoms of irritable bowel syndrome, hemorrhoids and other bowel problems [4].

Stool softener laxatives help to mix fluid into stools to soften them. This makes stools easier to pass out of the body. The example of this kind of laxative is docusate sodium.

Lubricant laxatives work by coating the surface of the stools, so they can move out of the body more easily. Drugs in this category are glycerin and mineral oil.
Saline laxatives draw fluid from nearby tissue into the bowel. This can soften stools and helps the bowel move them out. Magnesium hydroxide (milk of magnesia) is an example of saline laxatives.

Stimulant laxatives are the harshest laxative. They cause the bowel to squeeze or contract to move the stools out [4]. Several plants and plant products produce stimulant laxative effect due to their anthraquinone glycosides. The most interesting derivatives of anthraquinone compounds for laxative action are the O-glycosides of dianthrones and anthraquinones, as well as the C-glycosides of anthrones. The free anthraquinone aglycones present in the drug or formed by initial gastric hydrolysis, upon reaching the intestine, are absorbed in the small intestine, glucoconjugated in the liver, and almost totally excreted in urine. The glycosides of anthraquinones and dianthrones which are polar compounds, water-soluble, and have a high molecular weight, are not resorbed nor hydrolyzed in the small intestine. They are hydrolyzed in the colon by the $\beta$-glucosidase enzyme of the intestinal flora to give free anthraquinones which are further reduced to anthrones. The anthrones formed in situ are the active laxative form of anthraquinone compounds which affect intestinal motility and increase peristalsis of the colon and the sigmoid. They also affect the absorption of water and electrolytes [6]. The popular stimulant herbal drugs are the leaves of Senna alata, leaves and pods of Senna (Cassia angustifolia), pods of C. fistula, young leaves and young flowers of Senna siamea, leaves and seeds of Senna tora, castor oil and Aloe.

Some laxatives combine more than one type of active ingredients to produce a combination of the laxative effect. The pulp of ripe pods of tamarind which contain organic acids such as citric acid and tartaric acid, including mucilages is also used as a laxative drug.

Laxatives should not be used for longer than 1 week except for bulk-forming laxatives. Long-term use or overuse of laxatives can cause health problems. Most of the time, constipation does not require treatment with laxatives. It will go away on its own or by making changes in diet and other habits such as eating enough fiber, drinking enough fluids and getting enough exercise [4].

Ethnomedicinal laxative plants popularly used in Thailand and some other Asian countries

1. Senna alata (L.) Roxb., Leguminosae-Caesalpinioideae

Synonym: Cassia alata L.

Common names: Candle bush, Ringworm bush, Calalabra bush, Chumhet thet, Khikhak, Lap muen luang, Mak kaling thet, Chumhet yai, Ta-see pho

Part used: Mature leaves
Active constituents: Anthraquinones such as aloe-emodin, rhein, chrysophanol, emodin, isochrysophanol, 4,5-dihydroxy-1-hydroxymethylanthrone [5, 7].

Geographical distribution: *Senna alata* is a typical tropical plant, widespread in Southeast Asian countries. It is a heliophilous and hygrophilous plant and often grows along rivers and streams. It prefers moisture and sunlight, no specific soil required, but it is not suitable to the mountainous regions with too cold climate. In Thailand, it is often growing along ditches between rice-fields and is distributed in all parts of the country. It grows fast during the rainy season [5, 8].

*Senna alata* is a shrub, about 1-2 m high. Leaves are paripinnate, 30-60 cm long, consisting of 8-20 pairs of leaflets which are oblong or elliptic oblong 1-15 by 3-7 cm [5]. The flowering and fruiting period of this plant is during October-December. *S. alata* has been listed in The List of Herbal Medicinal Products of Thailand A.D, 2006 for laxative drug and has been used in primary healthcare for a herbal laxative drug and for treatment of fungal skin diseases. Thai herbal Pharmacopoeia (THP)[9] and The Standard of ASEAN herbal medicines [10] recommended that the dried *S. alata* leaves should contain not less than 0.5% w/w of anthraquinone glycosides.

Time of collection: The leaves and leaf-bearing branches, collected before flowering, are used fresh or dried as a laxative drug [8].
Traditional recipes [5]

1. Eight to twelve leaves are dried in the sun, powdered, and put the powdered leaves in a bag. Macerate 1-2 teabags of 3 g of dried powder in a cup of boiling water for 2-5 minutes. Take the infusion at bedtime.

2. Twelve fresh or dried leaflets are coarsely cut and boiled with 2 glasses of water until 1 glass of decoction is obtained, and strain into a glass. Take the whole decoction as a single dose before bedtime.

3. A few fresh inflorescences are cooked in boiling water and taken with a special sauce.

4. Three to five branches with leaves are boiled with water (1.5 liter). The decoction is boiled until about one third of the water used is obtained. Salt is added to the infusion to make a slightly salty taste. One glass of the decoction is taken before bedtime for laxative action [5].

5. In Vietnam, the decoction of *S. alata* dried leaves (20g), *Rumex wallichii* (20g) and Rhubarb (4-6g) is given orally for the treatment of constipation [8].

In our works [11], we analyzed the content of total anthraquinone glycosides in the leaves of *S. alata* collected in Thailand in all seasons. The results show that the leaves collected in Winter (November–February) and Summer (March–May) contain the highest amount of total anthraquinone glycosides (1.24% dry weight) while the samples collected in Rainy season (June–October) contain only 0.16% dry weight.

2. *Senna alexandrina* Mill., Leguminosae–Caesalpinioideae

**Synonym:** *Cassia angustifolia* Vahl

**Common names:** Senna, Tinnevelly senna, Indian senna, Ma kham khaek.

**Part used:** Dried leaflets and pods

**Active constituents:** Anthraquinone compounds such as aloe-emodin and its glycosides, physcion, rhein, rhein-8-glucoside, sennosides A, B [12]. The active principle causing peristaltic movement of the large intestine was thought to be rhein-anthrone [13]. World Health Organization recommended that dried Senna leaves and pods should contain not less than 2.5 and 2.2 %, respectively of hydroxyanthracene glycosides, calculated as sennoside B.

**Geographical distribution:** *Senna alexandrina* is indigenous to Somaliland and Arabia. Now, it is commonly cultivated in tropical regions [5].

Senna is normally recognized as two species, *Cassia acutifolia* Delile and *C. angustifolia* Vahl. Most of Senna cultivated in Thailand is *C. angustifolia* which is a small shrub 0.6-1.5 m. high. Leaves are paripinnate,
having 3-7 pairs of elliptic or lanceolate leaflets of 1.5-5 cm. long and 0.5-1.5 cm. wide. Flowers are yellow, in terminal racemes. Pods are flattened, about 4-7 cm long, 2 cm wide [5, 12].

**Time of collection:** The leaves are harvested before flowering. The pods are picked up just before the seeds are developed [5].

Senna is most frequently used as crude drug in several dosage forms such as powdered tablet, capsule and infusion tea. Senna pods are more stable and produce less spasmodic pain side effect than the leaves due to containing lesser content of free anthraquinones [14]. The effects of Senna are due to the hydroxyantracene glycosides, especially sennosides A and B. They are not absorbed in the upper intestinal tract. They are hydrolyzed by β-glucosidase enzyme of the bacteria in the large intestine into the active derivative, rhein-anthrone. The rhein-anthrone formed *in situ* affects on the motility of the large intestine by stimulation of peristaltic contraction and inhibition of local contraction, resulting in an accelerated colonic transit, thereby reducing fluid absorption. Also, rhein-anthrone has an influence on fluid and electrolyte absorption and secretion by the colon. It stimulates mucus and active chloride secretion, thus, fluid secretion is increased [15,16]. The action time of Senna is about 8-10 hours, and thus the drug should be taken before bedtime [15].

**Toxicity:** Senna may cause mild abdominal discomfort such as colic or cramps. Prolonged use or overdosage can result in diarrhoea. The major symptoms of overdose of Senna are griping and severe diarrhoea with consequent losses of fluid and electrolytes especially potassium. Potassium deficiency may lead to disorders of the heart and muscular weakness. Treatment should be supportive with generous amounts of fluid. Electrolytes, particularly potassium, should be monitored, especially in children and the elderly. Excessive use and abuse of Senna has been associated with finger clubbing and with the development of cachexia, and reduced serum globulin concentration [12, 13].

**Doses**

- Dried leaflets: 0.5-2.0 g (equivalent to 1-30 mg of hydroxyanthracene glycosides calculated as sennoside B).
- Dried pods: 4-12 pods (0.6-2.0 g, equivalent to 1-30 mg of hydroxyanthracene glycosides calculated as sennoside B) steeped in 150 ml of warm water for 6-12 hours.
- Leaf, liquid extract: 0.5-2.0 ml (1:1 in 25% alcohol)
- The powder prepared as oral infusion is taken daily at bedtime. Daily dose equivalent to 10-30 mg sennosides (calculated as sennoside B) taken at
night, is recommended for adults and children over 10 years. Senna should be used for short-term (less than 2 weeks) treatment of occasional constipation. Use for more than 2 weeks requires medical attention [12, 13].

3. *Cassia fistula* L., Leguminosae-Caesalpinioideae

**Common names:** Golden shower, Indian laburnum, Pudding pine tree, Khun, Lom laeng, Ku-phe-ya, Chaiya phruet, Ratcha phruet

**Active constituents:** Anthraquinone compounds such as rhein, aloe-Emodin, aloe-in, sennosides [7].

**Geographical distribution:** *Cassia fistula* is a native plant of India, naturalized in Africa, West Indies and South America. In Thailand, it is found in mixed deciduous forest and often cultivated as ornamental plant throughout the country [1].

*C. fistula* is a small to medium size tree, about 10-15 m tall. Leaves are compound pinnate, about 15-25 cm long, bears 3-8 pairs of leaflets which are 7-12 cm long and 4-8 cm wide. Flowers are racemes about 20-40 cm long. Fruits are straight cylindrical pods, 20-60 cm long and 1.5-2 cm in diameter. The pod is dark green when young, turning dark brown to black when mature. The ripe pod contains dark color sweetish pulp and numerous yellowish-brown seeds [5].

*Cassia fistula* leaves and flowers
Time of collection: The pods should be collected when ripe and carefully dried. The best pods are those which do not rattle when shaken. These possess the most pulp [1].

Traditional recipes

1. Pulp of the ripe pod (4 g) is boiled with water, and a little bit of salt is added. The extract is taken before breakfast or before bedtime [17].

2. The Pulp is dissolved in distilled water, filtered through a sieve. The extract is evaporated on a boiling water bath until a dark semisolid is obtained. Take 4-8 g of the drug before bedtime [18].

Quantitative analysis of total anthraquinone glycosides in the pulp of ripe pods of *C. fistula* was investigated in comparison with the content in the mature leaves. The results show that the content of total anthraquinone glycosides in the pod is 0.4% dry weight while the contents in the leaves collected in Winter, Summer and Rainy season are 0.5, 0.15 and 0.16% dry weight, respectively [11]. Thus, it is possible to use *C. fistula* leaves, which can be collected any time of the year especially in Winter, as a laxative drug instead of the ripe pods that have only once a year.

4. *Senna siamea* (Lam.) Irwin & Barneby, Leguminosae-Caesalpinioideae

Synonym: *Cassia siamea* Lamk

Common names: Cassod tree, Thai copper pod, Khilek, Khilek kaen, Khilek baan, Khilek luang, Khilek yai, Phak chee-lee

*Senna siamea* leaves and flowers
Traditional laxatives of Thailand

Part used: Young leaves and young flowers
Active constituents: Young leaves and young flowers of *S. siamea* contain rhein, chrysophanic acid, chrysophanol, phsicin.

From our work, we analyzed total anthraquinone glycosides in the leaves of *S. siamea* collected in Winter, Summer and Rainy season and found that the contents are 0.12, 0.08 and 0.06% dry weight, respectively [11].

Geographical distribution: *Cassia siamea* is native of Southeast Asia and widely cultivated in the tropics. The plants are found in various types of forests at lower altitudes [5].

*Senna siamea* is a medium size tree. Leaves are paripinnate, composed of 7-10 pairs of leaflets. Flowers are in large terminal panicles, yellow color. Young leaves and young flowers of *S. siamea* are popularly used as a vegetable in Khilek curry which promotes sleeping-aid and mild laxative effect. The tranquilizing effect of *S. siamea* is the effect of barakol which is developed from 5-acetonyl-7-hydroxy-2-methylchronone, a major constituent of the leaves and flowers of *S. siamea*, while the laxative action comes from anthraquinone derivatives [5, 7].

Time of collection: The young leaves and young flowers are collected for use as a laxative drug.

Traditional recipes

1. The fresh young leaves and young flowers are prepared as food by boiling with water at a ratio of 1:3 for 1 hour 2-3 times to reduce the bitterness. The water is then discarded and the boiled leaves are mixed with coconut milk and curry paste and cooked as a curry which is consumed with cooked rice as a food producing a mild laxative effect and sleeping-aid [19].
2. Fresh or dried leaves of *S. siamea* are boiled with water, and the extract is taken before breakfast.

5. *Senna tora* (L.) Roxb., Leguminosae-Caesalpinioideae

Synonym: *Cassia tora* L.
Common names: Foetid cassia, Chumhet thai, Chumhet khwai, Chumhet na, Chumhet lek, Phrom dan, Lap mue noi, Ya luek luen
Part used: Leaves and dried ripe seeds

Active constituents: Leaves of *S. tora* contain chrysophanic acid, emodin, rhein [7]. Seeds contain aloe-emodin, chrysophanol, emodin, phsicion, rhein [7, 20].
**Geographical distribution**: *Senna tora* is widely distributed up to the altitude of 1,000 m. The plant is hygrophilous and heliophilous, and often forms large populations in humid soils along riversides or on abandoned grounds. In Thailand, the plants are often found as a common weed [5, 8].

*Senna tora* is a herb or undershrub up to 1 m high. Leaves are paripinnate with 3 pairs of leaflets. The leaflets are 2-5 by 1.5-2 cm. Flowers are in axillary, short, 1-3 flowered racemes, yellow color. Pods are 10-15 by 0.5 cm. Each pod has 20-30 rhomboidal seeds, 5 mm in diameter [5].

**Time of collection**: The leaves are collected before flowering. The fruits are gathered when ripe in September-November, dried, rubbed for obtaining seeds which are collected and dried again to complete dryness. The seeds should be stir-fried or charred before use [8].

**Traditional recipes** [21, 22]

1. Leaves, 15-30 g, is boiled with a glass of water, add 1-2 dried fruits of cardamom and a little bit of salt to make better smell and taste of the extract, taken the extract before breakfast.

2. Boil 8-12 g of the dried seeds with a glass of water, add 1-2 dried cardamom fruits and a little bit of salt, take the extract before breakfast.
3. Heat the dried seeds in a hot pan to produce nice smell. Make infusion by putting a glass of hot water and drink as tea.

6. *Ricinus communis* L., Euphorbiaceae

**Common names:** Castor, Castor oil plant, Lahung, Mahong, Lahung daeng  
**Part used:** Castor oil from mature seeds  
**Active constituents:** Mature seeds contain 45-55% of castor oil of which 90% of fatty acids are ricinoleic acid, a monounsaturated, 18-carbon fatty acid with a hydroxyl functional group at the twelfth carbon. This functional group causes ricinoleic acid and castor oil to be unusually polar, and also allows chemical derivatization that is not practical with other biological oils. Castor oil also contains 3-4% of oleic acid and linoleic acid. The Castor seed contains ricin, which is a toxic protein. Ricin can be removed by cold pressing and filtering [3].

**Geographical distribution:** *Ricinus communis* is native to India. The principal producing countries are Brazil, India, China, the Soviet Union and Thailand [23].

Castor oil is a fixed oil obtained from the seeds of *R. communis* which is a shrub or small tree, up to 6 m high. The fruit is a three-celled thorny capsule containing one seed in each cell. The seeds show considerable differences in size and colour. They are oval, 8-18 mm long and 4-12 mm broad. The testa is smooth, thin and brittle. The colour may be grey, brown or black, or may be variously mottled with brown or black [23].

Preparation of castor oil: The seeds are deprived of their testas and the kernels are cold-expressed in suitable hydraulic presses. The oil is refined by steaming, filtration and bleaching. Cold expression yields about 33% of medicinal oil. Medicinal castor oil is a colourless or pale yellow liquid, with a slight odour, faintly acrid taste, and high viscosity [23].

Pure cold pressed castor oil is really tasteless and odorless. When additives are added to the pure cold pressed oil, it becomes adulterated and the taste and smell can be changed. At present, FDA recognizes castor oil as generally safe and effective for over-the-counter use as a laxative drug. When the castor oil is taken, it is converted into ricinoleic acid which is the active laxative agent, in the gut. It directly acts on intestinal mucosa or nerve plexus and alters water and electrolyte secretion. Castor oil is preferred when more complete evacuation is required [3].

Dose: 15 ml of castor oil as a purgative and lubricant [1].
7. *Aloe barbadensis* Mill., Liliaceae

**Synonym:** *A. vera* L.

**Part used:** Dried latex from leaves

**Active constituents:** Dried latex of the leaves of *Aloe* spp. has been known as Aloe which is a reddish-black glistening mass containing anthraquinone glycosides, aloin A and B. The bitter yellow latex is obtained from a pericyclic tubules beneath the epidermis of the leaves. The latex or juice is often drained from the transversely cut leaves, concentrated by boiling and solidified on cooling [23]. After being dried, it yields Aloe. Aloe is official in the USP XXII for a potent laxative drug. The official varieties of Aloes are the Cape from South Africa and Kenya, and the Curacao from the West Indian Islands of Curacao, Aruba and Bonnaire [23]. Cape Aloe contains not less than 18%, while Curacao Aloe contains not less than 28% of hydroxyanthracene derivatives, expressed as barbaloin. Aloe is used in forms of powder and preparations for oral use for short-term treatment of occasional constipation. The mechanism of action is stimulating colonic motility, augmenting propulsion and accelerating colonic transit, which reduces fluid absorption from the faecal mass [12].

The solid residue, Aloes, is mainly obtained from various species of *Aloe* i.e. Cape Aloe from *Aloe ferox*; Curacao Aloe from *A. barbadensis*, Socotrine and Zanzibar Aloes from *A. perryi*. The genus *Aloe* includes herbs, shrubs and trees, bearing spikes of white, yellow or red flowers. *Aloe* leaves are fleshy, strongly cuticularized, and are usually prickly at the margins [23].

**Geographical distribution:** *Aloe* spp. are native to Africa. They need an abundance of sunshine and a well drained, porous soil [23].

**Dose:** The dose recommended for adults and children aged over 10 years is 10-30 mg of hydroxyanthracene derivatives (calculated as aloin) once daily at night [24].

8. *Rheum officinale* Baill. and *R. palmatum* L., Polygonaceae

**Common names:** Rhubarb, Chinese Rhubarb

**Part used:** Dried rhizomes and roots, deprived of periderm tissues.

**Active constituents:** The dried rhizomes and roots contain anthraquinone glycosides and their aglycones such as aloe-emodin, emodin, chrysophanol, physcion, rhein and sennosides A and B. They also contain tannins including gallic acid, epicatechin gallate and catechin [24, 25]. The B.P. drug is required to contain not less than 3.0% of hydroxyanthraquinone derivatives calculated as rhein [23].
**Geographical distribution:** *Rheum officinale* and *R. palmatum* or other species (excepting *R. rhaponticum* L.) are native to China and Tibet. The production of Rhubarb extends over a large area of China. *R. officinale* is collected chiefly in the mountainous area, Tibet, Szechuen and Hupeh of China. *R. palmatum* is abundant in the province of Kansu and Tibet [1].

*R. officinale* and *R. palmatum* are perennial herbs. Their underground portions consist of strong vertical rhizomes with fleshy, spreading roots. The above-ground portions consist of a number of long petioled leaves which arise from the rhizomes. The lamina is cordate to orbicular, entire or coarsely dentate (*R. officinale*) or palmately lobed (*R. palmatum*). The fruit is an achene with 3 broad thin wings and surrounded at its base by the remain of the perianth [1].

**Time of collection:** The rhizomes and roots are dug up late in September from plants 8-10 years old. The Shensi Rhubarb, yielded by *R. palmatum*, is esteemed as the finest variety [1].

**Traditional uses**

Rhubarb has been used both as a laxative and an anti-diarrhoeal agents. The laxative action is due to anthraquinone derivatives, while astringent action comes from tannin components. Its use always causes intestinal griping and is seldom employed as a laxative now a day [2].

**Dose:** Small doses (0.05-0.5g) have an anti-diarrhoeal action while larger doses, i.e., 1-3 g have laxative effect after 6-10 h used in the forms of powder, extract and tincture, frequently mixed with other laxatives [25].

9. *Ocimum americanum* L., Labiatae

**Synonym:** *O. basilicum* L. var. citratum, *O. canum* Sims

**Common names:** Hairy basil, Mang lak, Kom ko khao, I tu

**Past used:** Dried ripe seeds

**Active constituents:** The seeds contain mucilages, pentosans, polysaccharides and sugars.

**Geographical distribution:** *Ocimum americanum* are widely spread in tropical Africa, India, Ceylon to South China and Malaysia. They are distributed in open waste places and also commonly planted in gardens [5].

*Ocimum americanum* is an erect herb, 30-50 cm high. Leaves are simple, opposite, 2.5-5 by 1-2.5 cm. White or purple inflorescences are in terminal raceme-like, simple or branched 7-15 cm long. Fruits are composed of dry 1-seeded ellipsoid nutlets, 1-2 mm long, black, dotted [5].
**Time of collection:** The black ripe seed is collected.

**Traditional uses**

The seeds are soaked in water until they are fully swollen. The swollen seeds are taken as laxative, or mixed with syrup and coconut milk, taken as a dessert. The outer seed coat can swell about 45 times and is not digested in the digestive tract, it acts as a bulk laxative. The dried mucilage powder from the seeds has been made in various dosage forms such as powder, capsule and tablet for a laxative drug [5]. The seeds may be used as a bulk laxative in post-operative patients [26].

When 2 teaspoonfuls of the seed is soaked with a glass (240 ml) of water and the mixture is taken, the laxative effect is found to be the same as taken 2 spoonfuls of Psyllium seeds. The seeds of *O. americanum* are used as a bulk laxative by increasing the quantity of faeces and lubricating the intestine. The seeds should be prepared with sufficient water for complete swelling before taking in order to prevent dehydration and intestinal obstruction [5].

**10. Scaphium scaphigerum** (G.Don) Guib. & Planch., Sterculiaceae

**Synonyms:** *S. macropodum* Beaum.  
*Sterculia scaphigera* Wall.

**Common names:** Phung thalai, Samrong, Buk jong, Jong  
**Part used:** Dried ripe fruits  
**Active constituents:** The fruits of *S. scaphigerum* contain 56-69% of dietary fiber which can swell in water around 10 times. The dietary fiber is composed of approximately 8% of soluble fiber, 90% of insoluble fiber, and 1% of polysaccharides [27].

**Geographical distribution:** *Scaphium scaphigerum* is always found in the forest and mountain area. In Thailand, the plants are distributed in the West of the country, especially in Chantaburi province [27].

*S. scaphigerum* is a medium to large sized tree, up to 45 m high. Mature fruits are brown color, thin pericarp. A part of fruit expands as a boat shape wing, called “Sum pao”, which can flow for a long distance. The mesocarp of the fruit contains mucilages which can be swollen very well in water yielding brown soft sponge material. This sponge is used to prepare a drink for health and acts as a bulk laxative [27].

**Time of collection:** The ripe fruits are gathered for using as a laxative drug.

**Traditional uses**

Macerate the dried mature fruits in water for 1-3 hours or until complete swelling, then separate the swollen sponge material from the seeds. The sponge is...
Fruit of S. scaphigerum showing sum pao

then mixed with syrup, honey or fruit juice and crushed ice to make as a cold drink or dessert and to promote bulk forming laxative effect [27].

11. Plantago afra L., Plantaginaceae

**Synonym:** Plantago psyllium L.

**Part used:** Dried ripe seeds

**Active constituents:** Mucilages

Psyllium seed or Plantago seed is the dried ripe seed of *Plantago afra* L. or of *P. indica* (known in commerce as Spanish or French Psyllium seed), or of *P. ovata* Forskal (known in commerce as Blond Psyllium or Indian Plantago seed). Plantago seeds contain 10-30% mucilaginous hydrocolloid which is localized in the outer seed-coat (husk) and is the major active constituent. The mucilage is composed of a soluble polysaccharide fraction containing mainly arabinoxylans (85%). It is neither absorbed nor digested in the intestinal tract [12].

**Geographical distribution:** *Plantago afra* and *P. indica* are native to West Mediterranean countries, while *P. ovata* is native to Asia and the Mediterranean countries. The plant is cultivated extensively in India and Pakistan, and adapts to western Europe and subtropical regions [12].

*P. afra* is an annual, erect, glandular-hairy caulescent herb, with an erect branching stem. It possesses whorls of flattened linear to linear-lanceolate leaves from the upper axils of which flowering stalks as long as the leaves arise. The flower is tetramerous with a calyx of 4 similar persistent, lanceolate sepals. The fruit is membranous, 2-celled and 2-seeded [12].
Psyllium seed is the most popular herbal bulk laxative. It is official in USP XXII. It can swell in water to a large volume promoting bulk laxation and lubrication. It is necessary to drink large amount of water when taking Psyllium seeds [2].

**Dose:** Usually 2 teaspoonfuls (about 7.5 g) with a glass of water, juice, or milk, stir throughly and drink it quickly before the mixture thicken [2].

12. *Amorphophallus* spp., Araceae

**Common name:** Bok  
**Part used:** Rhizomes  
**Active constituents:** Mucilages, glucomannan  

*Amorphophallus* spp. is a herb with brown rhizome which is rich in glucomannan and mucilages. The species which have high content of glucomannan are *A. konjac* C. Koch., *A. corrugatus* N.E.Br., *A. kerrii* N.E.Br., etc.

**Geographical distribution:** In Thailand, *Amorphophallus* which contains glucomannan can be found only in the western parts of the country [22].

Glucomannan is a water-soluble polysaccharide which can absorb water about 60 times of its dry weight yielding a viscous gel. The gel can coat the wall of the stomach and intestine. It reduces glucose and lipid absorption from the digestive tract and promotes bulk forming laxative effect. The polysaccharides from *Amorphophallus* rhizome is popularly prepared as food, such as noodles, instant drinks, or snacks [28].

13. Bran

Bran is the course outer coat or hull of the grain of rice (*Oryza sativa* L.), wheat (*Triticum aestivum* L.) or oats (*Avena sativa* L.). Bran is a cheap and abundant source of water-insoluble dietary fiber.  
**Active constituents:** Bran contains about 27% dietary fiber.  

When bran is taken, the fiber passes through the gut somewhat like a large wet sponge, absorbing and holding water and other compounds. The great bulk sponge increases the size of stool and decreases the emptying time of the colon [29]. In the market, bran is available in various forms such as crude material, compressed tablet, cereal and bread.  

**Dose:** Dried bran 1-2 tablespoons is put in a cup of hot water or hot milk, stir throughly, add some salt, sugar or spices, and taken. Bran should be prepared with sufficient water to prevent intestinal obstruction [28, 29].
14. *Musa sapientum* L., Musaceae

**Common names:** Banana, Kluai  
**Part used:** Ripe fruits  
**Active constituents:** Pectin

**Geographical distribution:** *Musa sapientum* is common in the tropics and is native to Southeast Asia. The plant requires well-drained and moist soil [5].

*Musa sapientum* is a large herb with underground stem. The aerial part consists of wide overlapping leaf sheaths. The leaves are large, spirally arranged, oblong. Fruits are berry, more than 10 cm long, cylindrical grouped in hands that are born in bunches, sweet when ripe [5]. The ripe fruits contain high content of pectin, a water-soluble dietary fiber. Pectin promotes bulk laxative effect by increasing the quantity of stool and lubricating the intestine [22].

**Time of collection:** The fully grown but unripe fruits are collected and left until fully ripen.  
**Dose:** Take 2-4 ripe fruits daily.

15. *Carica papaya* L., Caricaceae

**Common names:** Papaya, Papaw, Melon tree, Malakoo  
**Part used:** Ripe fruit  
**Active constituents:** Pectin

**Geographical distribution:** *Carica papaya* is native to tropical America, naturalized in Southern Florida, and found in tropical areas throughout the world.  

*Carica papaya* is a small tree, The trunk is non-woody and hollow. The large simple leaves, which are deeply lobed, are in a terminal cluster, alternate. The inflorescences consist of racemose cymes of yellow, staminate and pistillate flowers. The fruit is a large melon-like, edible berry. When ripe, the fruit is a very desirable food. Seeds are albuminous. Lacticiferous tubes occur in roots, stem, leaves and fruits. Shallow cuts made on the surface of fully grown but unripe fruits give a milky sap or latex which after collection and drying is known as crude papain [1, 29]. The ripe fruit contains pectin and is used as a mild bulk forming laxative. Normally, it is a popular sweet fruit.

16. *Tamarindus indica* L., Leguminosae-Caesalpinioideae

**Common names:** Tamarind, Indian date, Ma kham, Ta lup, Mak-kaeng  
**Part used:** Ripe pods
Fruits of *Carica papaya*

Pods of *Tamarindus indica*
**Active constituents:** The ripe pods contain pectin, mucilages, organic acids (12-15%) including tartaric acid, citric acid, malic acid and lactic acid [22].

**Geographical distribution:** *Tamarindus indica* is native to Africa. It is cultivated in India, the East Indies, Egypt and all over the tropics for their edible fruits and as the ornamental trees [1,5].

*Tamarindus indica* is a large tree up to 30 m high, having spreading branches with alternate paripinnate leaves and lateral racemes of yellow flowers. Each leaf comprises 8-10 pairs of leaflets. Pods are oblong, slightly curved, 5-15 by 1-2.5 cm, reddish-brown. Seeds are dark brown, embedded in a thick, sticky brown pulp. A pulpy mass has a light reddish-brown color, changing with age to a dark brown or black. The pulp contains some branching fibers and numerous seeds. The pulp is used as a mild laxative for treatment of constipation [1, 5].

**Time of collection:** The ripe pods are gathered, deprived of the brittle outer portion of the pericarp.

**Traditional recipes** [22]

1. Fruit pulp 70 -120 g is taken with salt, then drink large amount of water.
2. Fruit pulp is boiled with water, add sugar and a little bit of salt to prepare as a drink.
3. Fruit pulp is dissolved in water and mixed with salt, then it is used as rectal enema.

**Dose:** 15 g

**Conclusion**

Traditional medicine is one of the oldest form of healthcare which is mainly used in a holistic manner. For the people who live in the remote villages where it is difficult to obtain modern drugs, traditional medicines are still much more necessary. In some countries, traditional medicines are still a central part of the medical system, such as Ayurvedic medicines in India, traditional Chinese medicines and Thai traditional drugs.

Although the described plants have been traditionally used as laxatives for a long time, some of them have not been reported on pharmacological and clinical studies. It is interesting to find out the active compounds and confirm the laxative action of these plants. Besides being consumed as laxative preparations, they are always consumed as foods and drinks.

The high content of anthraquinone glycosides are found in several *Cassia* and *Senna* leaves which are collected in Winter and Summer. These results
support traditional way of plant collection of Thai people that the leaf drugs should be collected before the flowering period. The effectiveness of the herbal medicines mainly depend upon the proper use of authentic raw materials. A confusion of plant identification may cause by one name refers to different plants or one plant may have different dialect names. Therefore, using of corrected plant, part, dose and method of preparation is very important for traditional herbal medicines. Moreover, traditional medicines necessitated the availability of standards to ensure their quality, efficacy and safety. Thus, standardized raw materials are necessary and have to be concerned for the good quality of traditional medicines. The most popular traditional stimulant laxatives in Thailand are the leaves of *Senna alata* and *Senna alexandrina*, prepared informs of tea or decoction, while the most popular bulk laxatives are the dried ripe fruits of *Ocimum americanum* and of *Scaphium scaphigerum* prepared as drinks or desserts.

**References**