



Medicinal Plants of Thailand

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Introduction

For thousands of years, plants have formed the basis of sophisticated traditional medicinal systems in many parts of the world and remain a repository of new remedies for mankind (Gurib-Fakim, 2006). The healing properties of various plants are not only recognized by humans but, amazingly, are also widely utilized by other primates such as monkeys and apes (Halberstein, 2005). These primates have been observed to select for consumption specific botanical species that may act as analgesics, anti-microbials, anti-inflammatories, immunostimulants, anti-diarrheals, digestive aids and fertility regulators (Baker, 1996; Glander, 1994; Plotkin, 2000). It is noteworthy that an interesting review by Huffmann (1997) draws attention to the fact that monkeys, gorillas, chimpanzees as well as humans have been found to use the same plants for the treatment of similar diseases, injuries and other health problems.

In humans, often the various routes of administration of herbal medications are selected according to the consistency of the preparation and according to the disease that is being treated (Halberstein, 2005). The majority of plant-based remedies are consumed orally in the form of tea or a decoction prepared through prolonged and more thorough boiling and soaking of the harder plant parts such as branches, twigs, bark, roots or the entire plant part (Figueiredo *et al.*, 1997; Halberstein, 2005; Hirschborn *et al.*, 1981, 1982; Hylands and Stuart, 1981). Plant extracts are also processed or refined to produce therapeutic tinctures, syrups, sauces, oral sprays, tablets, encapsulated powders, snuffs and lozenges (Halberstein, 2005).

South-east Asian countries like Malaysia, Thailand and Borneo have a long history of using medicinal plant that offer considerable pharmaceutical potential. Lee and Houghton (2005) found that the South-East Asian region, owing to the vast bio-diversity of its flora, holds great promise for the discovery of novel biologically-active compounds.

Medicinal plants known as *samunphrai* in the local Thai language have long been used as a traditional source of healing in Thailand (Cheeptham and Towers, 2002). Panthong *et al.* (1986) observed that there is a considerable amount of information

available on Thai traditional medicines, although they are often written in the Thai language limiting the accessibility of this knowledge to the western world.

In this paper, we present some common medicinal plants from Thailand that are used in traditional and herbal medicine.

Medicinal Plants

Abrus precatorius is a member of the Papilionaceae family and is known as *ma klam taanuu* in the local Thai language. In English, it is referred to as the American pea/Crab's Eye vine (Panthong *et al.*, 1986). The plants belonging to the genus *Abrus* are popular in African folk medicine (Anam, 2001), a good example being the use of plants from the genus *Abrus* as an oxytocic in the Igbo-Nigeria folk medicine. The evaporated alcoholic extract from *Abrus precatorius* is administered in the form of vaginal pessary to induce abortion (Nwodo and Botting, 1983). Certain prostaglandins are known to induce abortion and labor. The lipid extracts prepared from the seeds of the genus *Abrus* are known to contain C₈-C₂₄ unsaturated carboxylic acids including linoleic acid (Lefar *et al.*, 1968) which are associated with the formation of precursors for prostaglandins and therefore there is a possibility that the lipids found in the seeds could be uterotonic (Anam, 2001). This plant is popular for its anti-inflammatory properties and the fresh leaves of the plant are crushed with oil and used as a poultice in Thailand (Chaicharntippayut, 1984; Songbanthitaya, 1973). The anti-inflammatory activity of compounds isolated from the aerial parts of *Abrus precatorius* has been reported by Anam (2001). Furthermore, the applications of *Abrus precatorius* in traditional medicine for treatment of leucoderma, itching and wounds have been reported by Kirtikar and Basu (1935). The toxic effects of the seeds of *Abrus precatorius* are its spermicidal activity. The Ayurvedic physicians of Sri Lanka have claimed that the powdered seeds, when taken orally, tend to inhibit conception in humans (Jayaweera, 1981).

Acanthus ebracteatus belongs to the family Acanthaceae. It is a spiny herb distributed in the mangroves of southern Thailand (Hokputsa *et al.*, 2004; Kanchanapoom *et al.*, 2001). This plant is used to treat a wide range of diseases. The boiled seeds are commonly used as a cough remedy and the seeds are also used for poulticing boils. A decoction is drunk against boils in Malaysia (Hokputsa *et al.*, 2004). In Thailand, the plant is known for its anti-asthmatic properties (Panthong *et al.*, 1986) and the roots are boiled in water and used as a drink (Boonyarattanakorakit and Supawita, 1977; Jirawongsa *et al.*, 1976). The roots and stem are also used for treating skin diseases and for longevity (Ong, 2001). Kanchanapoom *et al.* (2001) reported that the leaves dispensed with pepper (*Piper nigrum*) are also used as tonic pills by Thais for longevity. In China, the plant is prescribed against hepatosplenomegaly, hepatitis, lymphoma and asthma (Hokputsa *et al.*, 2004).

Acorus calamus is a member of the Araceae family and is known as *waan nam* in the local Thai language and in English it is referred to as Myrtle grass (Panthong *et al.*, 1986). *Acorus calamus* is a perennial shrub growing in damp marshy places, indigenous to Asia, North America and Europe (Parab and Mengi, 2002). The plant is attributed with both anti-asthmatic and anti-inflammatory properties and the roots of the plants are dried and partaken in the form of powder in Thailand (Anon, 1964; Pongs-Boonrod 1950; Tantiwattana, 1978). Crushed or dry rhizome as well as the oil from rhizome is applied to inflamed joints (Phu-pattanaphong, 1979; Pongs-Boonrod, 1950). The roots and rhizomes of this plant have been used extensively in the Indian systems of traditional medicine for hundreds of years (Mehrotra *et al.*, 2003). In Ayurvedic medicine, it is used for the treatment of insomnia, melancholia, neurosis, epilepsy, hysteria, loss of memory and remittent fevers (Agarwal *et al.*, 1956; Kirtikar and Basu, 1956). Researches

have attributed the plant as an insecticidal, antibacterial and antifungal agent (Asolkar *et al.*, 1992). In addition, the plant is used in the treatment of cough, bronchitis, gout, convulsions, depression and other mental disorders, tumors, haemorrhoids, skin diseases, numbness and general debility (Vaidyaratnam, 1994).

Aegle marmelos belongs to the family Rutaceae. It is commonly known as “Bael” in Hindi and English and is indigenous to India (Kesari *et al.*, 2006). In the Thai language it is known as matuum (Panthong *et al.*, 1986) vilvam in Tamil and in Sanskrit it is known as sripal or bilwa (Veerappan *et al.*, 2007). *Aegle marmelos* have been widely used in ethno medicine and possess a wide range of medicinal properties: astringent, antidiarrheal, antidyenteric, demulcent, antipyretic, antiscourbutic, haemostatic, aphrodisiac and is even used as an antidote against snake venom (Kirtikar and Basu, 1935; Nandkarni, 1976). The plant is popular for its anti-inflammatory properties. The fresh leaves are crushed and used as a poultice on inflamed areas in Thailand (Boonyarattanakornkit and Supawita, 1977). Decoction prepared from the leaves and fruits of the plant is used for treating dysentery, diarrhea, upper respiratory tract infections and heart ailments (Dymock William *et al.*, 1890; Kirtikar *et al.*, 1935; Murugesu Mudaliar, 1988). *Aegle marmelos* Corr is widely used in the Indian Ayurvedic medicine for the treatment of diabetes mellitus (Alam *et al.*, 1990; Kesari *et al.*, 2006; Prakash, 1992). Early reports on the blood glucose lowering activity of the green leaves of *Aegle marmelos* include that of Chakrabarti *et al.* (1960). Further, recent studies by Kesari *et al.* (2006) shows that aqueous seed extract of *Aegle marmelos* display both antidiabetic and hypolipidemic effects in diabetic rats.

Alpinia galanga belongs to the family Zingiberaceae and is widely cultivated in China, India, and Southeast Asian countries such as Thailand, Indonesia, and Philippines (Matsuda *et al.*, 2003). The plant is known as Galanga in English whilst *khaa* is the local Thai name (Panthong *et al.*, 1986). The rhizomes of this plant are extensively used as spice or ginger substitutes for flavoring foods. It is also used in traditional medicine for several purposes, such as stomachic in China, or as a carminative, antifatulent, antifungal, and anti-itching agent in Thailand (Matsuda *et al.*, 2003). The plant is attributed with anti-inflammatory properties and the rhizome is macerated in vinegar and applied to the inflamed area (Chaicharntippayut, 1980; Karnjanawan, 1972; Kasipan, 1974; Songbanthitaya, 1973; Teepakorn, 1969). A study was conducted by Lee and Houghton (2005) in which they used a SRB cytotoxicity assay to screen extracts and isolated constituents of some traditional medicinal plants from Malaysia and Thailand against two human cancer cell lines, COR L23 lung cancer cell line and MCF7 breast cancer cell line as well as the non-cancer MCF5 cell line. Five out of the seven species tested, i.e. Thai *Alpinia galanga*, *Alpinia officinarum*, *Cayratia japonica*, *Physalis minima*, *Tabernaemontana divaricata* exhibited *in vitro* cytotoxicity activity. The Thai *Alpinia galanga* was found to exhibit a strong toxicity on both cancer line cells compared to that of the Malaysian *Alpinia galanga*.

Apium graviolens belongs to the family Umbelliferae and is known to be endowed with antihypertensive properties (Panthong *et al.*, 1986). In English, the plant is known as Chinese celery whilst *khuen chaai* is the local Thai name (Panthong *et al.*, 1986). In Thailand, the fresh herb is boiled in water and used as a drink because of its antihypertensive property (Boonyarattanakornkit and Supawita, 1977; Mueanwongyaat, 1981; Panthong *et al.*, 1986; Payakorn, 1982; Utokkapachana, 1966). *Apium graviolens* is not only used for low blood pressure but also as a heart tonic in Trinidad and Tobago (Lans, 2006).

Cassia tora is a member of the Caesalpiniaceae family and in the local Thai dialect, it is referred to by the name of *chumhet thai* whilst in English it is known as Foetid cassia (Panthong *et al.*, 1986). The plant is known for its antihypertensive property and in Thailand, the seeds are grilled and a decoction is prepared from it or drunk as a tea (Chaicharntippayut, 1980). In Africa, however the leaves, roots and even the whole plant are employed in the treatment of impetigo, ulcers, helminthiasis and as a purgative (Dalziel, 1955; Irvine, 1961). The powdered leaves are applied to ulcers and to parasitic skin conditions or decoction may be prepared from fresh leaves, which may then be used as lotion for the same purpose (Chidume *et al.*, 2002). The decoction from the whole plant or root is taken orally and also the fermented leaves are pounded and added to food or "local gin." It is also taken orally for anthelmintic and purgative effects (Chidume *et al.*, 2002). In India, *Cassia tora* has been profusely researched because it is deemed as an important medicinal plant of the Ayurvedic system of medicine and has been widely used to treat various ailments (Asolkar *et al.*, 1992; Chatterjee and Pakrashi, 1992; Kirtikar and Basu, 1975; Maity *et al.*, 2001; Nadkarni, 1985). Anthraquinones have been isolated from the seeds (Kitanaka *et al.*, 1990; Niranjana and Katiyar, 1979; Upadhaya and Singh, 1976) and sennosides, which confers the plant its medicinal value have been detected in the leaves (Chakraborty and Chawala, 1983) whilst aloe-emodin which is known to be a purgative (Pal and Pal 1983) has also been isolated from the leaves of *Cassia tora* (Pal *et al.* 1977). Moreover, Maity *et al.* (1998) has reported that the leaf extract from the plant possess a significant anti-inflammatory activity as well. *Cassia fistula* Linn is known locally as *chaiyaphruek* in Thai (English: Golden shower, purging cassia). It belongs to the Caesalpiniaceae family and has been recorded by Panthong *et al.*, (1986) as a plant with anti-inflammatory activity. The young leaves of this plant is crushed and used as a poultice (Chaicharntippayut, 1980; Jirawongsa, 1976; Ar-yurawet, 1975).

Hibiscus sabdariffa belongs to the family Malvaceae and is known as *krachiap daeng* in Thailand (Panthong *et al.*, 1986). In English, it is usually known as roselle, red sorrel while in Arabic it is called karkade (Ali *et al.*, 2005). *Hibiscus sabdariffa* is an annual herb and is cultivated for its leaves, fleshy calyx, seeds and the fibres (Haruna, 1997). The plant which is widely grown in Central and West Africa, Southeast Asia and elsewhere (Ali *et al.*, 2005) is known to possess antihypertensive property and is used as a diuretic (Haruna, 1997). In Thailand, the calyx is used to prepare a decoction or drunk as a tea (Boonyarattanakornkit and Supawita, 1977; Mueanwongyaat, 1981; Panthong *et al.*, 1986; Tantiwattana, 1978). The calyces of *Hibiscus sabdariffa* are used in many parts of the world to make cold and hot nutritional drinks as the plant is regarded as a good source of ascorbic acid (vitamin C). The calyx extracts are known to include strong *in vitro* and *in vivo* antioxidant activity (Ali *et al.*, 2005). Moreover, in folk medicine, the calyx extracts are used for the treatment of several other complaints, which includes high blood pressure, liver diseases and fever (Ali *et al.*, 2005). The plant is also reported to possess antibacterial activities (Charcone, 1939; Gangrade *et al.*, 1979).

Impatiens balsamina belongs to the family Balsaminaceae and is known as *thian dok* in Thailand. In English, it is usually referred to as Garden balsam (Panthong *et al.*, 1986). It is an annual native of India and is widely cultivated both as an ornamental plant as well as a plant with medicinal value in the orient (Shoji *et al.*, 1994). The plant is attributed with anti-inflammatory properties and the flowers and stem are either ground into powder or produced as pills and taken orally (Chaicharntippayut *et al.* 1979). Nonsteroidal anti-inflammatory drugs (NSAIDs) are used for the treatment of inflammatory and infectious diseases and the prime mechanism of NSAIDs is to inflict an

inhibitory effect on cyclooxygenase. The aerial parts of *Impatiens balsamina* are widely used in Chinese herbal medicine for the treatment of articular rheumatism, bruises, beriberi, pain and swelling (Ishiguro and Oku, 1997; Oku and Ishiguro, 2002). The white petals of the flowers are also used as a folk remedy to relieve the itching sensation associated with insect bites (Oku and Ishiguro, 1999). In some parts of Japan, juice squeezed from the corolla of the plant is painted topically on the skin as an antipruritic to treat several types of dermatitis which includes urticaria (Oku and Ishiguro, 2002). The seeds are usually used to treat difficult labour, to suppress puerperal pain, and to act as an emmenagogue, expectorant and also as an antidote against fish poisoning in many oriental countries (Anon, 1977; Perry, 1980).

Jasminum sambac Aiton belongs to the olive or Oleaceae family. It is known as mali laa in the local Thai language (Panthong *et al.*, 1986). The main species of Jasmine include the *Jasminum officinale* also known as the Indian jasmine and the *Jasminum sambac* (also known as the Arabian jasmine or is also referred to as Chinese jasmine (*mo li*) and in Sanskrit *mallika* (Holmes, 1998). Jasmine is known to possess anti-asthmatic properties and in Thailand (Panthong *et al.*, 1986), a type of decoction as well as tea is prepared from the flowers (Boonyarattanakornkit and Supawita, 1977; Pongs-Boonrod, 1950). Jasmine is a plant with a high medicinal value and according to Holmes (1998), the use is versatile for example: (a) Jasmine's physiological uses include menstrual, reproductive and obstretrical applications, (b) it can be used as a uterine stimulant and relaxant during amenorrhea and spasmodic dysmenorrhea, (c) known to serve as an effective remedy throughout the stages of labour and thereafter, (d) can be used for skin care because of its emollient affect which moistens and soothes the skin and (e) jasmine is also known to exert both an euphoric and an aphrodisiac action which is mediated by the two chemicals opioid and peptides which it is known to harbor. In a study by Lee and Houghton (2005) on the cytotoxicity of plants from Malaysia and Thailand that are usually used to treat cancer, amongst others, *Jasminum sambac* (L) is listed as one of the plants.

Lantana camara is a woody shrub and is a member of the family Verbenaceae (Basu *et al.*, 2005). In the local Thai dialect it is known as *phakaa krong* and in English, it is commonly referred to as Hedge flower (Panthong *et al.*, 1986). Although a native of South America, currently, the plant is distributed throughout the tropical and sub-tropical parts of the world (Basu *et al.*, 2005; Ross, 1999). The aerial parts of the plant as well as the leaves and the roots are widely used in folklore medicine all over the world to treat various ailments associated with skin and stomach, rheumatism, asthma, malaria, convulsion, indigestion and fever (Basu *et al.*, 2005; Chopra *et al.*, 1956; Ross, 1999). In Thailand, it is categorized as a plant with anti-inflammatory properties (Panthong *et al.*, 1986) and the leaves are grilled and crushed and used as a poultice (Chaichartippayut *et al.*, 1979). Pounded leaves are also applied to cuts, ulcers and swelling and decoction prepared from leaves are used to prepare lotion for treatment of wounds (Anon, 1962). The leaves of the plant are boiled and prepared into a decoction as a remedy against coughs (Watt and Breyer-Brandwijk, 1962). According to Verma and Verma (2006) anti-feedant, larval mortality/repellency, anti-fungal and antibacterial activities of extracts of *Lantana* leaves have been duly reported. A study investigating the antibacterial activity of the *Lantana camara* root-bark prepared with solvents of different polarity and evaluated using the agar-well diffusion method has been carried out by Basu *et al.* (2005). Moreover, studies have shown that aqueous extracts of *Lantana camara* exhibit antifungal activity (Singh *et al.*, 1993) whilst the alcoholic extracts tend to possess insecticidal properties (Mukhtar and Ahmad, 1991; Saxena *et al.*, 1992).

Mimosa pudica belongs to the family Mimosaceae. It is a common plant found to grow in moist waste ground, lawns, open plantations and weedy thickets (Bum, 2004). The plant is originally a native of Middle America but is currently distributed in all tropical parts of the world (Hutchinson and Dalziel, 1958; Morton, 1981). The interest in *Mimosa pudica*, or the sensitive plant, has been mainly in relation to the chemistry and biology of the thigmonastic movement (rapid leaf movement observed upon touching the leaves) and nyctinastic movement (slow movement controlled by a biological clock) of the leaves (Kirk *et al.*, 2003). However, it is also a plant endowed with medicinal properties. In many countries, extracts of *Mimosa pudica* are used in the treatment of headache, migraine, insomnia, diarrhea, dysentery and fever and the powdered form of leaves and roots are used to treat piles and fistula (Amalraj and Ignacimuthu, 2002). The paste of the leaves is applied to glandular swelling and dressing for sinus (Sastri, 1962). *Mimosa pudica* is popular for its anti-inflammatory properties and is known as *yaa pan yot* in the local dialect in Thailand (Panthong *et al.*, 1986). The root is boiled in water or macerated in alcohol and used as a drink (Chaichantippayut *et al.*, 1980; Mueanwongyaa, 1981). In the traditional medicine, the leaves and stems are used against scorpion sting (Patwari, 1992) whilst the root extracts are used against cobra bite (Mahanta and Mukherjee, 2001).

Plumeria rubra is a member of the Apocynaceae family (Panthong *et al.*, 1986) and there are numerous reports on the ethnomedical uses of plants belonging to the pantropic genus *Plumeria* (Hamburger *et al.*, 1991). In the Thai language, it is known as *lan thom daeng* and in English it is known by the name of temple tree. In Eastern Asia, the fruit pulp, the latex and the stem bark is known to serve as an abortifacient and a purgative (Datta and Satta, 1976; Quisumbing, 1951; Sawhney *et al.*, 1978; Wasuwat, 1967). In Thailand the latex from the stem is mixed with coconut oil and applied to inflamed joint (Boonyarattanakornkit and Supawita, 1977; Chaichantippayut *et al.*, 1979). In Indonesia, the plant is cultivated as an ornamental species and decoctions prepared from the bark is used to treat venereal diseases (Burkill, 1966). The roots and rhizomes of this plant are also used against snakebite (Houghton and Osibogun, 1993). A number of plants are known to contain potent cardioactive glycosides that have positive inotropic effects on the heart and amongst many other plants that serve as sources of cardiac glycosides, one of them is *Plumeria rubra* (Frishman *et al.*, 2004). Studies reveal that extracts of various *Plumeria* species exhibit significant antibacterial, antifungal and antiviral activity (Jeven *et al.*, 1979; Sticher, 1977; Vanden Berghe *et al.*, 1978).

Thuja orientalis (also referred to as *Platyclusus orientalis*) belongs to the Cupressaceae family and is a long lived conifer (Xie, 1992). In the local Thai dialect, it is known as *son haang sing* and in English, it is often referred to as the Chinese arborvitae. The plant is included amongst the medicinal plants of Thailand because of its anti-inflammatory property (Panthong *et al.*, 1986). The fresh leaves are boiled in water and used as a drink (Pongs-Boonrod, 1950; Wittayanartpaisarn *et al.*, 1981). The seed oil is used in Chinese medicine to alleviate problems associated with the male reproductive system (Marcel *et al.*, 1991).

In conclusion, it is evident that Thailand medicinal plants have the potential to deliver natural products for various human diseases. However, more research is required to substantiate the existing medicinal claims and to identify credible leads for the development of therapeutic agents.

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