CHAPTER I

INTRODUCTION

Sophora exigua Craib is a member of the family Leguminosae, subfamily Papilionoideae, tribe Sophoreae (Niyomdham, 1980). Description of Sophoreae (Bronn.) DC. are as below:

Trees or shrubs. Leaves odd-pinnate, 5-many-foliolate, rarely simple or 1-foliolate. Petals subequal to clearly differentiated into standard, wings and keel. Stamens with filaments all free or only united at the very base; anthers uniform. Ovary with style glabrous on upper part. Fruit not jointed, dehiscent or not (Niyomdham, 1980).

The tribe is composed of 47 genera (Soladoye, 1985), but only two are indigenous to Thailand. One of them is *Ormosia* Jack., which comprises about 90 species in Asia and South America, only 8 species occur in Thailand. The other is *Sophora* Linn., which consists of about 50 species distributed in tropic and subtropic, only 4 species are found in Thailand (Niyomdham, 1980).

Niyomdham (1980) described the genus *Sophora* Linn. as follow:

Trees, shrubs or rarely perennial herbs. *Leaves* alternate, odd-pinnate; leaflets usually opposite;

petiolules very short; stipules present or absent; stipels setaceous or often absent. *Flowers* in terminal or axillary, racemes or panicles; bracts small; bracteoles very small when present, but usually absent. *Hypanthium* often well developed. *Calyx* more or less oblique, campanulate to tubular, with very short to prominent teeth, the upper 2 often connate up nearly to the apex. *Corolla* white, yellow, blue or purple; standard spatulate, oblong, obovate or orbicular, often emarginate apex, base attenuate to auriculate, claw short; wings oblique, oblong; keel oblong, falcate. *Stamens* 10, free or shortly joined at the very base; anthers uniform. *Ovary* shortly stipitate; style glabrous, with a small terminal stigma; ovules 5-many. *Pod* moniliform, often winged, dehiscent or indehiscent; valves coriaceous to fleshy; seeds ellipsoid, obovoid or globose, brown or red.

According to the Index Kewensis and its supplements, the 98 species of genus *Sophora* are shown below:

Sophora acuminata Desv.

S. *albescens* (Rehd.) C.Y. Ma

S. *albo-petiolulata* Leonard

S. *alopecuroides* Linn.

S. *ambigua* P.C. Tsoong

S. *arizonica* S. Wats.

S. *bakeri* C.B. Clarke, ex Baker

S. *benthamii* Steenis

S. *brachygyna* C.Y. Ma

Sophora buxbaumii (Bunge) B.Fedtsch.

S. carnosa (Pursh) Yakovlev

S. chathamica Cockayne

S. chinensis G. Don

S. chrysophylla Seem.

S. conzattii Standley

S. crassifolia Hassk.

S. davidii Kom. ex Pavol.

S. denudata Bory

S. dunii Prain

S. exigua Craib

S. fernandeziana Skottsb.

S. flavescens Ait.

S. franchetiana Dunn

S. fraseri Benth.

S. gibbosa (DC.) Yakovlev

S. grandiflora (Salisb.) Skottsb.

S. grisea Dagener & Sherff

S. gypsophila B.L. Turner & A.M. Powell

S. heptaphylla Linn.

S. heterophylla Arn.

S. hortensis (Boiss. & Buhse) K.H. Rechinger

S. howinsula (W.R.B. Oliver) P.S. Green

S. interrupta Bedd.

S. jabandas Montr.

S. japonica Linn.

S. koordersii (Backer ex Koord.-Schum.) G.Y. Yakovlev

Sophora koreensis Nakai

S. korolkowi Hort. ex Dippel

S. lanaiensis (Chock) O. Degener & I. Degener

S. leachiana M.E. Peck

S. lehmannii (Bunge) Yakovlev

S. linearifolia Griseb.

S. longicarinata G. Simpson & J.S. Thomson

S. longipes Merrill

S. ludovicea-decima-sexta Buc'hoz

S. macnabiana (R. Grah.) Skottsb.

S. mangarevaensis H. St. John

S. masafuerana Skottsb.

S. microcarpa C.Y. Ma

S. mollis R. Grah.

S. moorcroftiana Benth. ex Baker

S. nitens Benth. ex Harv. & Sond.

S. nitida Sm.

S. oblongata P.C. Tsoong

S. oblongifolia Ruiz & Pav.

S. oligophylla Baker

S. oligosperma Urb & Ekman

S. pachycarpa Schrenk, ex C.A. Mey.

S. pentaphylla Desv.

S. persica (Boiss. & Buhse) K.H. Rechinger

S. platycarpa Maxim.

S. polyphylla Urb.

S. praetorulosa Chun & T.C. Chen

S. prodanii E. Anders.

Sophora prostrata J. Buch.

S. *pubescens* Tausch

S. *purpusi* T.S. Brandegee

S. *rapaensis* H. St. John

S. *raivavaeensis* H. St. John

S. *reediana* (R. Phil.) Yakovlev

S. *reticulata* Hayek

S. *rhynchocarpa* Griseb.

S. *robinoides* Walp.

S. *rubriflora* P.C. Tsoong

S. *saxicola* Proctor

S. *secundiflora* Lag. ex DC.

S. *sericea* Nutt.

S. *shikokiana* Makino

S. *sinuata* Larranaga

S. *somalensis* Chiov.

S. *songarica* Schrenk

S. *stenophylla* A. Gray

S. *subprostrata* Chun & T.C. Chen

S. *sumatrana* G.P. Yakovlev

S. *tetragonocarpa* Hayata

S. *tetraptera* J. Mill.

S. *tomentosa* Linn.

S. *tonkinensis* Gagnep.

S. *toromiro* Skottsb.

S. *vanioti* Léveillé

S. *velutina* Lindl.

S. *vestita* Nakai

Sophora viccifolia Hance

S. unifoliata (Rock) Degener & Sherff

S. wightii Baker

S. xanthoantha C.Y. Ma

S. yunnanensis C.Y. Ma

S. zambesiaca Baker

(Brenan, 1981; Davies, 1987 a, 1987b; Duran and Jackson, 1941; Heslop-Harrison, 1974; Hill, 1926, 1929, 1933, 1938; Hill and Salisbury, 1947; Hooker and Jackson, 1895; Prain, 1908, 1913, 1921; Salisbury, 1953; Taylor, 1959, 1966, 1970; Thiselton-Dyer, 1904)

In Thailand, there are only 4 species of *Sophora* as follow:

1. *Sophora exigua* Craib, พิษนาด Phitsanaad
2. *S. tomentosa* Linn., สารพัดพิษ Saaraphatphit, สุรพิษดำ Suraphitdam
3. *S. velutina* Lindl.
4. *S. wightii* Baker, มะกล่ำสร้อย Ma Klam soi

(Chiang Mai University, Social Research Institute, 1982; Niyomdham, 1980; Smitinand, 1980)

According to Niyomdham (1980), the synonyms of *Sophora exigua* Craib are *S. violacea* Thw. var. *pilosa* Gagnep. and *S. violacea* Thw. ssp. *pilosa* (Gagnep.) Yakovl. It distributes in the north-eastern and eastern parts of Thailand. Niyomdham also described the characteristic

feature of this species as below:

Shrub about 0.5 m high; young shoots, leaf-rachises, inflorescences, calyces and pods densely tawny pubescent to tomentose. *Leaves* 15-30 cm long; stipules absent; leaflets coriaceous, 11-15, lateral ones slightly oblique, broadly elliptic to suborbicular, rounded at both ends, terminal one broadly obovate, cuneate at the base, apex rounded, 2-3 by 1.5-2.5 cm, upper surface glabrous, lower surface glabrescent with densely pubescent along margins and midrib. *Inflorescence* terminal racemes, soon leaf-opposed, up to 20 cm long; bracts small, subulate, 2-3 mm long; pedicels 4-5 mm long; bracteoles absent. *Calyx* tubular, about 8 mm long; teeth triangular-acute. *Corolla* purple; standard about 20 by 9 mm, spatulate-emarginate, base attenuate; wings about 16 by 3 mm; keel about 11.5 by 3 mm. *Ovary* hairy; ovules 10. *Pod* not seen in maturity.

Several species of *Sophora* have been reported to be used for medicinal purpose in many countries, especially in Asia, such as:

Sophora flavescens Ait. (*S. angustifolia* Sieb. & Zucc.), the North East Asia native plant, is reported that the root is bitter, refrigerant, diuretic, stomachic, astringent, tonic, and anthelmintic. It has been prescribed to treat jaundice, swollen ankles, fevers, scrofula, sore throat, inflammation, intestinal hemorrhage, syphilis, leprosy, toothache and asthma. It has been used effectively to treat bacillary dysentery and although its action is a

little slower than that of *Coptis chinensis* Franch., berberine and sulfathiazole, it has the advantage of being available, economical and non-toxic, though Hyatt (1978) stated that it was toxic in the large dose. The fruit has properties identical with the roots. The plant is also used as an insecticide (Hyatt, 1978; Keys, 1976; Perry, 1980).

Sophora japonica L. has been widely used in the traditional medicine of some oriental cultures. The Korean have used the flower buds to treat leucorrhea, ulcers and amenorrhea. In China, the seed and flower are analgesic, styptic and hemostatic in the dose of 5-10 g. It is prescribed for various kinds of hemorrhages such as hemoptysis, epistaxis, hematuria, hemorrhoids, bloody feces, intestinal ulcers and menstrual clots. Perhaps, the most important use is the source for rutin; the substance which is mentioned to be specific in treating and preventing hypertension. Some reports pointed that the decoction of the dried flowers has an effective cure for hypertension, brain hemorrhage and scabies. Besides that, the fruit is an insecticide and vermifuge. The grated leaves placed on painful gums act as an anaesthetic for dental caries. The decoction of the bark and root is a wash for burns and scalds (Hyatt, 1978; Keys, 1976; Perry, 1980).

The seed of *Sophora mollis* Grah., an Indian medicinal plants, is used as a parasiticide and insecticide (Chopra and Chopra, 1955; Chopra, Nayar and Chopra,1956).

Sophora subprostrata Chun & Chen, the root is frequently used as a remedy for sore throat, cough, jaundice and constipation. Aftermaking it into a powder, it is applied to burns and snake bites (Perry, 1980).

Sophora tomentosa L. has been well known of its use from Indo-China to Guam. In Malay Peninsula, the seed, leaf and root are used as an astringent in diarrhoea. In Indonesia, the seed and root have been employed as a remedy for cholera, colic, and dysentery. The root in combination with those of *Caesalpinia* is used as an antidote for poisoning. The finely grounded leaf or chewed seed may be applied to wounds caused by poisonous fish. In New South Wales, the root and seed are used in bilious sickness. In Philippines, the plant is regarded as a common remedy for stomach disorders. It was reported that the seed was administered principally as a febrifuge and secondly, a stomachic. The oil from the seeds is applied externally for bone-ache. It is also a good expectorant. A decoction of the root, stem or seed is considered as anticholeric. Other properties of the plant are diuretic, sudorefic and purgative especially the seed and leaf are considered to be powerful cathartic and emetic (Chopra and Chopra, 1955; Chopra et al., 1956; Perry, 1980; Quisumbing, 1951).

In Thailand, the plant is used in traditional medicine as analgesic, febrifuge and externally for insect bites. In the middle part of Thailand, the fruit is used

for remittent fever, and in combination with the fruit of *Brucea amarissima* Desv. for dysenteric fever. It also was mentioned as the component of the folklore remedy in the North (Chiang Mai University, Social Research Institute, 1982; Pongboonrood, 1976).

Sophora exigua Craib is the other Thai indigenous medicinal plant of the genus *Sophora*. It was said to be used for septic fever in many traditional Thai medicines (Pongboonrood, 1976).

Up to now, several species of the genus *Sophora* have been studied for their chemical constituents and biological activities. Those studies indicated the present of alkaloids, coumarins, flavonoids, glycosides etc., some of which are biologically active compounds. But *Sophora exigua* Craib had never been reported on any chemical constituents, though Laorpaksa, Amnuoypol and Jongbunprasert (1988) had reported that its alcoholic extract had antibacterial activity against *Pseudomonas aeruginosa*, *Staphylococcus aureus* and β-streptococcus group A. So the phytochemical works on this indigenous plant are undertaken in order to study the group of chemical constituents comparing in this genus and to search for compounds which might exhibit therapeutic values.