

CHAPTER I

INTRODUCTION AND LITERATURE SEARCH

The genus *Caesalpinia* is known as medicinal plants in various regions. Many species of this genus were studied in several countries such as Indonesia, Philippines, China, India and Pakistan. There have been several reports of chemical investigation on the seeds of this plant, for example, *Caesalpinia crista* [1-4], *Caesalpinia bonducella* [5-13], *Caesalpinia bonduc* [14-15] and on stem, bark, and root of *Caesalpinia pulcherrima* [16-17] and *Caesalpinia decapetala* var. *japonica* [18]. The seed kernels are used locally for the treatment of diseases including malaria and they have been tested for biological properties such as antimicrobial activity and anti-inflammatory. This research emphasised on the study of *Caesalpinia major* (Medik.) Dandy&Exell. One of the interested characteristics of this plant, is the hairy long bristle in every part of the plant. Moreover, there is bitter taste in branches, leaves, and seeds, especially in the seed kernels. Due to dominance characteristics of this plant, there is no insect invading any parts of the plant. Therefore, this plant should contain some substances that can expel worms and insect.

The aim of this research

The aim of this research can be summarized as follow:

1. To extract and isolate the chemical constituents from the seed of *Caesalpinia major* (Medik.) Dandy&Exell.
2. To determine the structure of the isolated substance.

The genus *Caesalpinia* belongs to sub-family *Caesalpinaceae*. This genus comprises of 100 species. Seventeen species are found in Thailand as followed [19].

1. *Caesalpinia pulcherrima* (Linn.) Swartz
2. *Caesalpinia sappan* Linn.
3. *Caesalpinia decapetala* (Roth) Alston in Trimmen & Hook.f.
4. *Caesalpinia mimosoides* Lamk.
5. *Caesalpinia godefroyana* O. Kuntze
6. *Caesalpinia parviflora* Prain
7. *Caesalpinia crista* Linn.
8. *Caesalpinia bonduc* (Linn.) Roxb.
9. *Caesalpinia minax* Hance
10. *Caesalpinia digyna* Rottler
11. *Caesalpinia pubescens* (Desf.) Hattink
12. *Caesalpinia enneaphylla* Roxb.
13. *Caesalpinia hymenocarpa* (Prain) Hattink
14. *Caesalpinia andamanica* (Prain) Hattink
15. *Caesalpinia farfuracea* (Prain) Hattink
16. *Caesalpinia cucullata* Roxb.
17. *Caesalpinia major* (Medik.) Dandy & Exell.

In this study, we are interested in *Caesalpinia major* (Medik.) Dandy&Exell. Because of its' availability and yields big seeds. *Caesalpinia major* (Medik.) Dandy & Exell. is a Pantropical Plant that distribute in pantropic of Asia ; Ceylon, India, Burma, Cambodia, S. Vietnam, Ryu Kyu Island, Malay Peninsular and Archipelago. In Thailand it is found in peninsular; Surat Thani, Trang, Pattani. It grows widely in thickets near the sea, flowers in August-September and fruits from November to March [19].

The common name of *Caesalpinia major* (Medik) Dandy & Exell. in Thai is “Wat” (Southern), “Wiat” (Saraburi, Surat Thani), “Kamchay” (Peninsular). *Caesalpinia major* (Medik.) Dandy & Exell. is characterized by a climber armed with straight and recurved prickles. Stipules awl-shaped, 1-3 mm, caducous. Leaves: rachis 30-50 cm ; pinnae 3-7 pairs ; leaflets 3-7 pairs, opposite to subopposite, shortly petiolulate (1-2 mm), elliptic-ovate, 2-8 by 1-5 cm, acute-mucronate at the tip, rounded and subequal at the base. Racemes supra-axillary, simple or branched, some with male flowers, others with female flowers (anthers without pollen). Bracts linear, 3-5 mm, erect, very early caducous. Pedicels 6-12 mm, pubescent, faintly jointed near the top. Sepals densely pubescent, subequal. Petals yellow, the standard constricted and hairy inside towards the middle. Filaments hairy. Ovary stalked, hairy and bristly, 3-4-ovalate, in the male flowers rudimentary. Pods stalked above the receptacle (5-10 mm), elliptic in outline, 5-10 by 3-5 cm, set with hairy 6-7 mm long bristle. Seeds 2-4, subglobular, 20 by 15 mm, grey-green [19].

The genus *Caesalpinia* is extensively used as medical plant.

In Indonesia, an infusion of the thin, hard, woody roots is used in treating lithiasis [20]. The seed kernel of *C. bonduc* has been used as emetic or for the treatment of dysentery.

In Philippines, a decoction from crushed seeds is used as an emetic, and is believed to be helpful in treating dysentery [20]. Alcoholic extracts of the seeds of *C. crista* was demonstrated to possess exceptionally high values of antimicrobial activity [21]. *C. pulcherrima* has been used as an abortifacient and emmenagogue [22].

In South China, the pounded plant of *C. minax* is a styptic and an anodyne used to treat contusion [20]. A decoction of the seeds of *C. japonica* is a vermifuge, and also a remedy for malaria and dysentery [20].

In Indo-China, *C. thorelii* is endemic to Cambodia and S. Vietnam. The plant is macerate and used in baths to treat liver illness; the roots, like a mustard plaster are used to treat tumors of the uterus [20].

In India, 50% ethanol extract of seed kernels of *C. crista* indica exhibited anti-inflammatory is activated using the technique of carrageenin induced paw edema in albino rats [23-24]. A decoction from kernels and leaves of *C. crista* Linn. and *C. bonducella* are valued as antimalarial and antitubercular agents [25-26].

In Pakistan, the crude *C. crista* powder was evaluated in chicken of the fumi breed, suffering from artificially induced *Ascaridia galli* infection [27] and its water and methanol extracts is effective and safe against natural neoscaris-vitulorum infection in buffalo calves [28].

The leaves of *C. boduc* have been used in polutices for worms in children, and itch [20] or the crushed leaves in water act as a vermifuge [20]. The roots are chewed in treating diarrhea and dysentary, also an antidote for poisoning. The powdered used is considered to be antipyretic, tonic [20], antiperiodic, utilized as febrifuge, antiplasmodic, antirheumatic, mild purgative [29-30], anthelmintic [20] and stomachic. The roasted seeds is used to treat cough [20]. The emollient fixed oil from seed kernels of *C. crista* removes the freckles of the face [31] and stop discharges from ear, roasted nuts with jaggery alleviates acute colic pain [32].

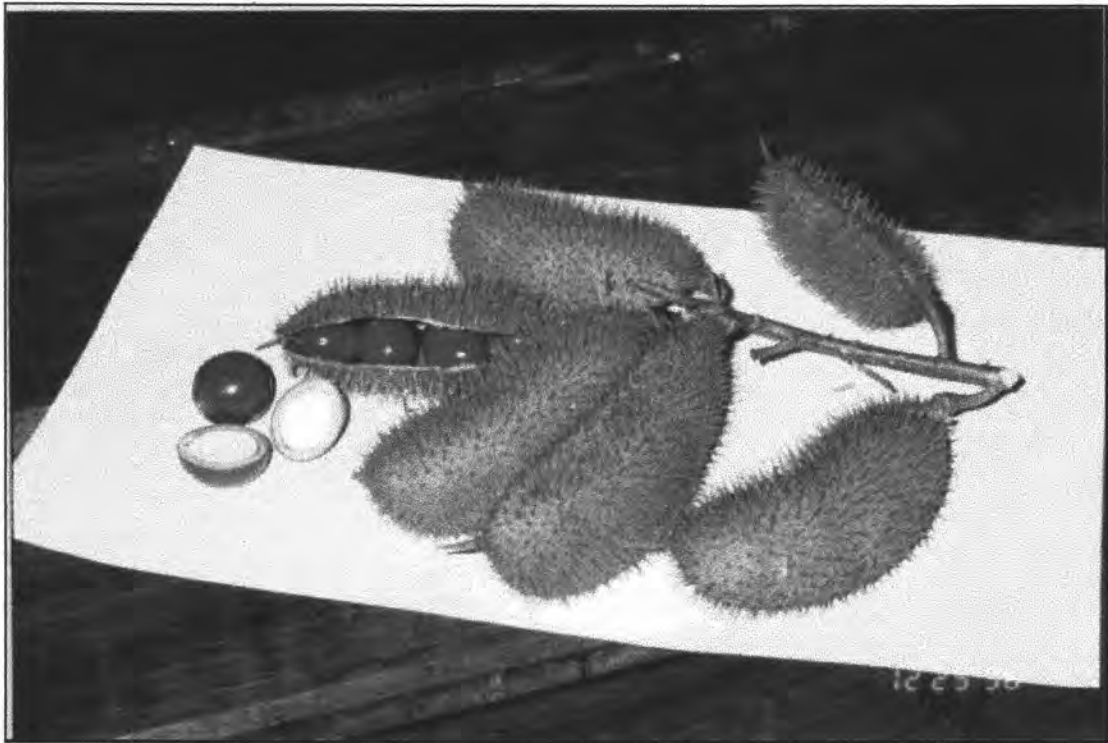


Figure 1 The seeds of *Caesalpinia major* (Medik.) Dandy & Exell.

1.1 Chemical constituents of plants in *Caesalpinia* genus

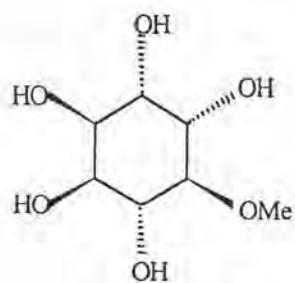
Literature surveys indicated that chemical constituents of some plants in *Caesalpinia* genus have been investigated and those are summarized in Table 1.1

Table 1.1 Chemical constituents of plants in *Caesalpinia* genus

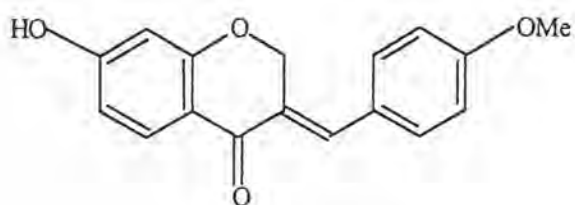
Scientific name	Plant parts	Isolated compounds	Reference
<i>C. crista</i> Linn.	seed kernel	Diosgenin, (+)-ononitol, L- γ -ethylideneglutamic acid,	[1] [2] [3]
	fruit shell	D-(+)-pinitol,	[4]
<i>C. bonducella</i> Linn.	seed kernel	α -caesalpin,	[5]-[9]
		β -caesalpin,	
		γ -caesalpin,	
		δ -caesalpin,	
		ϵ -caesalpin,	[10]
		ζ -caesalpin,	[11]
		bonducellin,	[12]
		caesalpin F,	[13]
<i>C. bonduc</i> (L.) Roxb	seed	neocaesalpin A,	[14]
		neocaesalpin B, bondenolide,	[15]
<i>C. pulcherrima</i> Swartz	stem	peltogynoids, homoisoflavonoid,	[16]
	root	vouacapen-5 α -ol, 6 β -cinnamoyl-7 β -hydroxy- vouacapen-5 α -ol, 8,9,11,14-didehydrovouacapen-5 α - ol, sitosterol,	

Table 1.1 (continued)

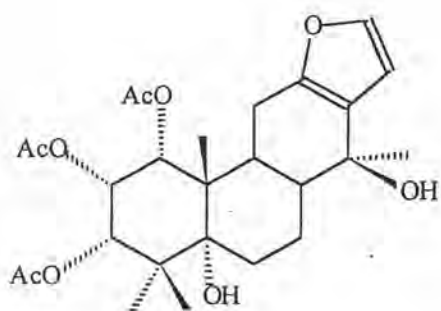
Scientific name	Plant parts	Isolated compounds	Reference
	bark	χ -caesalpin	[17]
<i>C. decapetala</i> var. <i>japonica</i>	bark	homoisoflavones, chalcones,	[18]
	root	caesaljapin, lup-20(29)-en-3 β -ol, betulinic acid, 3-deoxysappanchalcone, sappanchacone, catechin, methyl gallate, 3-hydroxy-1-(4-hydroxy-3- methoxyphenyl)-1-propanone,	
<i>C. major</i> (Medik.)	root	Caesalpinia a, b	[35]
Dandy&Exell.		Caesalpinia c, d, e	[36]



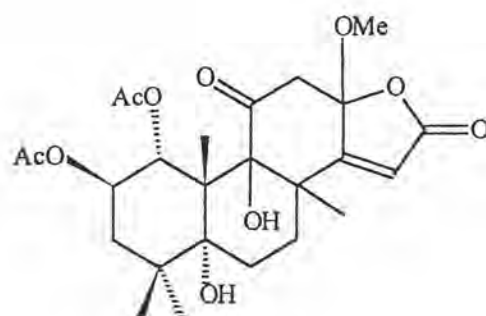
D(+)-pinitol



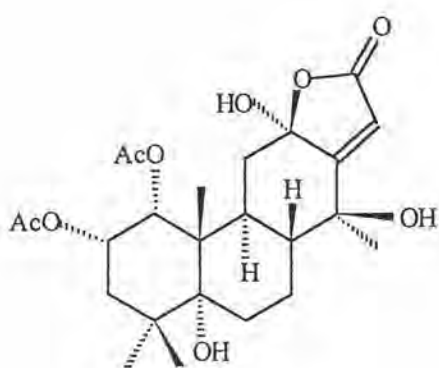
bonducellin



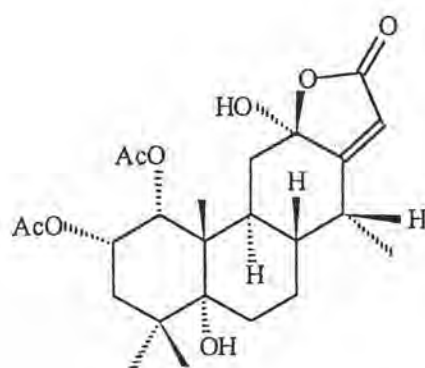
caesalpin F



bondenolide



neocaesalpin A



neocaesalpin B

Figure 1.2 The chemical constituents of plants in *Caesalpinia* genus

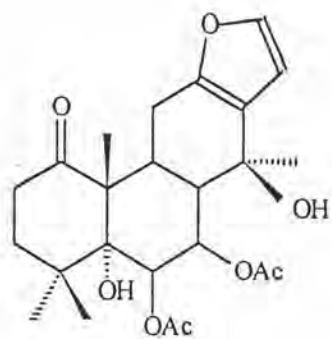
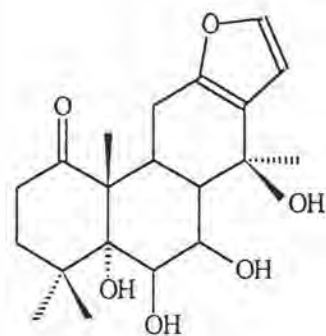
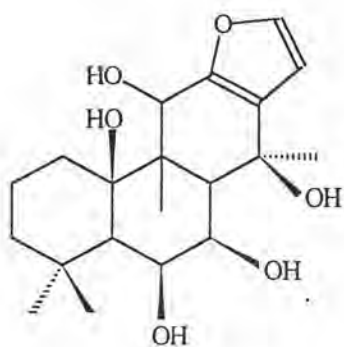
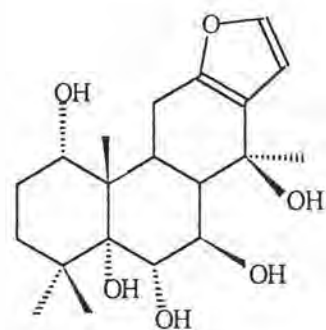
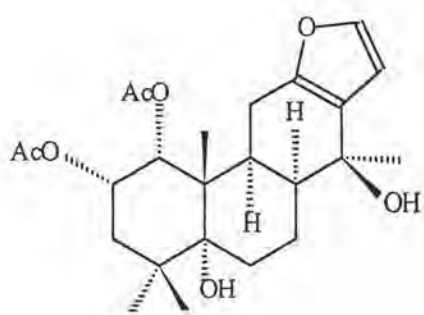
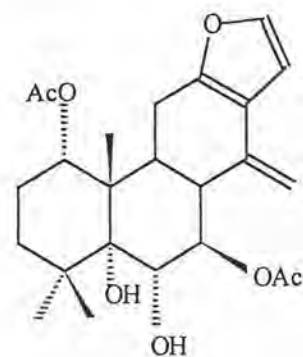
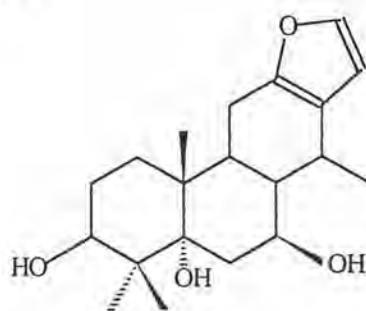
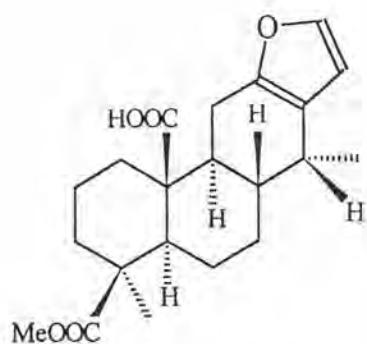
 α -caesalpin β -caesalpin γ -caesalpin δ -caesalpin ϵ -caesalpin ζ -caesalpin χ -caesalpin

Figure 1.2 (continued)



caesaljapin

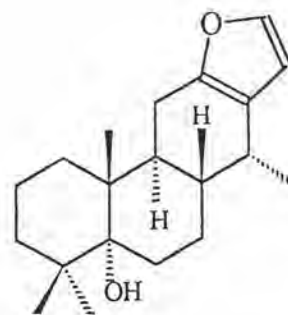
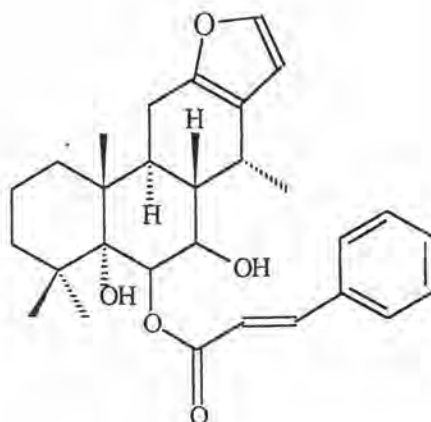
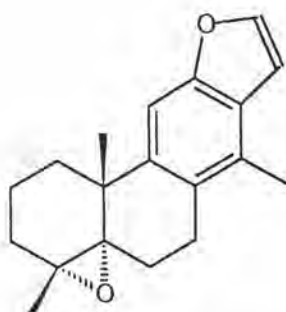
vouacapen-5 α -ol6 β -cinnamoyl-7 β -hydroxy-vouacapen-5 α -ol8,9,11,14-didehydrovouacapen-5 α -ol

Figure 1.2 (continued)