ต้นฉบับ หน้าขาดหาย

Piper nigrum Linn. is used externally as stimulant and rubefacient in poultices to treat adenitis, furuncles, colic, rheumatism; internally it is considered to be stomachic, diuretic and warming.[3]

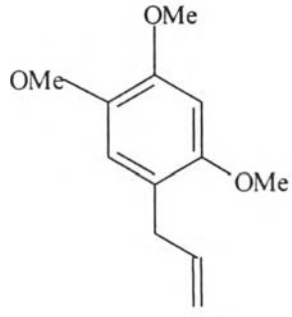
Piper ribesoides Wall. is principally used as a condiment to stimulate the stomach, promote digestion and it is a popular remedy for preventing the return of a poroxysm of internally fever.[3]

Piper sarmentosum Roxb. is used as a medicine to decrease fever and to aid digestion, treatment for discoloration of skin, relief coughs and asthma.[3]

Insecticidal and insect antifeedant compounds that were found in Piper genus are presented in Table 1.1 and Fig.1.1 shows their structures.

Table 1.1 : The insecticidal and insect antifeedant compounds from Piper genus.

Species	Isolated compounds	Fig.1.1	Ref.
P. futokadzura	isoasarone	(1)	5,6
Sieb.	piperenone	(2)	6,7
P. nigrum Linn.	dihydropipercide	(4)	8,9
	pellitorine	(6)	8,9
	pipercide	(3)	8,9
P. quineense	dihydropiperine	(9)	10
Schum.&Thonn.	dihydrowisanine	(11)	10
	N-isobutyl-trans-2-trans-4-eicosadienamide	(7)	10
	piperine	(8)	10
	trichostachine	(12)	10
	wisanine	(10)	10



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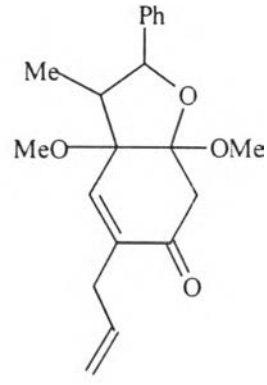

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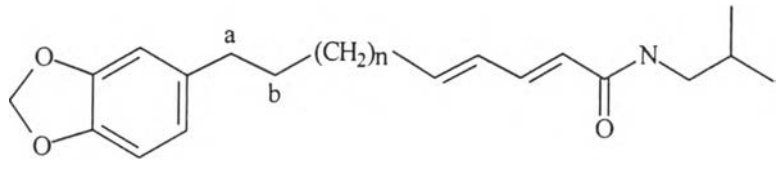
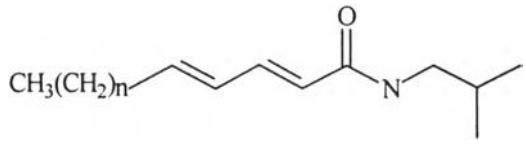


(3) n = 4, ab = unsaturated bond

(4) n = 4, ab = saturated bond

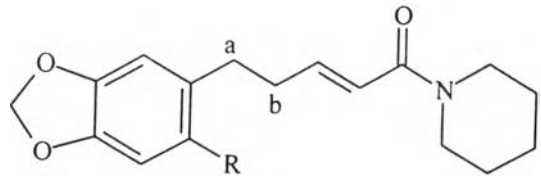
(5) n = 6, ab = unsaturated bond

Fig.1.1 : The structural formulas of the insecticide and antifeedant form Piper genus

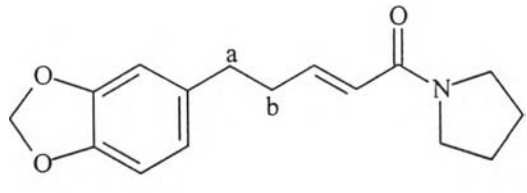


(6) n = 4

(7) n = 14



	R	ab
(8)	H	unsaturated bond
(9)	H	saturated bond
(10)	OMe	unsaturated bond
(11)	OMe	saturated bond



(12)

Fig.1.1 (continue) : The structural formulas of the insecticide and antifeedant form Piper genus

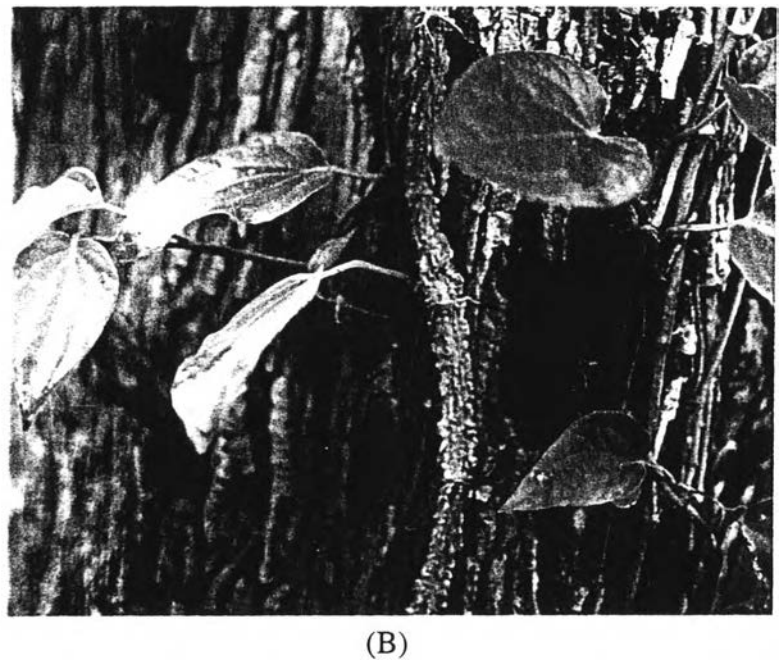
From the data above, it was found that they are very useful plants and literature survey of this genus indicated not only a variety of compounds including amide derivatives, flavones, sterols, lignans, etc. have been previously isolated from different Piper species but also new substances were isolated from the same ones. In continuation of work on Piper species, the investigation of the stems of *Piper aurantiacum* Miq. was undertaken. The purposes of this research are therefore to extract, isolate and determine the structural formulas of the chemical constituents from this plant and hopefully more informations would be obtained.

1.1 Botanical Description of *Piper aurantiacum* Miq. [2,11]

Piper aurantiacum Miq. is the plants belonging to Piperaceae family, Piper genus. Its common name is Sa khaan noo (Central area), Ta khaan noo (Southern) or Ja khaan noo (Northern) and Chaa phluu paa (North-Eastern).

Sa khaan noo is a stem climbing and rooting glabrous plant. Leaves all petioled coriaceous ovate elliptic or orbicular-ovate caudate-acuminate 5-nerved hairy or glabrate beneath base rounded or acute. Spikes 1.5-3 inches, stigmas very minute and young fruit angular ripe globose (Fig.1.2).

(A)



(B)

Figure 1.2 : *Piper aurantiacum* Miq.

(A) Fresh leaves

(B) A stem

1.2 Chemical Constituents of Piper Genus

From the literature surveys, many types of organic compounds have been isolated from the members of Piper genus. Some of their names are shown in Table 1.2 and their structures in Fig.1.3.

Table 1.2 : The chemical constituents of some plants in Piper genus

Scientific name (Common name)	Plant parts	Isolated compounds	Fig.1.3	Ref.
P. aborescens Roxb.	Leave	piplartine	1	12
P. aduncum Linn.	Leave	methyl 3-(6-hydroxy-3,7-dimethyl-2,7-octadienyl)-4-methoxy-benzoate	2	13
		piperiton	3	14
P. attenuatum Ham.	Root	N-isobutyl-deca-trans-2-trans-dienamide	4	15
		piperine	5	15
		piperlonguminine	6	15
	Whole	crotepoxide	7	16
P. aurantiacum Miq. (Sa khaan noo, Chaa phluu paa)	Fruit	piperine	5	17
	Seed	auranamide	8	18
		aurantiamide	9	19
		aurantiamide acetate	10	19
	Stem	eupomatene	11	20
P. auritum Kunth.	Leave	borneol	12	21
		borneol acetate	13	21
		eugenol	14	21

Table 1.2 (continue) : The chemical constituents of some plants in Piper genus

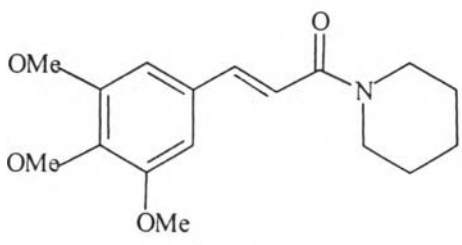
Scientific name (Common name)	Plant parts	Isolated compounds	Fig.1.3	Ref.
P. betle Linn.(Phluu)	Stem	crotepoxide	7	22
P. brachystachym C.DC.	Fruit	pipercide	15	23
		sesamine	16	23
P. callosum Opiz.	Root	pipercallosine	17	24
P. chaba Hunt. (Dee Plee)	Root	piperlonguminine	6	25
		piperine	5	25
		sylvatine	18	25
	Stem	piplartine	1	26
		piperine	5	26
P. cubeba Linn.	Stem	α-o-ethyl cubebin	19	27
		β-o-ethyl cubebin	20	27
		5″-methoxyhinokinin	21	27
		monoacetate dihydro cubebin	22	27
P. futokadzura Sieb.	Leave	piperenone	23	5,7
	Leave,	crotepoxide	7	28
	Stem	limonene	24	28
P. guineense Schum. & Thonn.	Fruit	piperine	5	29
		trichostachine	25	29
	Root	piperine	5	30
		wisanine	26	31,32
	Seed	wisanine	26	9

Table 1.2 (continue) : The chemical constituents of some plants in Piper genus

Scientific name (Common name)	Plant parts	Isolated compounds	Fig.1.3	Ref.
P. hostmannianum	Stem	methyl-2,2-dimethyl-2H-1-benzopyran-6-carboxylate	27	33
		methyl-4-hydroxy-3-(2′-hydroxy-3′-methylbut-3-enyl)-benzoate	28	33
P. longum Linn. (Prik haang)	Fruit	sesamine	16	23
	Root	piperlongumine	17	37
		piperlonguminine	6	37
	Stem	piperine	5	35
		piplartine	1	35
P. marginatum Jacq.	Leave	2-methoxy-4,5-methylenedioxy propiophenone	29	36
P. nigrum Linn. (Prik Thai)	Leave	eugenol	14	37
	Fruit	dihydropipercide	30	8
		pipercide	15	38,39
	Whole	crotepoxide	7	16
P. peepuloides Roxb.	Fruit	piperine	5	40
		sesamine	16	40
	Leave	2-methoxy-4,5-methylenedioxy cinnamonyl piperidine	31	41
		trichostachine	25	42

Table 1.2 (continue) : The chemical constituents of some plants in Piper genus

Scientific name (Common name)	Plant parts	Isolated compounds	Fig.1.3	Ref.
P. ribesoides Wall.	Fruit	bornyl-p-coumarate	32	43
(Sa khaan lek,	Stem	crotepoxide	7	43
Sa khaan yuak)		3,7-dimethyl-3-hydroxy-4-(p-coumaryloxy)-1,6-octadiene	33	43
		4-hydroxy-3-methoxy-N-methyl-aristolactam	34	43
		methyl piperate	35	43
		methyl-2E,3E,6E-7-phenyl-2,4,6-heptatrienoate	36	43
		piperlonguminine	6	45
		senediol	37	44
P. sarmentosum	Fruit	sarmentine	38	46
Roxb. (Chaa phluu)		sarmentosine	39	46
P. sylvaticum Roxb.	Root	alkamide	40	47
		piperlongumine	17	47,48
		piperine	5	47,48
		sesamine	16	47,48
	Seed	3,5-dihydroxy-4,7-dimethoxy flavone	41	50
		sesamine	16	49
P. trichostachyon	Stem	trocholein	42	50
		2-methoxy-4,5-methylenedioxy-propiophenone	29	50



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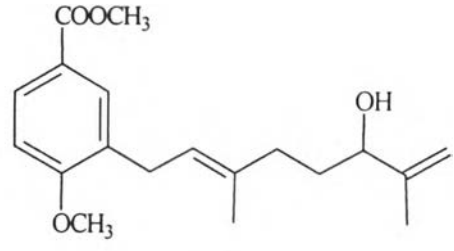

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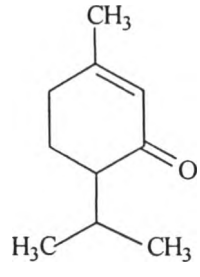

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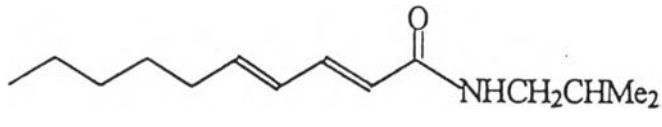

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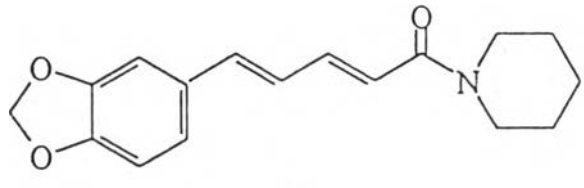
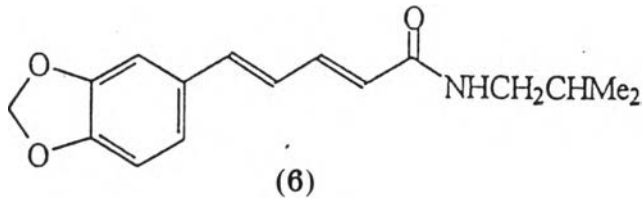


(5)

Fig.1.3 : The isolated compounds from Piper genus



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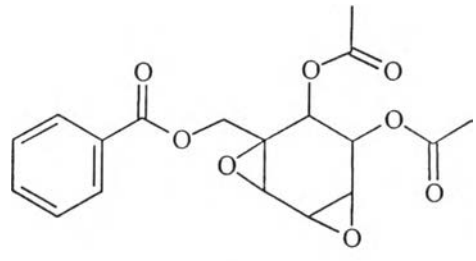
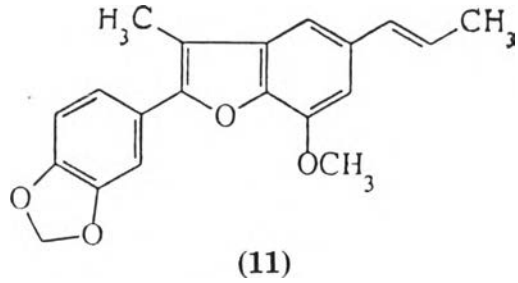


(7)

(8) PhCONHCH(CH$_2$Ph)CO$_2$CH$_2$CH(CH$_2$Ph)NHCOPh

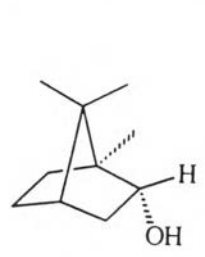
(9) PhCONHCH(CH$_2$Ph)CONHCH(CH$_2$PH)CH$_2$OH

(10) PhCONHCH(CH$_2$PH)CONHCH(CH$_2$PH)CH$_2$OCOMe



(11)

Fig.1.3 (continue) : The isolated compounds from Piper genus



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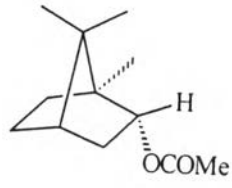

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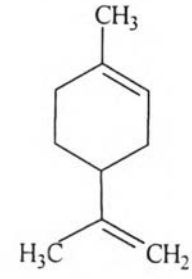

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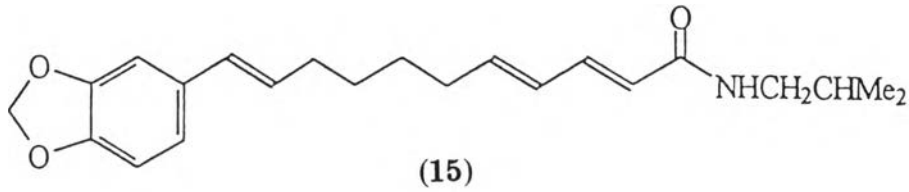

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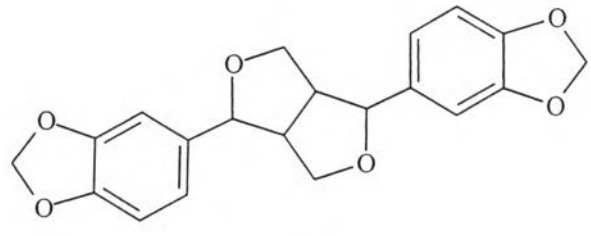

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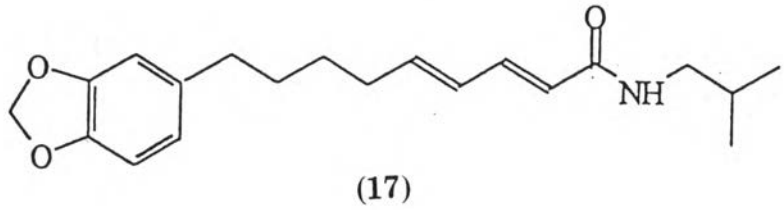

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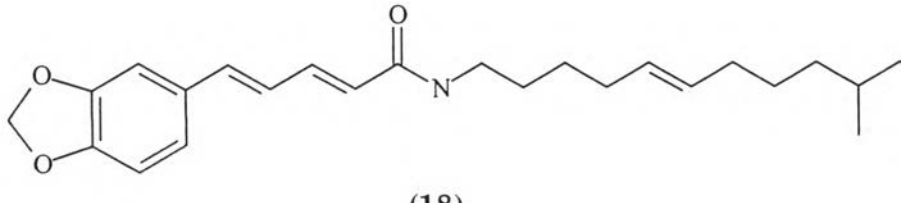
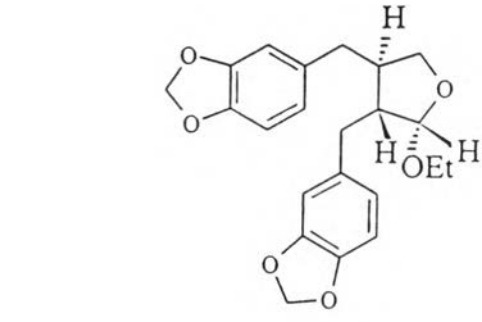


(18)

Fig.1.3 (continue) : The isolated compounds from Piper genus



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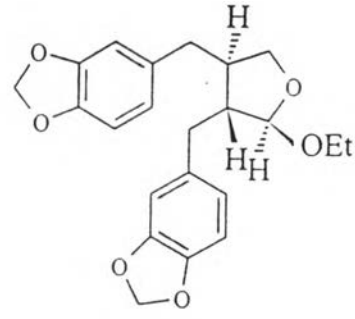

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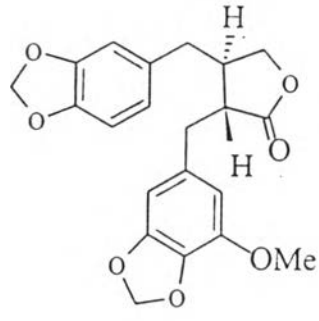

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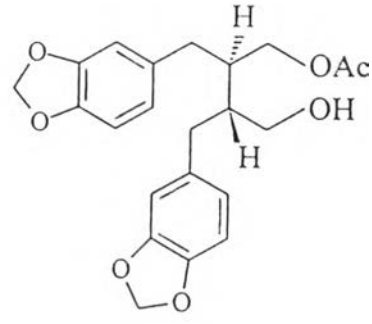

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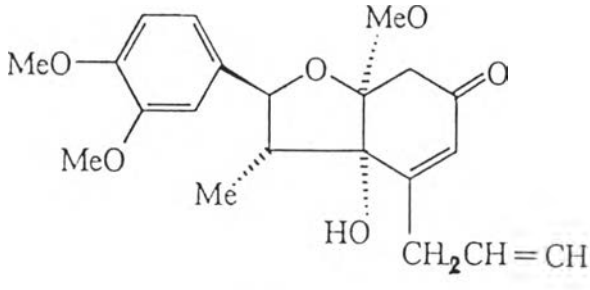

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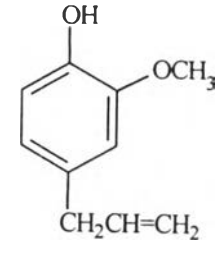

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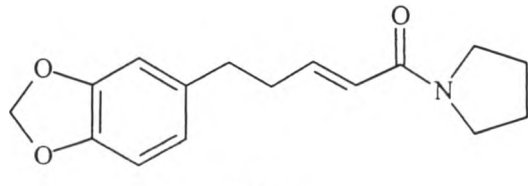

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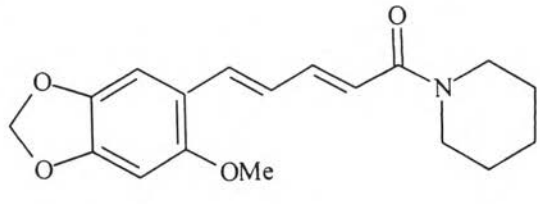
Fig.1.3 (continue) : The isolated compounds from Piper genus



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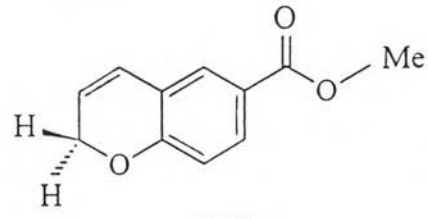

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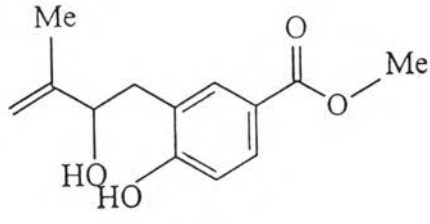

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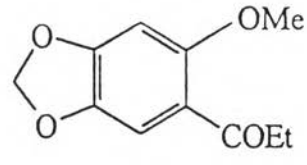

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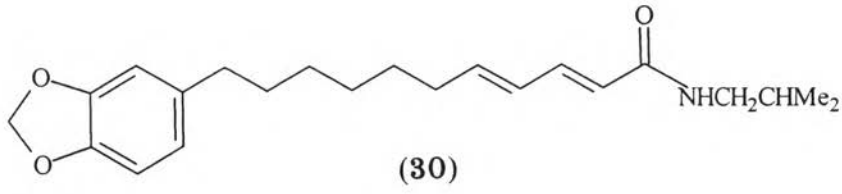

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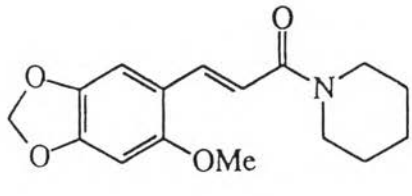

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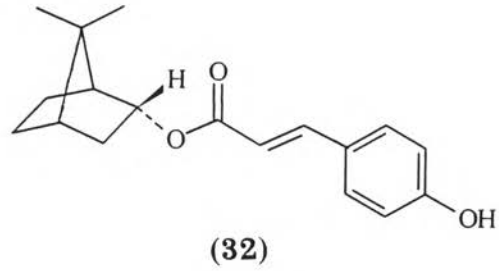
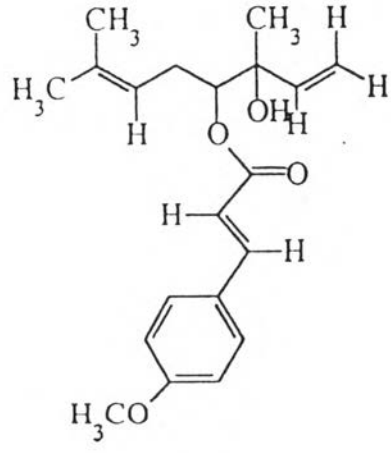


(32)

Fig.1.3 (continue) : The isolated compounds from Piper genus



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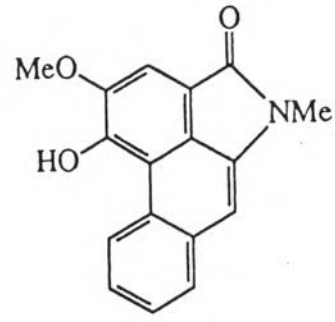

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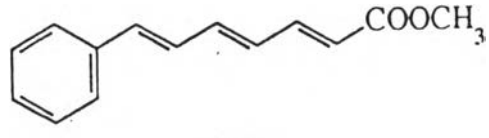

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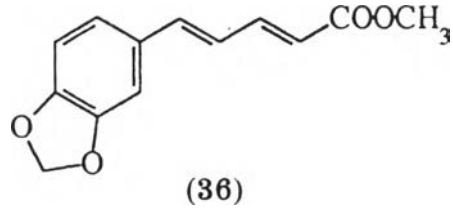

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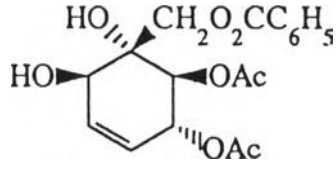
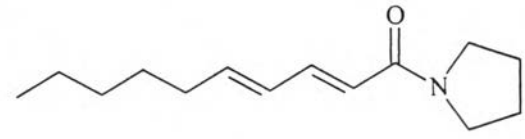


(37)

Fig.1.3 (continue) : The isolated compounds from Piper genus



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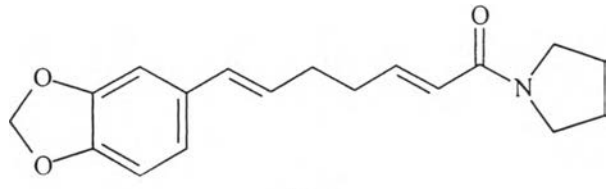

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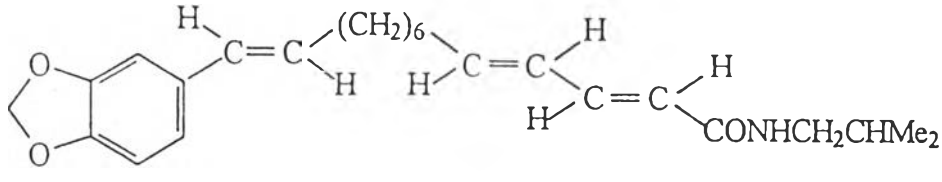

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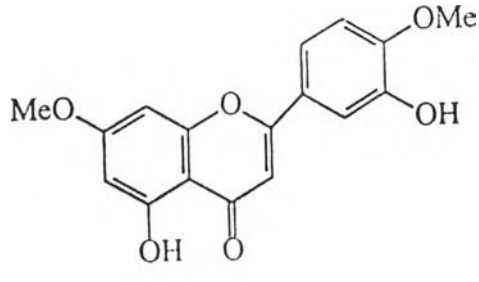

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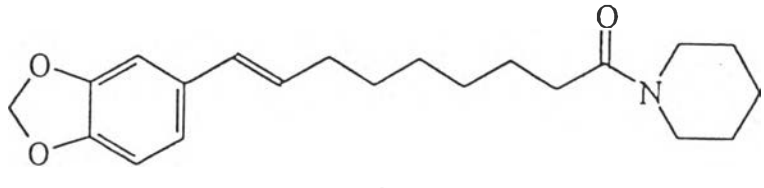

(42)

Fig.1.3 (continue) : The isolated compounds from Piper genus

1.3 Pharmacological Activities

The informations about the pharmacological activities and clinical trials of some of the Piper species are described in Table 1.3.

Table 1.3 : Pharmacological activities of some medicinal plants in Piper genus

Scientific name	Part of plant	Activities	Ref.
Piper aurantiacum Miq.	Fruits	Hypotensive activity Strong stimulation of the uterus and intestines Increase tone and movement	51
Piper betle Linn.	Roots Leaves	Antifertility Antimiotic Growth inhibition Mutagenic Antimutagenic Antifertility Antimicrobial Smooth muscle relaxant Insect attractant Toxicity assessment	4
	Fruits	Carcinogenic	
	Quids	Carcinogenic	
	Essential oil	Hypotensive Skeletal muscle relaxant Antispasmodic Anthelmintic	

Table 1.3 (continue) : Pharmacological activities of some medicinal plants in Piper genus

Scientific name	Part of plant	Activities	Ref.
Piper chaba Hunt.	Roots	Gastric intubation	4
	Flowers	Smooth-muscle stimulant	
		Hypertensive	
		Toxicity assessment	
	Fruits	Antibacterial	
		Mutagenic	
		Effects on CNS	
		Antitoxic	
		Spasmolytic	
Piper sarmentosum Roxb.	Leaves	Antimicrobial	52

1.4 The Objectives of This Research

The objectives of this research were summarized as follows:

1. To extract and isolate the chemical constituents from the stems of *Piper aurantiacum* Miq.

2. To identify the compounds which were isolated.

3. To update the chemical informations of the Piper genus.