TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
ABSTRACT IN ENGLISH	iv
ABSTRACT IN THAI	vi
LIST OF TABLES	×
LIST OF FIGURES	xi
CHAPTER	
1. INTRODUCTION	
- Objectives	2
2. LITERATURE REVIEWS	1
- Cancer	3
- Plant Selection	6
- Rubiaceae and Anticancer Activity	7
- Rubiaceous Plants Used in This Research	33
- Assay Methods	40
- Cancer Cell Lines	45
- Anticancer Drugs	45
3. EXPERIMENTAL	
- Materials	48
- Part I Phytochemical Methodology	50
- Part II Cytotoxic Activity Tests	60

4. RESULTS AND DISCUSSION	
- Part I Isolation and Cytotoxic Activity Test	62
- Part II Physicochemical Properties	85
5. CONCLUSIONS	103
	104
REFERENCE	
APPENDIX	112
CURRICULUM VITAE	128

LIST OF TABLES

Гable	P	age
1	Biological Activity of Rubiaceae	19
2	Comparison of In vivo and In vitro Assays	41
3	Cytotoxic Activity Test of Rubiaceous Plants	65
4	Cytotoxic Activity Categories of Rubiaceae	66
5	Cytotoxic Activity of Gardenia obtusifolia Extracts	69
6	Chemical Tests of Gardenia obtusifolia Extracts	70
7	Cytotoxic Activity of Fractions from Chloroform Extract	73
8	Cytotoxic Activity of Fractions from Chloroform: Ethyl acetate (1:1) Extrac	t 75
9	Cytotoxic Activity of Subfractions from Fraction 2 Extract	76
10	Cytotoxic Activity of Subfractions from Fraction 3 Extract	77
11	Chemical Tests of Active Fractions and Compounds	78
12 🤇	Comparison of ¹ H-NMR data of GO.1 and Reference compounds	92
	(I and II)	
13	Comparison of ¹³ C-NMR data of GO.1 and Reference compounds	93
	(I and II)	
11	Scientific Name and Voucher Specimen Number	113

LIST OF FIGURES

Figur	Pa	ge
1	Structures of ursolic acid and oleanolic acid	8
2	Structures of quinovic acid and quinovic acid 3-rhamnoside	10
3	Polyindoline alkaloids isolated from leaves of Psychotria forseriana	12
4	Alkaloids isolated from Nauclea orientalis	14
5	Triterpenes isolated from Gardenia coronaria and G. sootepensis	17
6	Reaction of (3,(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyl tetrazolium	44
	bromide (MTT) in viable cells	
7	Structure of 5-Fluorouracil	46
8	· Structure of Vinblastine sulphate	47
9	Extraction Scheme for Gardenia obtusifolia	52
10	Isolation Scheme active components from chloroform extract	54
11	Gardenia obtusifolia Roxb. ex Kurz	68
12	TLC chromatograms of fraction 2 and 3 of chloroform:ethyl acetate (1:1)	79
	fraction, and GO.1, GO.2 on silica gel 60 developed by chloroform:ethyl	
	acetate (7:3), detected with UV spectrophotometer, at λ 254, 365 nm	
	$(Rf_{GO.1} = 0.42, Rf_{GO.2} = 0.26)$	
13	TLC chromatograms of fraction 2 and 3 of chloroform:ethyl acetate (1:1)	80
	fraction, and GO.1, GO.2 on silica gel 60 developed by chloroform: dieth	/i
	ether (7:3), detected with UV spectrophotometer, at λ 254, 365 nm	
	$(Rf_{GO.1} = 0.42, Rf_{GO.2} = 0.26)$	
14	HPLC Chromatogram of GO.1, retention time 30 min	81
15	HPLC Chromatogram of GO.2, retention time 28 min	84
16	UV spectrum of GO.1 (in methanol)	86

17	IR spectrum of GO.1 (dry film on sodium chloride)	87
18	IR spectrum of GO.1 (KBr, pressed disc technique)	88
19	Flavonoid skeleton	90
20	Proposed structure of GO.1, 5,3'-dihydroxy-3,6,7,8,4'-pentamethoxy	91
	flavone	
21	Structures of reference compounds	91
22	¹ H-NMR spectrum of GO.1 (in CDCl ₃ , 500 MHz)	94
23	¹ H-NMR spectrum of GO.1 (add D ₂ O, in CDCl ₃ , 500 MHz)	96
24	¹³ C-NMR spectrum of GO.1 (in CDCI ₃ , 125 MHz)	98
25	UV spectrum of GO.2 (in methanol)	101
26	IR spectrum of GO.2 (dry film on sodium chloride)	102
27	Voucher specimen of Gardenia sootepensis	115
28	Voucher specimen of Gardenia obtusifolia	116
29	Concentration of 5-Fluorouracil (positive control) and percent	119
	survival of MCF-7 cell lines (n=6); IC $_{50}$ (average) 47.8 \pm 7.6 μ g/ml	
30	Concentration of vinblastine (positive control) and percent survival	120
	of KB-3-1 cell lines (n=6); IC ₅₀ (average) 7.4 \pm 0.8 ng/ml	
31	Crude ethanol extract of plant seleced in screening process	121
32	Crude ethanol extract of Gardenia obtusifolia	121
33	Chloroform extract of G. obtusifolia after partition	122
34	Chloroform:ethyl acetate (1:1) fraction of G. obtusifolia from column	122
	chromatography	
35	Fraction 2 and fraction 3 of chloroform:ethyl acetate (1:1) column	123
	chromatography	
36	Column chromatography of G. obtusifolia	123

37	Cytotoxic activity test of Rubiaceous plants extracts with KB-3-1 cells;	124
	detected with MTT assay	
38	Cytotoxic activity test of fractions from G. obtusifolia with MCF-7 cells;	124
	detected with MTT assay	
39	Cytotoxic activity test of fraction 3 from G. obtusifolia with MCF-7 cells;	125
	detected with MTT assay	
40	Cytotoxic activity test of chloroform:ethyl acetate (1:1) fractions from	125
	G. obtusifolia with KB-3-1 cells; detected with MTT assay	
41	Cytotoxic activity test of subfractions 2 and GO. 1 from G. obtusifolia	126
	with MCF-7 cells; detected with MTT assay	
42	Cytotoxic activity test of subfractions 2 and GO. 1 from G. obtusifolia	126
	with KB-3-1 cells; detected with MTT assay	
43	Cytotoxic activity test of subfractions 3 and GO. 2 from G. obtusifolia	127
	with KB-3-1 cells; detected with MTT assay	