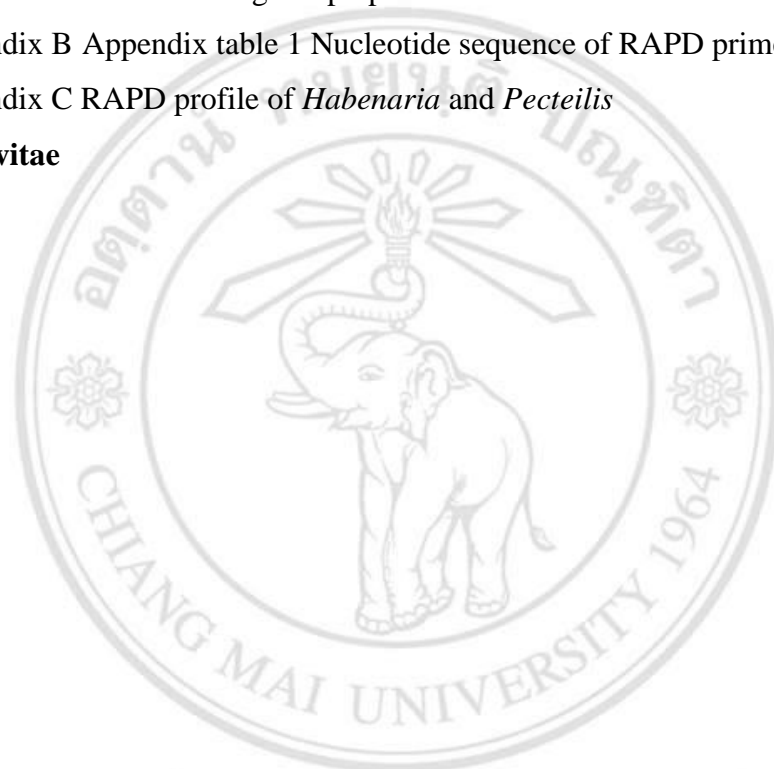


CONTENTS

	Page
Acknowledgements	iii
Abstract in English	iv
Abstract in Thai	v
Table of contents	vi
List of tables	viii
List of figures	ix
Chapter 1 Introduction	1
Chapter 2 Literature review	3
2.1 General information of orchids	3
2.2 General information of terrestrial orchids	3
Chapter 3 Materials and Methods	11
3.1 Morphology and growth development of plant species	11
3.2 Analysis of genetic relationship of <i>Habenaria</i> and <i>Pecteilis</i> by RAPD technique	12
Chapter 4 Results	16
4.1 Orchid morphology	16
4.2 Analysis of genetic relationship of genus <i>Habenaria</i> and <i>Pecteilis</i> by RAPD technique	22
4.3 Analysis of genetic relationships	56
Chapter 5 Discussion	72
5.1 Orchid morphology	72
5.2 Analysis of genetic relationship of genus <i>Habenaria</i> and <i>Pecteilis</i>	74

by RAPD technique	
5.3 RAPD analysis in accordance with morphological characteristics	77
Chapter 6 Conclusions	79
References	80
Appendices	85
Appendix A Chemical reagents preparation	86
Appendix B Appendix table 1 Nucleotide sequence of RAPD primer	88
Appendix C RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i>	91
Curriculum vitae	103



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
 Copyright© by Chiang Mai University
 All rights reserved

LIST OF TABLES

	Page
Table 1 Flower size of different <i>Habenaria</i> and <i>Pecteilis</i>	21
Table 2 DNA concentration and absorbance ratios ($A_{260/280}$) of DNAs extracted by CTAB and SDS buffers.	24
Table 3 PCR amplifications by 8 OPA primers	29
Table 4 PCR amplifications by 11 OPC primers	36
Table 5 PCR amplifications by 9 OPD primers	41
Table 6 PCR amplifications by 3 OPF primers	43
Table 7 PCR amplifications by 7 OPG primers	47
Table 8 PCR amplifications by 5 OPN primers	50
Table 9 PCR amplifications by 9 OPU primers	55



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

LIST OF FIGURES

		Page
Figure 1	<i>H. erichmichelii</i> (Christenson) Szlach. & Marg.	4
Figure 2	<i>H. lindleyana</i> Steud.	5
Figure 3	<i>H. myriotricha</i> Gagnep.	5
Figure 4	<i>H. rhodocheila</i> Hance. (red flower)	6
Figure 5	<i>H. rhodocheila</i> Hance. (orange flower)	6
Figure 6	<i>H. rhodocheila</i> Hance. (pink flower)	6
Figure 7	<i>H. xanthocheila</i> Rild.	7
Figure 8	<i>P. hawkesiana</i> King & Pantl. (yellow lip)	8
Figure 9	<i>P. hawkesiana</i> King & Pantl. (White lip)	9
Figure 10	<i>P. susanna</i> (L.) Rafin	9
Figure 11	Morphology of <i>H. rhodocheila</i> , orange flower	16
Figure 12	Morphology of <i>H. rhodocheila</i> , pink flower	17
Figure 13	Morphology of <i>H. rhodocheila</i> (red flower)	17
Figure 14	Morphology of <i>H. lindleyana</i>	18
Figure 15	Morphology of <i>H. myriotricha</i>	18
Figure 16	Morphological of <i>H. xanthocheila</i>	19
Figure 17	Morphology of <i>P. hawkesiana</i> , white lip	19
Figure 18	Morphology of <i>P. hawkesiana</i> , yellow lip	20
Figure 19	Morphology of <i>P. susanna</i>	20
Figure 20	<i>Habenaria</i> and <i>Pecteilis</i> DNAs extracted by CTAB buffer (Left) and SDS + PVPP buffer (Right)	22
Figure 21	Gel electrophoresis of <i>Habenaria</i> and <i>Pecteilis</i> DNA extracted by CTAB buffer	23
Figure 22	Gel electrophoresis of <i>Habenaria</i> and <i>Pecteilis</i> DNA extracted by SDS+PVPP buffer	23

	Page
Figure 23 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA02 primer	25
Figure 24 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA07 primer	26
Figure 25 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA09 primer	26
Figure 26 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA10 primer	27
Figure 27 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA15 primer	27
Figure 28 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA16 primer	28
Figure 29 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA18 primer	28
Figure 30 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPA20 primer	29
Figure 31 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC04 primer	30
Figure 32 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC05 primer	30
Figure 33 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC06 primer	31
Figure 34 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC07 primer	31
Figure 35 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC08 primer	32
Figure 36 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC09 primer	32

	Page
Figure 37 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC10 primer	33
Figure 38 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC11 primer	33
Figure 39 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC14 primer	34
Figure 40 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC16 primer	34
Figure 41 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC17 primer	35
Figure 42 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPC19 primer	35
Figure 43 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD01 primer	36
Figure 44 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD05 primer	37
Figure 45 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD06 primer	37
Figure 46 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD08 primer	38
Figure 47 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD12 primer	38
Figure 48 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD13 primer	39
Figure 49 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD15 primer	39
Figure 50 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD18 primer	40

	Page
Figure 51 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPD20 primer	40
Figure 52 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPF01 primer	41
Figure 53 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPF05 primer	42
Figure 54 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPF09 primer	42
Figure 55 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPG04 primer	43
Figure 56 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPG07 primer	44
Figure 57 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPG09 primer	44
Figure 58 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPG10 primer	45
Figure 59 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPG13 primer	45
Figure 60 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPG15 primer	46
Figure 61 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPG17 primer	46
Figure 62 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPN04 primer	47
Figure 63 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPN05 primer	48
Figure 64 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPN10 primer	48

	Page
Figure 65 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPN16 primer	49
Figure 66 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPN20 primer	49
Figure 67 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU01 primer	50
Figure 68 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU06 primer	51
Figure 69 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU10 primer	51
Figure 70 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU11 primer	52
Figure 71 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU12 primer	52
Figure 72 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU15 primer	53
Figure 73 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU16 primer	53
Figure 74 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU17 primer	54
Figure 75 RAPD profile of <i>Habenaria</i> and <i>Pecteilis</i> generated by OPU19 primer	54
Figure 76 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPA10 primer	56
Figure 77 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPA10 primer	56
Figure 78 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC05 primer	57
Figure 79 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC05 primer	57
Figure 80 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC06 primer	58

	Page
Figure 81 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC06 primer	58
Figure 82 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC07 primer	59
Figure 83 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC07 primer	59
Figure 84 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC11 primer	60
Figure 85 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC11 primer	60
Figure 86 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC14 primer	61
Figure 87 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC14 primer	61
Figure 88 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC16 primer	62
Figure 89 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC16 primer	62
Figure 90 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPD05 primer	63
Figure 91 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPD05 primer	63
Figure 92 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPD08 primer	64
Figure 93 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPD08 primer	64
Figure 94 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC16 primer	65
Figure 95 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPC16 primer	65
Figure 96 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPG09 primer	66
Figure 97 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPG09 primer	66
Figure 98 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPG15 primer	67

	Page
Figure 99 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPG15 primer	67
Figure 100 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPN04 primer	68
Figure 101 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPN04 primer	68
Figure 102 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPN05 primer	69
Figure 103 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPN05 primer	69
Figure 104 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPU12 primer	70
Figure 105 PCoA dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on OPU12 primer	70
Figure 106 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on fifteen primers	71
Figure 107 Dendrogram of <i>Habenaria</i> and <i>Pecteilis</i> based on all fifteen primers	78