

CHAPTER V

DISCUSION AND CONCLUSION

Twenty one species and 6 varieties of the genus *Hedychium* J. König are recognized for Thailand. Three species, *H. muanwongyathiae*, *H. phuluangense* and *H. siamense* are new to science. One species, *H. neocarneum*, is first recorded for Thailand. *H. forrestii*, *H. samuiense* and *H. thaianum* are reduced to be synonymous with *H. coronarium* var. *forrestii*, *H. roxburghii* and *H. pauciflorum* respectively.

As regards the morphological study the genus *Hedychium* can be divided into 2 main groups based on bract characteristics of inflorescences.

1) Bracts imbricate group is subdivided into 2 subgroups; the first subgroup is recognized in cylindrical or elliptic imbricate bracts, with 1 or 2-4 flower(s) per bract. However, one species of elliptic imbricate bracts is distributed in northern and northeastern Thailand whereas the others with cylindrical imbricate bracts are found in peninsular Thailand. The second subgroup is conspicuous with conical imbricate-elongate bracts with 4-6 flowers per bract.

2) Bracts not imbricate group is subdivided into 2 subgroups; the first subgroup is distinct in 1 flower per bract whereas the second subgroup in flowers more than 1 per bract.

As regards the phylogenetic analyses of *Hedychium* using ITS regions, three phylogenetic trees are shown based on data from Thailand, Genbank and combined data between both sources. The analysis of ITS gene sequences in Thai *Hedychium* has shown that the genus *Hedychium* is monophyletic with highly supported (bootstrap=100%) and four clades of *Hedychium* species were defined with moderate to strong bootstrap supported (bootstrap=70-100%).

Clade 1 contains imbricate bract species (most species are cylindrical imbricate bract except *H. longicornutum*) and not imbricate bract species. Within clade 1,

most species are distributed in peninsular Thailand (only *H. villosum* in northern and northeastern Thailand) and possess 1 or 2-4(-8) flower(s) per bract.

Clade 2 contains imbricate to elongated bract species which are cultivated throughout Thailand and not imbricate bract species which are found in northern and northeastern Thailand. All species are Himalayan elements possessing 3-7(-11) flowers per bract.

Clade 3 contains imbricate and not imbricate bract species found in northern and northeastern Thailand. All species are Himalayan elements with 1 flower per bract and filament as long as or longer than labellum.

Clade 4 contains only one not imbricate species found in northern Thailand. The species is a Himalayan element with 1 flower per bract and filament shorter than labellum.

In conclusion, taxonomic study and phylogenetic analyses are successfully combined for grouping Thai *Hedychium* species. The genus can be divided into 2 main groups as follows:

Group 1 with one flower per bract group can be further subdivided into 2 subgroups; the first subgroup is recognized in cylindrical or elliptic imbricate bracts, *H. ellipticum*, *H. longicornutum* and *H. siamense*. They exhibit glabrous or sparsely pubescent on lower leaf surfaces, long anther (0.8-1.7 cm long) and filament twice as long as the labellum. *H. ellipticum* possesses elliptic imbricate bracts, and distributed in northern and northeastern Thailand. *H. siamense* and *H. longicornutum* both possessing cylindrical or elliptic imbricate bracts are found in peninsular Thailand. Phylogenetic analyses have shown that both species are in the same clade with moderately supported bootstrap value (bootstrap=76%). The second subgroup is not imbricate bracts, *H. aureum*, *H. gomezianum*, *H. pauciflorum*, *H. phuluangense*, *H. spicatum* var. *acuminatum*, *H. spicatum* var. *spicatum* and *H. tomentosum*. All are found in northern and northeastern Thailand with an exception *H. gomezianum* in peninsular Thailand. They are grouped in the same clade with highly supported bootstrap value (bootstrap=99-100%).

Group 2 with more than one flowers per bract can be further subdivided into 2 subgroups; the first subgroup is conspicuous with conical imbricate-elongate bracts, *H. coronarium* var. *chrysoleucum*, *H. coronarium* var. *coronarium*, *H. coronarium* var. *flavescens*, *H. coronarium* var. *forrestii*, *H. malayanum* and *H. khaomaenense*. The second subgroup is characterized by not imbricate bracts, *H. biflorum*, *H. coccineum*, *H. collinum*, *H. muanwongyathiae*, *H. neocarneum*, *H. roxburghii*, *H. speciosum*, *H. stenopetalum* and *H. villosum*. Within group, clade of Himalayan species are heighly supported bootstrap value (bootstrap=99%).

From this study, 21 species and 6 varieties are enumerated for Thailand:

1. *H. aureum* C. B. Clarke & Mann ex Baker
2. *H. biflorum* Sirirugsa & K. Larsen
3. *H. coccineum* Buch.-Ham. ex Sm
4. *H. collinum* Ridl.
5. *H. coronarium* J. König var. *coronarium* J. König
6. *H. coronarium* J. König var. *chrysoleucum* (Hook.) Baker
7. *H. coronarium* J. König var. *flavescens* (Carey ex Roscoe) Baker
8. *H. coronarium* J. König var. *foresstii* (Diels) Picheans. & Wongsuwan
9. *H. ellipticum* Buch.-Ham. ex Sm.
10. *H. gomezianum* Wall.
11. *H. khaomaenense* Picheans. & Mokkamul
12. *H. longicornutum* Griff. ex Baker
13. *H. malayanum* Ridl.
14. *H. muanwongyathiae* Picheans. & Wongsuwan
15. *H. neocarneum* T.L. Wu, K. Larsen & Turland
16. *H. pauciflorum* S.Q. Tomg
17. *H. phluangense* Picheans. & Wongsuwan
18. *H. roxburghii* Blume
19. *H. siamense* Picheans. & Wongsuwan
20. *H. speciosum* Wall.
21. *H. spicatum* Sm. var. *spicatum* Sm.
22. *H. spicatum* Sm. var. *acuminatum* (Roscoe) Wall.

23. *H. stenopetalum* Lodd.

24. *H. tomentosum* Sirirugsa & K. Larsen

25. *H. villosum* Wall.