

CHAPTER V

DISCUSSION AND CONCLUSION

Discussion

1. After the tedious excursion throughout the country, the plants and their seeds of two species of Reo from genus *Amomum*, family Zingiberaceae were collected for investigation and the results of this experiment were shown to be different. For instance, the fruit of *Amomum uliginosum* K. D. Koenig is obovate, covered by slender and soft spines. The capsule has 3-lobes containing 18-50 seeds; having white and reddish brown, brown or dark brown color when dried, covering with white membranous aril while the fruit of *Amomum fulviceps* Thw. is ovate or round, covered by short and hispid spines, having persistent calyx. The capsule has 3-lobes containing 18-39 seeds; having brown to dark brown, covering with white membranous aril and turns dark brown to black when dried.
2. The pharmacognostic study led to the conclusion of significant different macroscopical and microscopical between *A. uliginosum* K. D. Koenig and *A. fulviceps* Thw. For macroscopical, the seeds of *A. fulviceps* Thw. are obovoid, having slightly odor and bigger than those of *A. uliginosum* K. D. Koenig of which the latter are obtusely angular, having astringent with a camphoraceous odor. The cross section of both types of seed are proved the similarity of *Amomums*, while the microscopical characteristic differences of calcium oxalate crystal types are evidenced. Prisms are found abundantly in *A. uliginosum* K. D. Koenig, where as rosette aggregate in *A. fulviceps* Thw.
3. The value of the volatile oil content and major compositions of authentic samples are individually proceeded and recorded. The mean of values are shown as follow:

	Volatile oil content (%w/w)	
	Steam distillation	Supercritical fluid extraction
<i>A. uliginosum</i> K. D. Koenig	2.485	1.97
<i>A. fulviceps</i> Thw.	-	0.85

Major composition	Content (% relative)	
	Steam distillation	Supercritical fluid extraction
<i>A. uliginosum</i> K. D. Koenig		
Bornyl acetate	45.79	45.35
Camphor	26.96	25.61
Borneol	4.14	4.67
Limonene	3.20	1.72
<i>A. fulviceps</i> Thw.		
Isoborneol	-	0.68
Eucalyptol	-	0.26
<i>trans</i> -Farnesol	-	0.20

4. The value of the volatile oil content and major compositions of reo were purchased from Thai traditional drugstores are individually proceeded and recorded. The mean of value are shown as follow:

	Steam distillation	Supercritical fluid extraction
Volatile oil content (%w/w)	2.48 ± 0.31	1.95 ± 0.49
Major compositions (% relative)		
Bornyl acetate	31.35	29.42
Camphor	27.41	25.55
Borneol	7.21	7.93
Limonene	3.59	1.58

5. The value of the volatile oil content and major compositions of dissimilar and lesser commercially available species (Bangkok 4-b) from those of remaining samples purchased from Thai traditional drugstores was determined and recorded. The values are shown as follow:

	Supercritical fluid extraction
Volatile oil content (%w/w)	0.70
Major compositions (% relative)	
β -Selinene	39.03
γ -Muurolene	9.14
α -Caryophyllene	6.63
δ -Cadinene	2.85

6. The volatile oil content and composition from two methods (steam distillation and supercritical fluid extraction) gave nearly similar results. It is possible that supercritical fluid extractor (SFE-400: Supelco) was designed for just preparative scale of extraction which gave rise to comparatively lesser contents, thus the conditions concerning quantitative determination would not appropriate for using this method for quantitative purposes. However, time consumed for extract of supercritical fluid extraction method is less than steam distillation method about eightfold (30 minutes for supercritical fluid extraction method and 240 minutes for steam distillation method).
7. Qualitative evaluation of collected materials by the author and proved to be identical with market samples of reo was individually proceeded and recorded. The mean of %values were shown as follow:

	% value
Foreign matter	1.45 \pm 1.53
Moisture content	1.78 \pm 0.12
Total ash	8.24 \pm 0.56
Acid insoluble ash	3.03 \pm 0.37

8. In this investigation, it is proved that there are not less than three kinds of crude drugs that were entitled "Reo" distributed in Thai market. From fifteen traditional drugstores, there is the only one store in Bangkok that dispense two kinds of reo such as *Amomum uliginosum* K. D. Koenig, of which called "reo noi" (Bangkok 4-a) and *Alpinia* sp., was called "reo yai" (Bangkok 4-b). The majority of reo in Thailand is *A. uliginosum* K. D. Koenig, the minority is

Alpinia sp., possibly is *A. allughas* Rosc., and adulterant species are usually *Amomum fulviceps* Thw. (Songkhla-b) and *Alpinia* sp. (Bangkok 4-b). For bastard cardamom which longly believed to be *Amomum villosum* Lour. var. *xanthioides* (Wall. ex Baker) T. L. Wu & S. Chen, are not found either in the wild and market in Thailand and specimens at BKF are not confirmed. Under the consulted by Prof. Wu Te Lin from China, specimens of *A. uliginosum* K. D. Koenig and *A. fulviceps* Thw. are differ from *A. villosum* Lour. var. *xanthioides* (Wall. ex Baker) T. L. Wu & S. Chen, so majority crude drugs of reo in Thailand were not identical with *A. villosum* Lour. var. *xanthioides* (Wall. ex Baker) T. L. Wu & S. Chen.

Conclusion

The results of this investigation clearly indicated that the macroscopic, microscopic characters and gas chromatograms can be effectively assisted each other as an important role to differentiate varieties of reo which were purchased in traditional drugstores throughout Thailand.

It is clearly that the majority of commercially available crude drugs named “reo” in Thailand is from *Amomum uliginosum* K. D. Koenig and other species should be either substitute or adulterant, so bastard cardamom, English name of “reo” in Thailand is belong to *A. uliginosum* K. D. Koenig too.

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