

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Thai cosmetic market has been raising annually. In 2010, cosmetic marketing gained over 82,747 millions baht. Moreover, the export market was over 164.2 millions baht (Thai Ministry of Commerce, 2012). Thai cosmetic product market segmentation of the skin care was of 41% for facial product. The lightening and anti-wrinkle products are accounted for 48% and 43%, respectively and another 10% belongs to sun-protection and others (Marketing Oops, 2008). Skin care product in Asian countries also has a decidedly more dominant market share of 40% in both Japan and China market (Global Insight, 2007). Moreover, the consumer demands interested in the development of the product contains natural ingredients and the environmental friendly products. These make the green marketing in Europe, America, and Asia being the main export market of Thailand. Thai cosmetic product, approximately 70%, was recognized to be natural products. The worldwide natural product was investigated to have the market value over 3 trillion baht (Kasikorn Research, 2010).

The study and development of natural bioactive ingredients in cosmetics are expanded. In addition, the new source of natural bioactive compound is being explored. The purposed active properties are, for example, anti-oxidant and anti-tyrosinase which considered to be the active ingredient in the anti-wrinkle or anti-aging cosmetic and in the whitening or lightening cosmetic, respectively. The example of natural ingredients

employed in the cosmetic are yeast extract, ginseng extract, soy-protein, yuzu extract, almond and mango butter. Those ingredients are function to balance, repair, moisture, and firm the skin. The natural active ingredients used in the reducing of melanin pigment production are mulberry extract, licorice extract and algae extract, for example (Bureau of Cosmetics and Hazardous Substances, 2004). The plant sources were had to be imported overseas which increases the production capital. According to that, the development of the native plant extract will increase the import rate and lower the cosmetic cost. Furthermore, this will be alternative for value-adding of Thai agricultural products.

Betel nut is the traditional plant related to Thai culture for long time. The betel nut seed chewing have the helminthicide and other traditional medicinal properties (Lee, K.K., Cho, J.J., Park, E.J. & Cho, J.D., 2001). The betel nut seed and leaf were used to threat diarrhea, edema, heat stroke, beriberi, pharyngitis, eczema, lumbago, bronchitis, the urinary system malfunction (Oxenham, M.F., Locher, C., Cuong, N.L. & Thuy, N.K., 2002) decrease the tooth decay bacterium. The betel nut alkaloids have the stimulate affect to the central nervous system (Nelson, B.S. & Heishber, B., 1999) as same as the caffeine and nicotine consumption, but not effected to the appetite (Norton S.A., 1998). The previous studies show that betel nut owns the variety bioactive compounds, the major constituents belong to the polyphenolic and tannin (condensed tannin) which possesses the antioxidant and UV absorbent activities. In addition, flavonoids group of catechin, epicatechin, and cyanidins also found with their bioactive activities such as antioxidant, anti-inflammatory, and anti-bacterial activities (Zhang, W.M., Li, B., Han, L. & Zhang, H.D., 2009; Wetwitayaklung, P., Phaechamud, T., Limmatvapirat, C. & Keokitichai, S., 2006; Lee, K.K. & Choi, J.D., 1999 a,b).

The increment of cosmetic consumer leads to the development of raw materials and active ingredients which own the multifunction in the same time. The multifunctional ingredients are also found to have the synergistic effect and product unique perspective in the market and also lower the cost. As the previous reports, the betel nut contains a number of phenolic substances and offers various biological activities. It would greatly

provide multifunctional properties for cosmetic applications. The obtained betel nut extract and its finished product would represent Thai tradition and culture and also promote the outstanding of Thai betel nut.

This thesis was then purposed to study an extraction and evaluation of bioactive compounds from betel nut (*Areca catechu* L.) fruit for application it as cosmetic multifunctional agent. The results were also purposed to be the novel information for developing of advance natural active ingredient in the future. In according to the betel nut, this thesis could inherit the folk wisdom of consuming betel nut into the valued cosmetic to support and conserve the native plant leads to the agricultural sustainable development.

1.2 Objective of the Study

1.2.1 To study the effect of ripening stage and part of betel nut fruit on cosmetically bioactive compounds extraction

1.2.2 To study the effect of the extraction method on cosmetically bioactive compounds extraction from the betel nut

1.2.3 To study the effect of the extraction solvent on cosmetically bioactive compounds extraction from the betel nut

1.2.4 To evaluate the phenolics, flavonoids, and catechin content, antioxidant, anti-tyrosinase, anti-elastase, antimicrobial activities, and ultraviolet-rays absorbability of the betel nut extracts

1.2.5 To study the biochemical and physiochemical stability of the betel nut extract

1.2.6 To investigate the elution profile of betel nut extracts by high performance liquid chromatography (HPLC)

1.2.7 To study the stability of the formula containing the betel nut extract

1.3 Scope of the Study

1.3.1 Collecting of the betel nut fruit in the age of 3-6 months (raw) and 7-9 months (ripe) from Thasala, Nakorn Sri Thammarat, Thailand

1.3.2 Studying the effect of ripening stage of raw and ripe and part of seed and pericarp of the betel nut

1.3.3 Studying the effect of extraction method of conventional shaking and microwave-assistance

1.3.4 Studying the effect of extraction solvent of ethyl acetate, 95% ethanol, 50% ethanol, water, and propylene glycol

1.3.5 Studying the cosmetic bioactivities of betel nut extract; extractable phenolics, flavonoids, and catechin content, antioxidant, anti-tyrosinase, anti-elastase, antimicrobial activities and ultraviolet-ray absorbability.

1.3.6 Studying the cosmetic bioactivities stability of the betel nut extract; extractable phenolic, anti-oxidant, and anti-tyrosinase

1.3.7 Studying the physical stability of the betel nut extract; pH value and color of the extract

1.3.8 Studying the solid-liquid fractionation extraction using hexane, ethyl acetate, acetone, 95% ethanol, 50% ethanol, and water to obtain the various polar constituents in the betel nut

1.3.9 Investigating the elution profile of the betel nut extract using high performance liquid chromatography (HPLC)

1.3.10 Studying the stability of the formula containing the betel nut extract

1.4 Outcome of the Study

1.4.1 To know some factors influence cosmetic bioactive compounds extraction of betel nut

1.4.2 To obtain the cosmetic bioactivities of the betel nut extract

1.4.3 To obtain the guideline for the application and storage condition of the betel nut extract

1.4.4 To obtain the multi-functional betel nut extract for the application in cosmetic product

1.4.5 To obtain the formulation containing the betel nut extract as the multi-functional active ingredient

1.4.6 To provide the alternative way for value-adding of betel nut, Thai agricultural product

1.4.7 To provide the guideline of inheritance development and conservation of native Thai plant leads to the sustainable development

1.5 Timeline of Research (1st year)

Activity	2011							2012				
	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1. Betel nut sample preparation	←→											
2. Study of sample and extraction method			←→									
3. Study of extraction solvent				←→								
4. Determination of extractable phenolics, flavonoids and catechin content			←→									
5. Determination of antioxidant activities			←→									
6. Determination of anti-tyrosinase and anti-elastase inhibitory activities						←→						
7. Determination of antimicrobial activity								←→				

1.5 Timeline of Research (2nd year)

Activity	2012						2013						
	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
1. Determination of UV absorbability	←→												
2. Study of the extract stability		←→											
3. Solid-liquid fractionation extraction				←→									
4. HPLC analysis						←→							
5. Study of formula containing betel nut seed							←→						
6. Statistical analysis									←→				
7. Information accumulation and thesis book preparation								←→					