CHAPTER 1

Introduction

1.1 Principles and Rationale

Herbs and flowers have been used for medicinal and soothing properties for decade, whether by consuming, applying and drinking. Herbs are commonly used as fresh or dried leaves in cooking for example, basil, Thai mint, citronella, ginger and galangal. Flower has been used in culinary as well and mostly used in sweet products such as pastries, puddings which scented with either jasmine or rose water. Flower waters were widely used for flavoring cakes or adding into jam and jellies. Many of herbs and flowers were applied in beverages and sweets as for their stimulating or relaxing effect (Wachtel-Galor & Benzie, 2011). Each herbs and flowers always have different and unique aroma with similar aroma compounds but the unique aroma of mostly came from different ratio of the mixture of volatile compounds or distinctively different volatile compound in each flower (Samakradhamrongthai, Utama-Ang, & Thakeow, 2009). Most of the affected aroma and flavor toward consumer were called dominant or character compound that mostly provided pleasant aroma which mainly originates from the petals (Schiestl & Marion, 2013) and enhances good emotions and sensation to consumers. Moreover, it has been proved that flower aroma can stimulate blood circulation and help the respiration system (Leelapornpisid, Chansakaow, Chaiyasut, & Wongwattanakul, 2007).

Flavor engages an significant part in consumer fulfillment and stimuli toward food consumption (Teixeira, Andrade, Farina, & Rocha-Leão, 2004). Flavor and aroma are applied on food, beverages and sweets in many processed. Even though, there are increasing interests on stability of flavor and aroma because of its association with superiority and suitability, however, it still has limitation and difficulty to control

because most of flavors and aromas possessed highly volatility and easy to fluctuate. (Lubbers, Landy, & Voilley, 1998). The encapsulation technique has been known to increase stability of flavor and aroma in foodstuff is generally protected with or within another structure (Madene, Jacquot, Scher, & Desobry, 2006). The encapsulation system plays a dominant part and is one of the most efficient ways to convey flavor into product and can keep most of the specific properties until the product has delivered to consumer (Venskutonis, 1997; Lastwiley, 2007).

In the last decades, Flavor encapsulation has become very appealing process and happened to be one of the most consideration processes in the food industry. The main purpose of microencapsulation is to capture unstable flavors into carriers. The encapsulation can increase the core compound protection and reduce its evaporation It is also easily to handle. In addition, it can be applied for controlling the release of flavors during food processing and storage (Reineccius, 2006).

The controlled release defined as a system that one or more active constituents are arrangly presented at a desired place and time at the specific rate (Pothakamury & Barbosa-Canovas, 1995). Researchers enlightened a better understanding of effects that stimulated the releasing from complex matrices in many applications (Guichard, 2000). The encapsulated volatile compounds and its releasing depends on variation of dependent processes such as diffusion of volatile compound through the matrixes, type and geometry of the particle, transferring from matrix to environment, and degradation of material (Pothakamury & Barbosa-Canovas, 1995). There are potential product applications for the controlled release from nanosphere or microsphere system, for examples, baked goods, refrigerated/frozen dough, microwaveable entrees, confectionery, chewing gum, and desserts (Shefer, 2012).

Dessert is generally important part of Thai culture which reflects social nature. These are considered one of the exquisite cuisines of the world (Thai Food, 2011). Thai desserts have been used in rituals and ceremonies over centuries due to their divine taste and stunning appearance. Thai sweets and desserts are neatly made in colorful and

impressive features with unique flavor and aroma. Thai dessert always has unique taste and appearance and the variation of Thai sweets and desserts are neatly made in colorful, impressive flavor and aroma (Thaiways Magazine, 2002). One of characters in Thai dessert is aroma. The uniqueness of aroma is coming from fragrant candle and flower water. In addition, most of Thai desserts have unique appearance that attracted consumer interests. The authentic Thai desserts are consisted of rice flour, sticky rice flour, sugar, and coconut milk. There are adaptations of Thai dessert when approaching different culture such as mixing of egg or different kind of flour with its attractive name for our own culture style. The total market value of Thai dessert from 2010 was 15,200 million baht and the prediction in year 2011 was 16,600 million baht. This indicated that market of Thai dessert is still expanding and there should be supporting of product development, brand awareness, re-design, re-brand, and re-packaging (Nanawan, 2010).

Despite the current focus in the market on desserts produce that aim at a fast preparation time, for many consumers that require traditional or relatively long processing times remain of interests. Flavors are added during process time to provide flavor, aroma and mixture of desired flavor to desserts. The problem occurs is that flavors added to the product become available immediately or rather quickly after addition and then quickly disappear with progression of time. There are many processes of making Thai dessert which are candied, confiturated, steamed, poached, baked and fried. Most of the production involved medium to high level of temperature with certain level of moisture. Some are even involved mechanical force such as kneading (Rithagorn, 2009). Steamed desserts are one of the popular processes of making Thai dessert. Those steamed dessert were mostly affected by temperature, moisture and mechanical force in making process. Therefore, flavor and aroma are hardly to control due to its volatility. The disappearing of flavor and aroma could be the result from heat-deterioration or evaporation of aroma compounds which obviously affected its attractions (European patent application, 2010). Silva, Sims, Balaban, & Silva (2000) studied the changes of kinetics from flavor and aroma in thermally processed *Theobroma grandiforum*. The heating time and temperature affected toward sensory rating which decreased aroma and flavor rating. Therefore, there is a need for flavor releasing during process time and from which the flavor preferably slowly becomes

available over an increased period of time and not at a burst of flavor at the start of the processing time. In addition, the flavor should preferably be provided good shelf life stability and the flavor in the product should preferably be stabled during production of the product and storage of it (European patent application, 2010).

This research aimed to investigate the suitable flavor encapsulation for controlled release and its flavor release model. This was expected that flavor encapsulation complex was able to control and retain the flavor. The multi-core encapsulation which enfolds flavor within was used to retain the inner flavor powder through the production of making dessert. The inner flavor powder was entrapped the extracted flavor with inclusion and complexation techniques that assured to create the controlled release effect toward consuming process especially while the consumer chewed the product. In addition, the encapsulation complexes were developed in Thai steamed dessert model to improve stability with controlled release properties of flavor/aroma within desirable period of time.

1.2 Purposes of the study

1.2.1 To screen Thai aromatic plants using consumer preference on overall aroma as a main criteria and antioxidant activity as minor criteria of the selection.

1.2.2 To identify dominant volatile compounds of extract from selected plants and its characteristic aroma.

1.2.3 To compare the encapsulation process between spray drying and freeze drying, and characterization of selected plant.

1.2.4 To investigate the suitable ratio of wall material for controlled release encapsulating complexes and release profile of aroma from encapsulating complexes in simulation saliva comparing with release profile in oral cavity.

1.2.5 To develop product of Thai dessert with multi-core encapsulated complexes that has controlled release aroma and flavor properties.

1.2.6 To investigate flavor release profile from the multi-core encapsulated flavor powder in Thai dessert using time intensity method.

1.3 Education and application advantages

1.3.1 To obtain selected Thai aromatic plants from the consumer preference result on overall aroma as a main criteria and antioxidant activity as minor criteria.

1.3.2 To obtain characteristic dominant aroma of extract from selected plants and its characteristic volatile compounds.

1.3.3 To acknowledge the suitable ratio of wall material for controlled release encapsulating complexes and release profile of aroma from encapsulating complexes in simulation saliva comparing with release profile in oral cavity.

1.3.4 To acknowledge the product concept of Thai dessert model with multi-core encapsulated complexes that has controlled release aroma and flavor properties.

1.3.5 To acknowledge the release profile of flavor and aroma from Thai dessert using time intensity method.

1.3.6 To apply multi-core encapsulation technique to entrap active compound that can controlled-release at the desirable place and time.

1.3.7 To apply multi-core encapsulated flavor powder to food that can release flavor and aroma from in-process food and during consuming.

1.4 References

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