CHAPTER I

INTRODUCTION

Recently, fruit extracts are used worldwide in cosmetic products, especially alpha hydroxy acids group. The compounds from fruit extracts are the important ingredients in cosmetic products, they are used as composition in creams, lotions, and facial cleansers. The compounds are from different sources, for example, glycolic acid is produced from a constituent of sugar cane juice, lactic acid is produced by microorganism *Lactobacillus*.

Effects of alpha hydroxy acid are dose-dependent. Category of the concentration in low, medium and high concentrations, are as following, low concentration of alpha hydroxy acid is less than 4 percent of active ingredient in formulation, medium concentration is most widely used appear in range of 4 % to 12 %, high concentration of this compound is more than 12 %. (Uhoda et al., 2005) Alpha hydroxy acid have directly effected on epidermis. They help turnover rate of skin cell. When its happen, skin color is lightened in color (Briganti, Camera and Picado, 2003) and smooth; it reduces skin wrinkle and skin moisturizing is increased. (Roenigk, 2000) Moreover, alpha hydroxy acids are helping to increase flexibility of skin (Uhoda et al., 2005). In clinical study, efficacy to skin protection and protection from irritation of creams formulation containing alpha hydroxy acids, i.e. glycolic acid, lactic acid, tartaric acid and gluconolactone has been evaluated. Creams were applied on skin of healthy volunteers before using sodium lauryl sulphate. The result from this study shows that epidermis of skin was not irritated (Berardesca et al., 1997). Furthermore, in the study of the effect of sunscreen SPF 4 containing glycolic acid at concentration of 4 % and 8 % for 24 weeks in volunteers, showed that sunscreen was not decrease protection functional of epidermis and not increased cell death that was damaged from ultraviolet (Johnson, Stoudemayer, and Ligman, 2000).

Tamarind, botanical name is *Tamarindus indica* Linn., the tree is in family Ceasalpiniaceae, the other local name called Ta luup, Kham (Farnsworth and Bunyapraphatsara, 1992). Thailand has 2 types of tamarind, they are appeared in sweet tamarind and sour tamarind. Most tamarind growing province are Loei, Phetchabun and Nakhonratchasima. Tamarind pulp are useful, eaten and made into

refreshing drink. Raw and dried pod using as flavoring agent in Indian and Thai cuisine those give sour taste. Uses of Tamarind pulp have been reported as in Thai traditional text books as laxative, expectorant, abcesses and blood tonic (Fransworth and Bunyapraphatsara, 1992; Kapoor, 2001; Wiart, 2002). Moreover, in traditional cosmetic use of tamarind pulp, it has been used as scrub for skin lightening. Chemical components in tamarind pulp consist of 25-41% reducing sugar, 2-3.5 % pectin, 2-3 % protein and organic acids. Most of organic acid that found in tamarind pulp is 8-18% tartaric acid, and 2-3 % of other organic acids present as malic acid (Lewis, 1964).

Even, tamarind is available, non-expensive and is found in every season, but use of tamarind for cosmetic production are limited, because of its stability, color and odor problems and quantitative control of tartaric acid content. From the problems of using tamarind pulp extract in cosmetic production, in this study spray-dried tamarind pulp extract was developed. Spray drying method has several advantages. This method can be use with heat sensitive products, and also has the following advantages; the rapidly process, cost benefit, equipments are available, and suitable for use in large scale production (Madene et al., 2006). Spray-dried tamarind pulp extract was developed to make it easy to incorporate in cosmetic product for lightening purpose. Oil-in-water emulsions is widely use in market.

Tamarind pulp extract has sticky characteristic properties because it consists of reducing sugar. Direct spray drying of tamarind pulp extract is limited. Addition of spray drying carrier, such as maltodextrin or acacia, in fruit juice for spray dying method is necessary. Abadio et al. (2004) showed that pineapple spray-dried with maltodextrin as a carrier has significant effect on the moisture content. Increase in maltodextrin concentration results in decrease in moisture content. The effect of addition of spray-drying aid for spray-drying sticky substances, i.e. fructose, glucose, sucose and citric acid, by using 1:4 of maltodextrin: sticky substance with inlet temperature 95 $^{\circ}$C for spray drying method was studied (Adhikari, 2004). Spray dried carrier, i.e. acacia, maltodextrin, waxy starch and microcrystalline cellulose, were studied for spray drying mango pulp extract, which has sticky properties. The results have shown that using maltodextrin as a spray-drying carrier in mango extract produced, spray-dried mango powder with good solubility property but it was stickier

than using other carrier. Using acacia as a carrier for spray drying mango pulp extract has given good solubility property of product but less sticky than using maltodextrin. Waxy starch did not show good in solubility property when compared with maltodextrin and acacia, but waxy starch gave spray-dried mango pulp extract less sticky than others. In addition microcrystalline cellulose together with those 3 carriers showed that it decreased solubility and sticky property of spray-dried powder (Cano-Chauca et al., 2005). In addition of spray-dried carrier such as acacia or maltodextrin, it is necessary to apply this technique to fruit juices, adding amounts not exceeding the operational limits of the equipment. Currently maltodextrin and acacia are the most widely used as spray dried carrier to obtain fruit juice powders. Maltodextrin has low viscosity at high solid ratio and it was available in difference average molecular weights. Furthermore, maltodextrin is a good compromise between cost and effectiveness (Cano-Chauca et al., 2005; Madene et al., 2006). Acacia is most often used as encapsulation wall material because of its solubility, low viscosity property at high concentration in feed (Madene et al., 2006).

The chemical composition in tamarind pulp mostly is reducing sugar. Preparation of spray-dried tamarind pulp by using maltodextrin or acacia could result in hygroscopic property, they can absorb moisture and show sticky mass. Thus, adding of adsorbents such as silicon dioxide in feeding might reduce agglomeration of spray-dried powders.

In this study, preparation of spray-dried tamarind pulp extract was developed. Maltodextrin and acacia were used as carriers for development of spray-dried tamarind pulp extract powder using spray drying technique. Silicon dioxide was also used as adsorbents. Conditions for spray drying, inlet temperature and fan spray flow rate were studied. Tartaric acid and others organic acids that found in tamarind pulp, were alpha hydroxy acid structure. Oil-in-water emulsions containing spray-dried tamarind pulp extract might have whitening and moisturizing effects. Then, whitening and moisturizing efficacy were also investigated. Melanin value and moisture of skin were determined.

The main objectives of the present study were as follows:

1. To prepare spray-dried tamarind pulp extract.
2. To prepare oil-in-water emulsions containing tamarind pulp extract with physical and chemical stability.
3. To develop analytical method for determining of tartaric acid in tamarind pulp extract, spray-dried tamarind pulp extract and oil-in-water emulsion containing spray-dried tamarind pulp extract.
4. To study the whitening and moisturizing efficacies of oil-in-water emulsion containing spray-dried tamarind pulp extract in volunteers.