

## CHAPTER I

### INTRODUCTION

Thailand is an agricultural country with an abundant supply of many vegetables and fruits year round. For this reason, agricultural raw materials are processed by the industry into a variety of food products for both local consumption and for export. Such food processing operations usually leave a large amount of by-products or wastes to be taken care of. Several of these by-products contain mostly dietary fiber. Corn (*Zea mays*) is one of the common commodities for food processing. In 2006 the production of fresh corn was about 359,486 tons with the country consuming value being 87,106 tons and for exportation 272,822 tons, totaling 4,592 million baht (1).

In 2010 Thailand became the third largest exporting country for sweet corn in the world in response to the consumers demand especially in the United States, Europe, Japan and Korea. Thus, sweet corn products are important for world economics showing an average increase in the market values of 7-8% each year (2). Due to the increase in exportation, the production has to be accelerated to provide adequate supply of the products. This, in turn, causes an increase in the wastes or by-products from corn such as corn silk and corncob. These wastes are normally transformed to animal feeds (1). Nevertheless, they contain a large amount of dietary fiber and could be used as a source for developing dietary fiber ingredients for foods.

Dietary fiber means carbohydrate polymers including lignin and other components such as phenolic compounds, waxes, saponins, phytates, cutin, and phytosterols when closely associated with carbohydrate polymers of plant origin and extracted along with, which are not hydrolyzed by the endogenous enzymes in the small intestine of human (3). In general it comprises the carbohydrate polymers with ten or more monomeric units. With regards to health, dietary fiber can be divided into two groups based on their digestibility in the gastrointestinal tract. The first group includes starch, simple sugars and fructans that can be hydrolyzed by human digestive

system and absorbed in the small intestine. The components are classified as non-structural carbohydrates, non-fibrous polysaccharides (NFC) or simple carbohydrates. The second group comprises cellulose, hemicelluloses, lignin, pectin and beta-glucans which are resistant to digestion in the human gut and require bacterial fermentation located in the large intestine. These groups are called complex carbohydrates, non-starch polysaccharide (NSP) or structural carbohydrates (4). Furthermore, the applications of dietary fiber from agricultural by-products or wastes such as pineapple core, cactus pear plant (5, 6) and other sources as food ingredients for texture modifying, gel forming and emulsifying have been reported. Dietary fiber could also provide beneficial physiological effects such as laxation, decreasing blood cholesterol and glucose (7, 8).

Nowadays, Thai people, especially those who live in major cities such as Bangkok are facing with changes in their lifestyle and dietary habit. One of the emerging problems is a transition towards consumption of high fat and/or sugar diet with an inadequate intake of dietary fiber from vegetable and fruit sources. These changes have been related to an increase in the incidence of chronic diseases such as obesity, cardiovascular disease and cancer (9, 10). One way to solve this problem besides the promotion to increase vegetable and fruit consumption could be to introduce dietary fiber-enriched food products as an alternative choice.

Corn silk is the part of corn stigma and is one of the agricultural by-products in Thailand. Its appearance is light green or yellow-brown strands about 20-30 cm long. Corn silk contains calcium, potassium, sodium, magnesium, volatile oil compounds, steroid compounds namely citosterol and stigmasterol, alkaloid, saponin, tannin and flavonoids (11, 12). Many reports suggested the beneficial quality of corn silk that has antioxidant activity determined by inhibiting lipid oxidation. In the folk remedy, it is used for edema, gout, uro-cystitis, kidney stone and prostatitis (12, 13, 14, 15). Another part of corn silk which could be utilized is dietary fiber. However, there is limited research involving corn silk fiber and its functional properties. Therefore, this study aims to investigate the preparation of dietary fiber from corn silk, its physical and chemical properties as well as potential application in food products.