

## CHAPTER 1

### INTRODUCTION

#### 1.1 Statement and significance of the problem

Nowadays, changes in the world as global climate or the progress of technology are the cause of health problems of people around the world. Most people increasingly realize and give priority on health care. Although, the use of synthetic chemicals can treat and cure diseases high potentially, but they have high cost, side effects, and toxic accumulate when used for a long time. Using chemicals from natural sources such as fruits, vegetables, and medicinal plants to replace synthetic chemicals has been interesting because they can promote health and alleviate illness. Most of them are proved to be safe, good biocompatibility, lesser side effects, and low cost. So in respect of the healing power of plants and a return to natural remedies is an absolute requirement of our time.

It is well known that, oxygen free radical or more generally, reactive oxygen species (ROS) is product of normal cellular metabolism. They can be either beneficial or harmful to living system [1-2]. Beneficial effect of ROS occurs at low/moderate concentrations and involves physiological roles in cellular response to noxia, as for example in defense against infectious agents and in the function of a number of cellular signaling systems. One example further beneficial of ROS at low concentrations is the induction of a mitogenic response. In contrast, at high concentration, ROS can be important mediators of damage to cell structures, including lipid and membranes, proteins and nucleic acids, which in term oxidative

stress and it causing various diseases as hemorrhagic shock, arthritis, aging, atherosclerosis, ischemia, Alzheimer's disease, diabetes, AIDS, tumor promotion and carcinogenesis [3, 4, 9]. The harmful of ROS are balanced by antioxidant.

Antioxidants are substance that delay or inhibit oxidative damage to a target molecule. They can react with single free radicals and are capable to neutralize free radical by donating one of their own electrons. Antioxidants can be classified into two groups according to the reaction mechanism, primary or chain breaking antioxidants and secondary or prevention antioxidants. Some antioxidants exhibit more than one mechanism of activity, referred to as multi-function antioxidants. Another commonly used classification categorizes antioxidants into primary antioxidant, oxygen scavenging, and secondary antioxidant, enzymatic and chelating/sequestering antioxidants [21-23]. In addition, antioxidants can be classified into two groups according to source of antioxidant, endogenous antioxidant both enzymatic such as superoxide dismutase, catalase, and glutathione peroxidase and non enzymatic such as glutathione, albumin, and uric acid. Another, exogenous antioxidants that contribute from the diet both synthetic chemicals such as butylated hydroxyl anisole (BHA), and butylate hydroxyl toluene (BHT) and phytonutrients or phytochemicals such as vitamin C, vitamin E, and phenolic compounds.

Well-known that, natural antioxidants, such as vitamin C, vitamin E, and phenolic compounds commonly found in vegetables, fruits, and medicinal plants. Phenolic compounds, plant secondary metabolite have been recognized largely as beneficial antioxidant. Recently, phenolic compounds have begun to receive much attention among researchers as a new natural antioxidant. Research associated with natural antioxidants has increased dramatically in various field, including food

chemistry, food biology, natural plant chemistry, biochemistry, and medicinal plants. There are many reviews reported that medicinal plants contained a wide variety of phenolic compounds.

Various types of natural antioxidants are usually involved mechanisms and multiple reaction characteristics as well as different phase localizations. The methodologies used for evaluating natural antioxidants must be carefully interpreted based on the system and analytical method for determining the extent of end point of oxidation. There are no single method will accurately reflect all antioxidants in a mixed or complex system. Therefore, it is essential use more than one method to evaluate antioxidant activity of natural antioxidants.

The measurement of antioxidant levels is important during the production process to confirm the presence of antioxidants and enable any necessary product improvements to be made. Also allows marketing claims to be made. The extracted form is a current trend of using medicinal plants in pharmaceutical and cosmeceutical, which mostly crude extracts that have physical characteristics as liquid, semi-solid, and solid form for make it easier to use and suitable for product formulation [60]. The efficiency in the treatment or disease prevention of various extracts was based on the characteristics of active ingredients and the part of plant that used for extraction. If it has quality control of raw materials and extraction procedure, in addition to increasing the efficiency of extracts, the value of them also increases.

Thailand is the country with a diversity of medicinal plants either cultivated or natural growth. They are important sources of active ingredients that useful for medical, health, and beautiful. Some medicinal plants are used as raw materials in the manufacture of modern medicines. Many kinds of medicinal plants have been used in

quack medicine and traditional medicines. According to the imported and production statistic data of traditional medicines, it was reported that the importing of traditional medicines in the country has slightly increased in the range of 10 year later (114.02 – 330.62 million baht in 1999 - 2008). For the manufacturing of traditional medicines in the country, the value was significantly increased in the range of 10 year later (485.73 – 2547.30 million baht in 1999 - 2008) [61]. The results exhibited that traditional medicines also played important role in therapeutic and health promotion.

This role is supported by the policy of Thai government that provides the production supporting and promotes the use of medicinal plant products in the public hospitals in place of the modern medicines [62]. Thus, the market of medicinal plant products in Thailand is growing up rapidly in diet supplements, herbal medicines, and recently in cosmetic products.

*Rafflesia kerrii* Meijer, which has a common name as “Bua Phut” or “Bua Toom” is a parasitic plant with fiber-like tissue. It subsists on root and trunks on the wild grape family known as “Yan Kai Tom” (*Tetrastigma sp.*). It is found in the rainforest of the southern part of Thailand. The local Thai people believe that the bloom of *R. kerrii* has curative power. Flower buds boiled with water can promote rapid uterus restoring of post-natal’s women to a normal condition. However, the western medicinal approaches do not seem to have a recognition on *R. kerrii* in medicinal properties [49-53]. There is a few reports related to this, e.g. on hydrolysable tannin and phenylpropanoid glycoside [57] and just a little about antibacterial activity [58-59], but on antioxidant activity of this plant, there has not yet been reported anywhere else.

In present study, it was designed to evaluate antioxidant activity of *R. kerrii* extracts by various methods in order to study the mechanism of their antioxidant action. In the first section of this work, the antioxidant activity of liquid extract form of *R. kerrii* was compared with the other medicinal plant extracts commonly used in the manufacturing of cosmetic products. In the second section, *R. kerrii* was further investigated by using extracts from fractionated extraction with different polar solvents to find the active extract which possessed the highest antioxidant activity.

The last section has revealed the stability test of the extracts which were operated under the accelerated circumstances to evaluate their resistance to heat and humidity for long retained storage.

## **1.2 Aims of the study**

1.2.1 To determine antioxidant activity of *R. kerrii* extract with four other medicinal plants extracts obtained from S&J Company

1.2.2 To determine antioxidant activity of *R. kerrii* extracts obtained from fractionation extraction process

1.2.3 To study the active group that possessed the highest antioxidant activity of *R. kerrii* extract

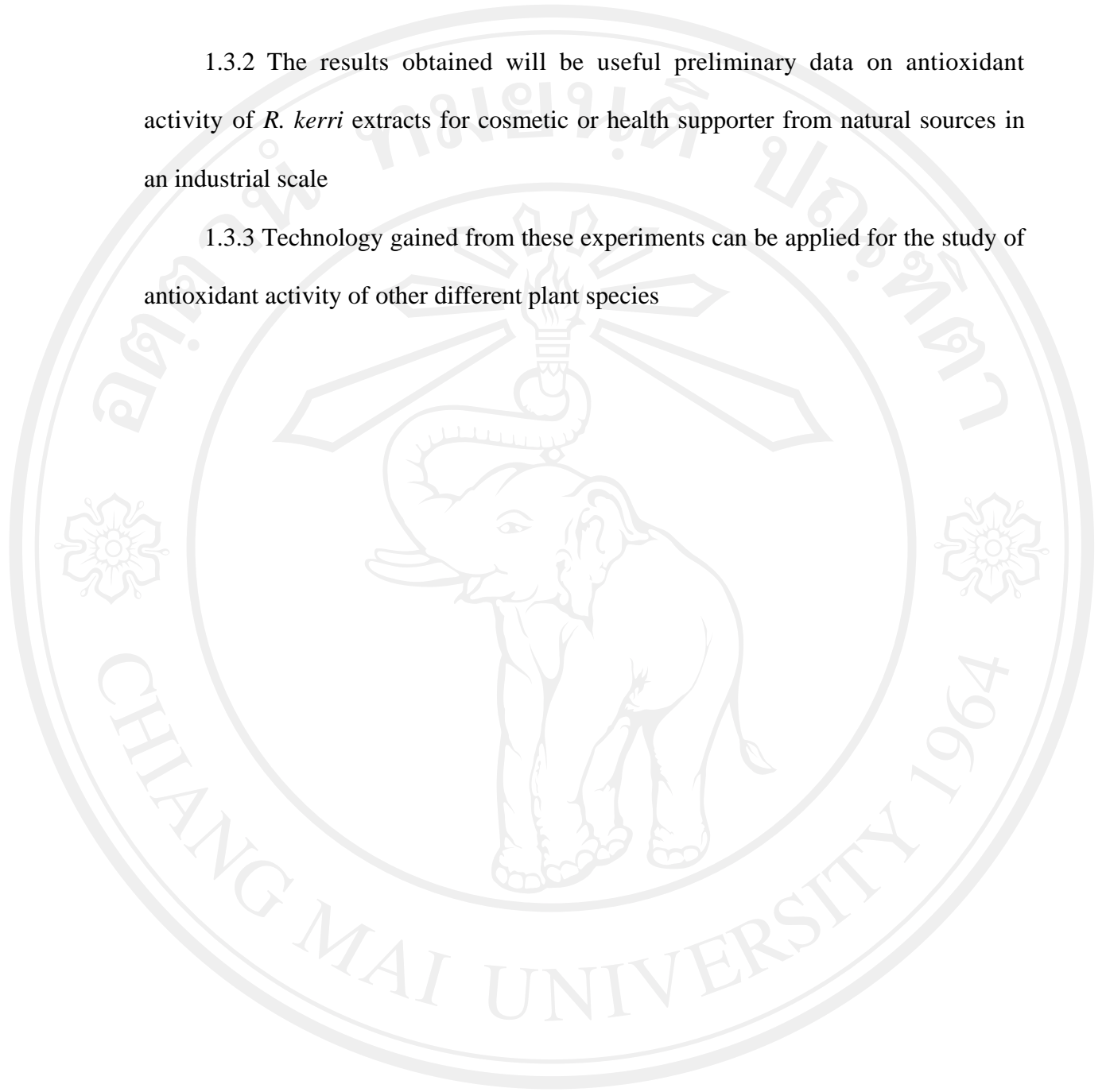
1.2.4 To study the stability of *R. kerrii* extracts under the accelerated circumstances

## **1.3 Education advantages**

1.3.1 The knowledge of the antioxidant activity, total phenolic content, and stability of *R. kerri* extracts in different forms will be obtained

1.3.2 The results obtained will be useful preliminary data on antioxidant activity of *R. kerri* extracts for cosmetic or health supporter from natural sources in an industrial scale

1.3.3 Technology gained from these experiments can be applied for the study of antioxidant activity of other different plant species



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