CHAPTER I
INTRODUCTION

Essential oils are fluid, colorless and volatile. Essential oils are synthezied and stored in some specialized plant structures such as secretory cells, glands and glandular hairs. The chemical of essential oils are rather complex. They are constituted of terpenes, sesquiterpenes, esters, alcohols, phenols, aldehydes, ketones and organic acids. Essential oils are contained and reported in many plants, especially are abundant in Labiatae, Myrtaceae, Coniferae, Rutaceae, Lauraceae, Umbelliferae and included Orchidaceae[1,2].

Orchidaceae is one of the three largest plant families, the other two families are Asteraceae and Poaceae. Over 25,000 species are subdivided into some of 750 genera which are known to exist. With the exception of the Arctic, the Antarctic and hot, desert regions, orchids are distributed across all continents and zones, as high as 94-95% of species are naturally found in the Tropics. Kaiser (1993) has documented approximately 2,200 natural species. Of these 2,200 species, at least 50% may be classified as moderately to strongly scented, while only 15-20% proved to be scentless. The orchid scents are divided into four groups according to olfactory and chemical criteria including (a) flower scents with a white-floral image, (b) a rosy floral image, (c) an ionone-floral image and (d) a spicy-floral image. Many attractive flowers are scent, especially those of the orchids, in fact, cannot be obtained as essential oils because their important fragrance compounds are easily destroyed and high volatile compounds are completely lost. Furthermore, the production costs for the orchid flowers extraction would rather be astronomical[3-5].

In the beginning of the century, Haberlandt (quoted by Krieger, 1988) attempted to culture isolated plant cells. Plant cell culture is the science of growing plant cells which tissue or organ is isolated from the mother plants which are grown under aseptic condition on artificial medium. Plant cell culture methods have gained considerable

importance towards to the production of the secondary metabolites. So that, production of essential oil in plant tissue culture has been reported[6].

Since the orchid plants possess the small amount of scent which the essential oils are not able to extract easily by some traditional methods. Thus, applied tissue culture technique should be the another alternative method to be used for solving this difficulty problem. In addition, by using this tissue culture technique, it is hoped that the essential oil production can be increased in the plant cells of scent crops.

Orchid is one of the most popular ornamental plants which has been known for a long time since it possesses beautiful flowers and scent of them have fragrant. Naturally, orchid will give flowers once a year. *Dendrobium* is a member of a large group of epiphytic orchid, which comprises about of 1,100 species[7]. Orchids have been used as medicines for a longtime, for example *Dendrobium crumenatum* is used in Indonesia to cure earaches, *D. hancockii* is used in China against coughs and *D. teretifolium* is used in Tahiti to cure headaches. Cosmetic uses of dried plants of *D. clavatum* in India and dried leaves of *D. salaccense* in Indonesia, for their scent, made a beauty cream[3]. Chemical compounds found in *Dendrobium* species such as polysaccharides, alkaloids and mineral elements[7]. Chen *et al* (2003) have measured effectiveness of extracts of *D. hancockii* in relaxing the isolated aortic ring of the rat[8]. Ye *et al* (2002) have studied for immunomodulatory activity four sesquiterpenes glycoside isolated from *D. nobile*[9]. *D. parishii* Rchb.f. is a kind of orchid plant which its flower has scent, but its chemical constituents of scent has not been studied and reported. Recently, it is found that using of plant cell culture technique is an alternative interesting method to improve the secondary metabolites from the culture medium because this technique can produce essential oils which are similar to their natural products and oil qualities can be effectively control. Therefore, if we know the chemical constituents of essential oils and can increase the level of their productions which studying from *D. parishii* plants, it is anticipated that this technique will give further guidelines to increase the level of production of essential oils which produce from the other orchids and some other interesting plants.

Purpose of the study

1. To study on chemical constituents of essential oil from *D. parishii* Rchb.f. and the methods of their plant cell cultures by using solid phase microextraction technique and analyzed by gas chromatoghaphy mass spectrometry.
2. To enhance the effectiveness of the essential oil production in plant cell cultures of *D. parishii* Rchb.f.