CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The role of yeast in biotechnology had been discovered for a long time. Other than used in production of food and beverages, yeasts also play important role in pharmaceutical field. They are involved in production of medicines, dietary supplements and probiotics. As the importance of yeast in biotechnology is expanding, huge amounts of yeast are cultivated nowadays. Despite the fact that yeast can cause many diseases, researchers continue to investigate other angelic side of yeast that can be developed for humans’ sake. One of a newly discovered application of yeast is found in production of fatty acid, such as linoleic acid, alpha-linolenic acid, and arachidonic acid (Yazawa et al., 2009).

Arachidonic acid (AA) is a polyunsaturated fatty acid (PUFA) which is a fundamental nutrient component for human beings. It is pale yellow in colour and has slight odour. AA is liable to dissolve in organic solvent but not in water. According to Leray (2011), AA was first isolated in 1940 from phospholipids from beef suprarenal glands by Shinowara et al. (1940) and its structure was elucidated three years later by Arens et al. (1943). The first total synthesis of AA was made by Osbond et al. in 1961. AA is vital to human growth and nutrition. It has extensive application in pharmaceuticals, cosmetics and chemical materials.
AA is prominent to human at every stage. It mainly helps information transfer of nerve systems and can aid development of infants (Bigogno et al., 2002; Higashiyama et al., 2002). Thus, AA is very important in baby formula. Bigogno et al. (2002) also stated that AA is transferred directly from mother to infant by breast-feeding. This showed that AA is significant to pregnant women. AA also is necessary for old folks because it involves in control of memory (Higashiyama et al., 2002). Besides that, AA is capable of protection of gastric mucosa, treatment of skin psoriasis, reduction of fatty liver, killing of tumor cells and improvement of cirrhotic patients.

It is important to make sure that there is suitable amount of AA in our body to avoid various kinds of health effects. Any overtake or deficiency of AA may lead to risk in our health condition. Normally human gets AA through their diets that are usually found in red meat, egg yolk and organ meat. Besides that, AA was taken as supplement, which is famous among bodybuilder and athletes. AA also was produced into processed food, for example milk that is specialized for pregnant women.

Researchers are looking for the best producers of AA which can be consumed by everyone without any limitations. AA can be produced from fish and swine, however the process is more complicated as the removal of cholesterol, odours and tastes is quite difficult. Besides, marine resources are unstable due to unlimited fishing season and geographic locations (Yongmanitchai & Ward, 1989). Swine, the major producer of AA, are prohibited in certain religion and vegetarians. Nowadays higher plant such as algae was very popular among AA researcher. Besides that, microorganisms such as fungi were widely used in production of AA. In this research, works were done to extract AA from yeast as one of the promising producer of AA.
1.2 PROBLEM STATEMENT

Arachidonic Acid (AA) is presently isolated from numerous sources, in example animal adrenal gland and liver, and from sardine (Bajpai et al., 1991). Generally, porcine liver is used as the main source of AA (Yu et al., 2003). However, in a certain religion, any source from swine is forbidden or non-‘Halal’. With the rising consumer demand for a ‘Halal’ integrated lifestyle, it is a need to find alternatives in producing products that can fit ‘Halal’ standards. Besides that, it is difficult to remove cholesterol and some objectionable tastes and odours from animal sources and fish oil concentrates (Jareonkitmongkol et al., 1993). Marine resources are also unstable due to limited fishing seasons and geographic locations (Yongmanitchai & Ward, 1989). Based on the potential need for AA in human, a few researches for new efficient source have been conducted. Some of microorganisms especially from fungi species turned out to have potential to accumulate lipid in their bodies equivalent to about 50% of dry biomass (Higashiyma et al., 2002). Therefore, it is important to study the effectiveness of microorganism as a source of AA.

1.3 OBJECTIVE

The main objective of this research is to study the optimum condition for arachidonic acid (AA) production from Candida krusei. The measureable objectives are:

i. To determine the effect of pH for yeast culture

ii. To determine the effect of different types of carbon source needed by yeast in AA production

iii. To determine the effect of agitation rate that is suitable for culture of yeast in AA production