

# THESIS INFORMATION

## INTRODUCTION

Thesis title: **OBTAINING FATTY ACIDS FROM BANG SEED OIL  
TERMINALIA CATAPPA WITH ENZYME LIPASE MUCOR  
JAVANICUS, RHIZOPUS ORYZAE AND ORIENTATION  
FOR FOOD APPLICATION**

Major: **FOOD TECHNOLOGY**

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## CONTENT

The *Terminalia Catappa* tree produces large fruit yields, and the seeds separated from the fruit have a fairly high fatty oil content containing many essential fatty acids. *Terminalia Catappa* seeds are a material favored by nature with high economic value but have not been fully cared for and exploited. Research to create many products such as *Terminalia Catappa* seed oil and saturated and unsaturated fatty acid fractions has increased the value of this seed in the future.

*Terminalia Catappa* seed oil is a product with high nutritional value that can be used as food oil which is rich in essential fatty acids. On the other hand, the fatty acid mixture obtained from hydrolysis of *Terminalia Catappa* seed oil and crystallized in a cold acetone environment to separate into high purity fatty acid fractions. In the unsaturated fatty acid fraction, most of the essential fatty acids include: Oleic acid (omega 9), which is beneficial for the heart, helping to control sugar levels in the body and also has antioxidant effects, helping to reduce signs of dry skin; Linoleic acid (omega 6), which reduces the risk of cardiovascular diseases, has a direct impact on brain function, enhances immune function and protects bone density, has anti-proliferative properties and is used in diabetes treatment and cancer prevention. These two types of fatty acids are widely used to produce functional foods and pharmaceuticals. Therefore, selecting production methods that are highly effective, environmentally friendly, do not affect product quality and long-term storage is the goal of the project.

The results of this project bring new contributions as follows:

*Scientifically:*

- Providing a database on planting directions, fruit harvesting seasons, and fruit ripeness
- Providing data on the characteristics of *Terminalia Catappa* seeds
- Providing processes for collecting *Terminalia Catappa* seeds, collecting almond seed oil, hydrolyzing almond seed oil with lipase enzymes *Mucor javanicus* and *Rhizopus oryzae* to

obtain fatty acid mixtures and crystallizing fatty acids with cold acetone to separate fatty acid segments has high purity.

- Proposing methods to improve the yield of *Terminalia Catappa* seed oil collection. Select the recommended cold oil as food oil.
- Determining conditions affecting the activity and kinetics of lipase enzymes *Mucor javanicus* and *Rhizopus oryzae*.
- Comparing the effectiveness and choose the *Rhizopus oryzae* lipase enzyme as a catalyst to hydrolyze almond seed oil, which will achieve higher efficiency.
- Determining the conditions that affect crystallization related to the efficiency of collection of fatty acid fractions.

*Applicationally:*

- Choosing a cold oil collection method by combining cold pressing of seeds and oil cake extraction with a solvent mixture of n-hexane: 75% ethanol (2:1) achieving an efficiency of up to 91.93%. *In vivo* test result shows that the oil is non-toxic, resistant to 5 types of pathogenic bacteria and has good antioxidant properties.
- Cold acetone was added to the fatty acid mixture obtained from cold oil hydrolysis with *Rhizopus oryzae* lipase enzyme at a ratio of 6:1 (v/w) to fraction at -5°C for 24 hours, effective in capturing saturated fatty acid fractions, saturation reached 84.57% and purity reached 99.65%, and unsaturated fractioned fatty acid efficiency (UFA) reached 79.69%, purity reached 92.77%. The saturated fatty acid fraction is quite rich in palmitic acid, with a very small portion of stearic acid, which has the effect of moisturizing the skin and is often used in the cosmetic and pharmaceutical industries.

**Scientific supervisors**

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