

CHAPTER I INTRODUCTION

1.1 Introduction

Palm oil plantations have a high level of productivity. Starting from palm oil, which is highly needed in various food and consumer products (Darras et al., 2019). Palm oil is a type of vegetable oil with a rapid growth process, especially in tropical countries such as Indonesia and Malaysia. The existence of palm oil plantations gives Indonesia and Malaysia countries significant natural resources and economic value compared to other countries. Palm oil in one hectare can produce between 10-35 tons of Fresh Fruit Bunches (FFB) per year. The life cycle of palm oil is more than 200 years, while the productive period is between 20-25 years (Akhbari et al., 2020).

Based on data from the United States Department of Agriculture (USDA) Foreign Agriculture, Service 2023. The total palm oil production in Indonesia is 47.000.000 Million Tons 59%, and Malaysia produces 19.000.000 Million Tons of oil or 24% of palm oil processing. Palm oil production in Indonesia and Malaysia combined accounts for 83% of global Crude Palm Oil (CPO) production (Kamyab et al, 2017).

The palm oil industry not all produces oil but also produces waste from the oil production process. The waste produced is divided into solid waste and liquid waste known as Palm Oil Mill Effluent (POME). Palm oil solid waste comes from empty fruit bunches, shells, and coir (Warsito et al., 2016). One ton of palm oil produces 220-230% (Haryanti et al., 2014). Liquid waste comes from sterilization and separation of palm oil products based on specific gravity (Silalahi et al., 2017).

Boiler ash is a type of solid waste derived from palm fiber and shell. The shell is the outer part of the seed that is broken down into the core and shell. The texture of boiler ash, is rough in the form of a very fine crust. Palm oil fruit bunches in 1 ton can produce 4-6 kg of boiler ash (Effendi et al., 2022). Judging from the large amount of BA produced. Throughout this, boiler ash has not been widely utilized so it is wasted. Judging from the content of boiler ash, which is rich in organic cations and potassium,

can be used as a bio-activator in making Palm Oil Mill Effluent Digestate (POMED) waste sample fertilizer (Boey et al., 2011).

Throughout this, the utilization of palm oil liquid waste processing is still limited. Stated that in palm oil liquid waste there are nutrients that are suitable for plant growth, namely Nitrogen (N) 450-590 mg/L, Phosphorus (P) 92-104 mg/L, Potassium (K) 1,246 - 1,262 mg/L, and Magnesium (Mg) 249-271 mg/L which can be used as a source of organic fertilizer for plants (Ideriah et al., 2007 in Purnomo et al., 2020).

Based on 2021 Statistical Data, global fish and aquaculture production is approximately 178 Million Tons. An estimated on 70% of the total production is disposed of consisting of 9-12% fish heads, 12-18% offal, 1-3% fish skin, 5% bones, and 5% scales (Yusof et al., 2023). The Advisory Coordinator to the Minister of Maritime Affairs and Fisheries for Research and Competitiveness, Prof. Rokhmin Dahuri, said “that in 2019 30-40% or 8.6 million tons of fisheries in Indonesia production became waste and around 2 million tons of that amount was wasted and became unutilized waste (Annonim, 2020), Shortage of utilization of fish waste is rich in benefits for agriculture so that fish waste can be processed into Microorganism Local with the addition of brown sugar, the results of which can be called Fish Amino Acid (FAA). FAA has a content that is like the nutrient Nitrogen, therefore, to increase the content of Nitrogen (N) in the sample can use bio-activator FAA.

This study was conducted using POMED samples, namely sludge or digestate from the processing of palm oil liquid waste, which has many benefits for agriculture. The POMED used is the Treated type sludge aged more than 6 months which has suitable content for agriculture. In recent years, there has been no research on POMED with the addition of bio-activators and producing an NPK ratio of 2:1:4. Where fertilizer with an NPK ratio of 2:1:4 is a suitable ratio according to the Ministry of Agriculture, personal communication, 2024. Fertilizer with an NPK ratio of 2:1:4 can produce dense fruit can be reused as fertilizer for palm oil plantations and also fertilizer for other fruit-producing plants.

Therefore, it is necessary to conduct research with the title Study Major Plant Nutrient Content in Palm Oil Mill Effluent Digestate (POMED) and its Suitability as Bio-Organic Fertilizer. This study was conducted to determine the content of Nitrogen, Phosphorus and Potassium with the addition of FAA to increase Nitrogen content and BA to increase Potassium content, which will later become organic fertilizer with an NPK ratio of 2:1:4, a better concentration than other organic fertilizers by the Standards and Industrial Research Institute of Malaysia (SIRIM) and Indonesian National Standards (SNI) 2803:2010.

1.2 Aim and Objective

The aim of this study are:

1. Increase the concentration of Nitrogen, Phosphorus and Potassium (NPK) with the addition of Fish Amino Acid (FAA) and Boiler Ash;
2. To obtain a 2:1:4 ratio of Nitrogen, Phosphorus and Potassium (NPK) from solid waste from palm oil production for plant growth.

Objectives:

1. Analyze the content Nitrogen in Fish Amino Acid (FAA) and Potassium in Boiler Ash (BA);
2. Analyze the NPK content after the addition of Fish Amino Acid (FAA) and Boiler Ash (BA) to obtain the 2:1:4 NPK ratio.

1.3 Benefits of The Research

The benefits in this research are:

1. Reducing waste that pollutes the environment;
2. Utilizing palm oil waste into products that are valuable and contain many benefits, namely Bio-organic fertilizer;
3. Getting optimal yields and increasing plant productivity.

1.4 Problem Limitations

The problem limitations in this final project are:



1. This study uses samples from waste palm oil Terengganu Development Management (TDM) Berhad, Sungai Tong, Terengganu;
2. Experiments were carried out using Fish Amino Acid purchased in the market and Boiler Ash taken from the solid waste of TDM Berhad, Sungai Tong, Terengganu;
3. Experiments were conducted to increase the Nitrogen and Potassium values;
4. Experiments were conducted using waste samples from palm oil production that were more than 6 months old (Treated);
5. The analysis method was carried out with Inductively Coupled Plasma (ICP) analyzing Phosphorus (P) and Potassium (K) content and CHONS analyzing Nitrogen (N).

1.5 Systematization of Writing

CHAPTER I

INTRODUCTION

The chapter contains the background, aims, objectives, benefits, laminations of the research problems and signification of the study.

CHAPTER II

BACKGROUND RESEARCH

This chapter contains theoretical literature on palm oil waste, anaerobic digester, the availability of nutrients in palm oil waste, the benefits of Nitrogen, Phosphorus and Potassium in increasing plant growth productivity, previous research on NPK content in palm oil waste and other supporting theories.

CHAPTER III

RESEARCH METHODOLOGY

The research stages conducted, analysis method in the laboratory as well the location and time of the research.

CHAPTER IV

RESULT AND DISCUSSION

The research discussion is accompanied by a discussion.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

This chapter contains conclusions and suggestions based on the discussion sion that has been described.