

CHAPTER

2

**POME: STATISTICS,
CHARACTERISTICS, AND
COMPOSITION**

Muzzammil Ngatiman and Mohd Amir Asyraf Mohd Hamzah

2.1 INTRODUCTION

Oil palm industry encompasses three main sectors: Upstream, midstream, & downstream. Oil palm plantation defines the upstream sector where the cultivation of palm oil trees is the main activity aim to produce fresh fruit bunch (FFB) (Figure 2.1). Entering midstream, FFBs are later transported to palm oil mill (POM) (Figure 2.2) where they will be processed for extraction of the crude palm oil (CPO), crude palm kernel oil (CPKO) and palm kernel cake (PKC). CPKO and PKC could also be produced separately by individual kernel crushing plant (KCP). CPO and CPKO will then be transported to palm oil refinery for refining process which will then produce refined palm oil (RPO), refined palm kernel oil (RPKO), palm fatty acid distillate (PFAD), palm kernel fatty acid distillate (PKFAD), palm olein and palm stearin. In the downstream sector, oleochemical plants utilized RPO, RPKO, PFAD, PKFAD and palm stearin as feedstocks to produce oleochemical products such as crude fatty acid methyl esters, crude glycerol and crude fatty acids. These products can be further processed to produce ingredients for end user products such as fatty acid methyl esters, fatty acids, fatty alcohols, fatty nitriles and fatty amines.



Figure 2.1 Fresh fruit bunch



Figure 2.2 A typical aerial view of a palm oil mill

In the process of producing these palm derivatives product, large amount of biomass is generated in the process; empty fruit bunch (EFB), palm kernel shell (PKS), mesocarp fibre (MF) and palm oil mill effluent (POME) (Jafri et al., 2021). Unlike other biomasses that are in solid, POME is in slurry form and therefore, by large quantity, it possesses risk of water pollution if it is not treated accordingly. Hence the stringent regulation governing the discharge of POME from palm oil mill;

regulated and enforced by the Department of Environment, Malaysia (DOE). In recent times, POMs can be seen actively exploring available technologies in the market as they struggle to find the best ones to consistently meet the increasingly stringent POME discharge regulation. In order to treat POME to the level permitted for its discharge, understanding the characteristics and biochemical nature of POME is imperative. This chapter intended to present related information about POME focusing on relevant scientific and statistical information with the aim to promote wholesome understanding of POME to pave way for better management of its treatment and recovery.

2.2 POME GLOBAL PRODUCTION

Malaysia produces 18.15 million tons of palm oil in 2023, contributing to 24.8% of global palm oil production, amounting to 73.01 million tons (Figure 2.3). Top producer of palm oil, Indonesia, recorded 46.5 million tons of palm oil, equivalent to 63.6% of global palm oil production, followed by Thailand, Colombia, Nigeria, Guatemala, Papua New Guinea, Cote d'Ivoire, Honduras, and Brazil, which makes up the remaining 11.6% of the global production, as reported by the United States Department of Agriculture in 2024. Along with these production figures of palm oil lies the fact that there is also huge amount of biomass generated as a result of palm oil extraction. Among all of the biomass, POME presents itself as the most abundant biomass being generated from palm oil mill processing. Table 2.1 summarizes the production ratio of each type of biomass per ton of CPO processed at the mill.

Applying this ratio to the global production of palm oil, the world observes a 273.8 million ton of POME being generated in 2023 with 68.06 million ton generated by Malaysia alone. The huge amount of POME generated as biomass contributes to the massive land use for the treatment of POME in a particular palm oil processing mill which were once recorded between 1.6 and 4.25 hectares (Chin et al., 1996; Wong, 1980).