



PRELIMINARY RISK PROFILE OF MINERAL OIL HYDROCARBONS (MOH) IN COCONUT OIL

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Executive Summary

The European Commission (EC) is considering whether to establish Maximum Levels (ML) of Mineral Oil Hydrocarbons (MOH) in specific food items on the basis of the latest European Food Safety Authority (EFSA) assessment in September 2023 (EFSA, 2023). Vegetable oils were reported to contain the highest level of MOH and are a primary source of two MOH fractions: Mineral Oil Saturated Hydrocarbons (MOSH) and Mineral Oil Aromatic Hydrocarbons (MOAH) (EFSA, 2023). The ongoing developments in the European Union (EU) guidelines for mineral oil contamination and drafting regulations for the ML of MOH have raised concern in the Philippines since it may create challenges in the supply chain and affect exports of coconut oil to the EU (K. Yap, personal communication, July 10, 2023).

The Philippines is the top producer and leading exporter of coconut oil worldwide (Department of Agriculture-Philippine Coconut Authority [DA-PCA], 2019; United States Department of Agriculture Foreign Agricultural Service [USDA-FAS], 2023). In 2022, the country produced 1.668 million metric tons (MT) of coconut oil and exported 950 thousand MT to the Netherlands, the United States, and Malaysia (Observatory of Economic Complexity [OEC], 2023; USDA, 2023). In terms of consumption, coconut oil ranks third among the top 30 commonly consumed food items among households in the 2018-2019 Expanded National Nutrition Survey (ENNS), Food Consumption Survey (Department of Science and Technology, Food and Nutrition Research Institute [DOST-FNRI], 2022).



Currently, there are no available data and monitoring on the levels of MOH (MOSH/MOAH) in coconut oil in the Philippines due to lack of capability to test for the mineral contaminant, as reported by the DA-PCA (Philippines Agriculture Office [PAO], 2023). The EC sets a maximum LOQ of 2.0 mg/kg and a target limit of LOQ of 0.5 mg/kg for MOSH/MOAH under the fats and oil category as a food safety requirement for trade for EU Member States (AGRINFO, 2023; European Commission et al., 2023). Further, the EU is pushing local coconut oil millers to adopt the lower MOSH and MOAH LOQ, leading to a more stringent or higher requirement on the quality of crude coconut oil that will be exported to the EU (United States Department of Agriculture Foreign Agricultural Service [USDA-FAS], 2023). Considering the importance of coconut oil to Filipino consumers and its significance to trade, it is necessary to gather relevant information on MOH (MOSH/MOAH) contamination in coconut oil, its risk to human health, available control measures, and risk management options.

This report aimed to develop a preliminary risk profile based on available secondary data to provide background information on MOH and its possible contamination in coconut oil. The findings and recommendations derived from this report will serve as reference material in the development and review of existing relevant Philippine National Standards (PNS) on coconut, the primary raw material in producing coconut oil. A review of available secondary data was conducted. The outline of the preliminary risk profile was based on the risk analysis framework of the Food and Agriculture Organization of the United Nations/World Health Organization (FAO/WHO) (2006), consisting of the following components: (1) hazard and food identification, (2) hazard characterization, and (3) risk management information.

The major findings of this study are as follows:

1. MOH are a diverse group of chemical compounds obtained mainly from crude oil and produced synthetically from coal, natural gas, or biomass (FEESA 2023b)

These compounds are categorized into two main types based on chemical structure: MOSH and MOAH (EFSA, 2023b). Among various foods, vegetable oils have been found to contain the highest level of MOH due to their high-fat content (EFSA, 2023a). Coconut oil, a type of vegetable oil derived from copra, can be contaminated with MOH in many ways throughout the supply chain (FEDIOL, 2018). Possible sources of contamination include environmental factors (e.g., smoking of copra), use of lubricants for machinery during processing and refining, migration from packaging materials, and transport of coconut oil through contaminated cargo (FEDIOL, 2022). There is a high risk of MOH contamination in coconut oil during processing and refining due to various supply chain activities preceding the refining of the oil (FEDIOL, 2022).

2. The potential human health impact of MOH varies widely (EFSA, 2023a). MOAH with 3-7 aromatic rings may be mutagenic and carcinogenic (EFSA, 2023b). Some highly alkylated MOAH can act as tumor promoters (EFSA, 2023b). MOSH is associated with lipogranulomas in the liver, spleen, lymph nodes, and other organs (EFSA, 2023b). While MOSH is not carcinogenic, long-chain MOSH can act as tumor promoters at high doses (EFSA, 2012). There are no current internationally agreed Health Based Guidance Values (HBGV) available for MOH (FSANZ, 2018). Based on the latest re-evaluation of the risk exposure to MOH through food, the Panel on Contaminants in the Food Chain (CONTAM) concluded that **MOSH does not raise concern for human health for all age classes at the current levels of exposure (EFSA, 2023b). On the other hand, exposure to MOAH with 3 or more aromatic rings is of possible concern for human health (EFSA, 2023a).**
3. There are no current legal regulations for the ML of mineral oil components in coconut. Only national and international standards, codes of practice (COP), preventive measures, and guidance documents relevant to MOH contamination in food which include coconut and coconut oil are available.

The major recommendations of the study are as follows:

1. DA-PCA to monitor levels of MOH (MOSH/MOAH) in coconut oil products to assess current levels;
2. DA-PCA to train copra farmers and coconut oil producers on the existing control measures to reduce MOH contamination in the primary production of coconut and processing of coconut oil.
3. DA-BAFS to consider the development of a specific PNS on the Code of Practice for Copra, considering that MOH contamination may be introduced at primary production;
4. DA-BAFS to review the existing PNS on Good Agricultural Practices (GAP) for Coconut (PNS/BAFS 238:2018) and consider possible amendments to include control measures to prevent MOH contamination.
5. DA-PCA, in collaboration with the Department of Health-Food and Drug Administration (DOH-FDA), to consider the development of COP in Coconut Oil considering that there is a high risk of MOH contamination in coconut oil during processing and refining, and include control measures to prevent MOH contamination at the processing level; and
6. DA-PCA to educate consumers on the possible health risks of consuming food contaminated with MOH (MOSH/MOAH).

