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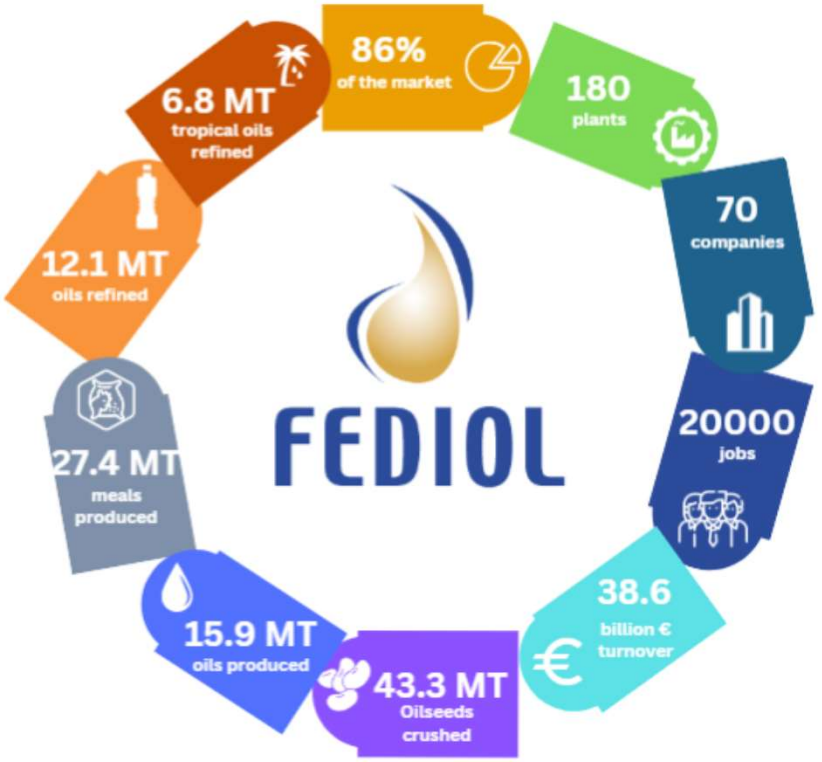
Stakeholder forum on MOH in food – EC

Addressing MOH from the perspective of the vegetable oil and fat industry

18 January 2024

Introduction to FEDIOL

- Covering 86% of the European market and 16 EU countries + UK
- **FEDIOL companies are committed to food safety** and strive for constant improvement of food safety, whenever supported by scientific evidence and applying best available technology
- **Numerous actions** of the sector to address contaminants through FEDIOL codes of practices, FEDIOL food chain risk assessments, FEDIOL positions and proactive engagement, FEDIOL response to EFSA annual call for data on chemical occurrence data (such as MOH)



EU Vegetable Oil and Proteinmeal Industry

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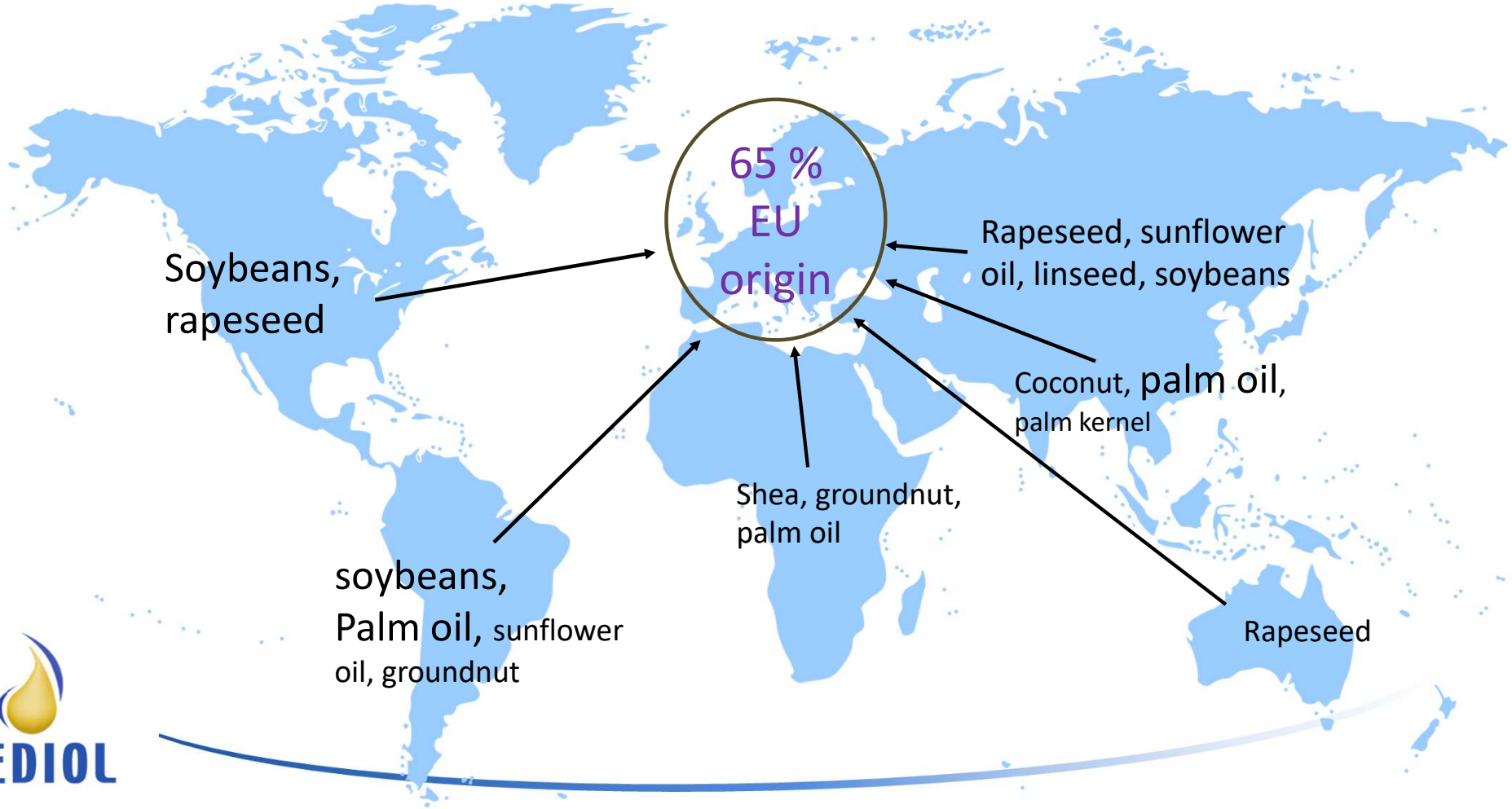
Sourcing of raw material (simplified)



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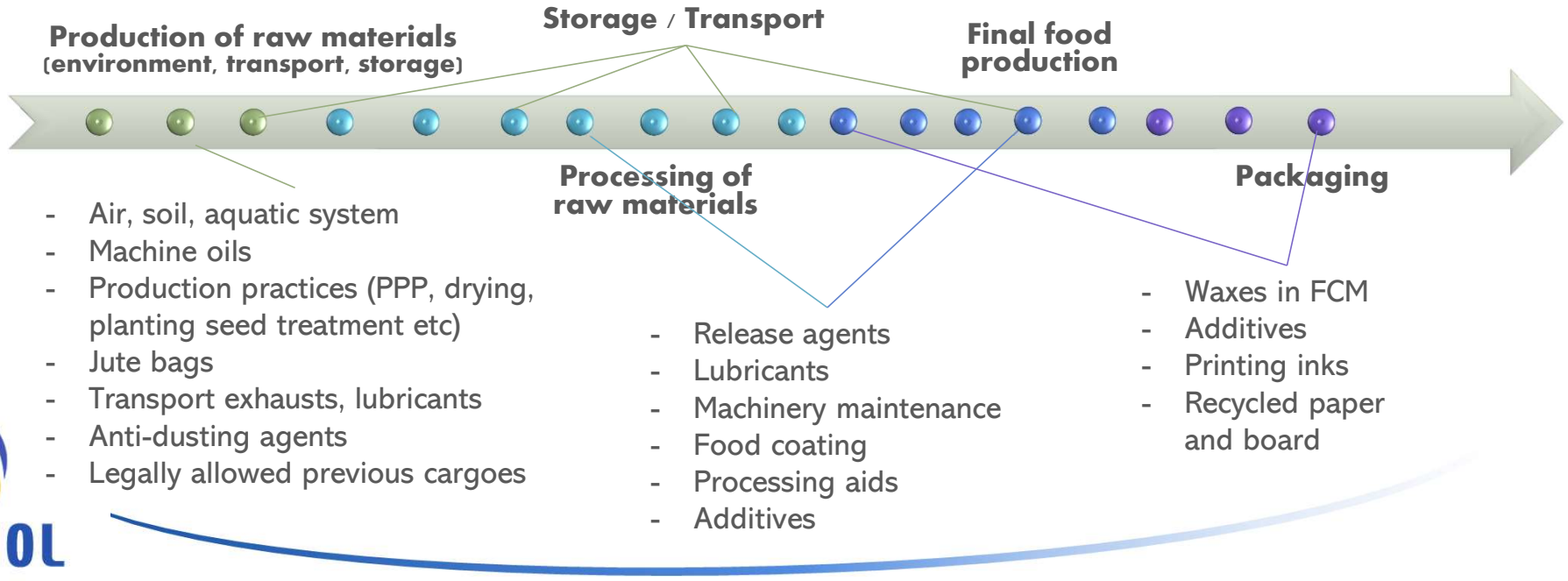
Mineral oil hydrocarbons contamination in food

- Mineral oil hydrocarbon contamination can happen **throughout** the food supply chain

Issue to be managed by the whole food industry



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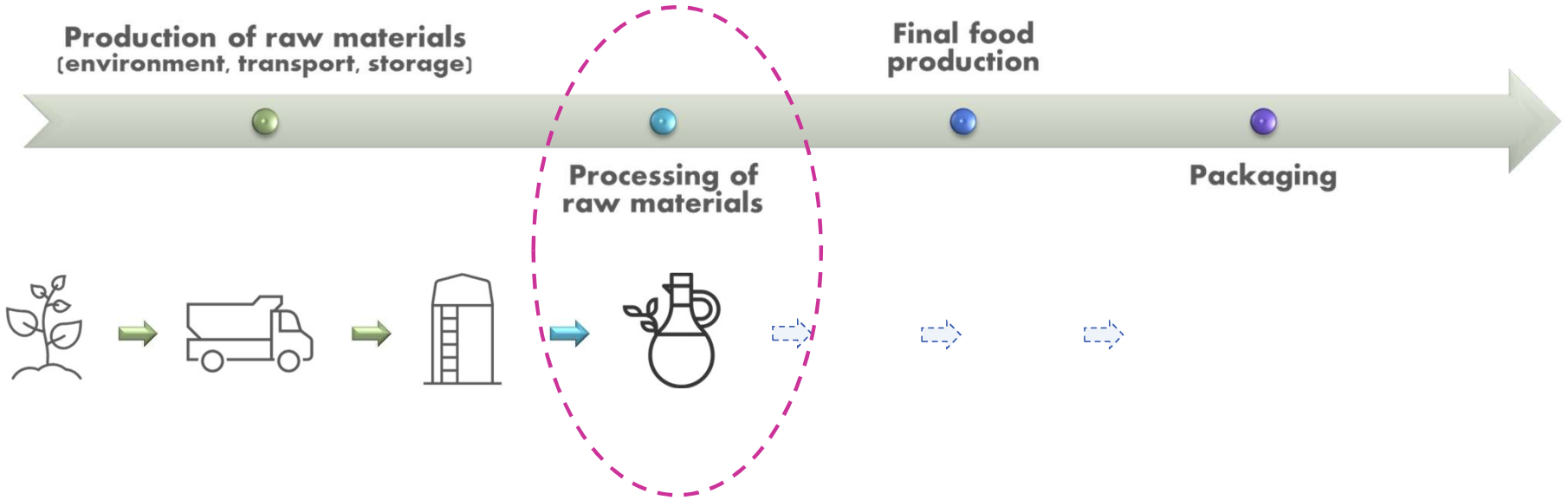
Mineral oil hydrocarbons contamination in vegetables oils



- Vegetable oil and fat sector: **complex issue**, with **multiple potential sources** of contamination;
- **Multiple actions** have been taken already for a long time (**FEDIOL Code of Practice;** see annex), but **challenges still remain** (next slides).

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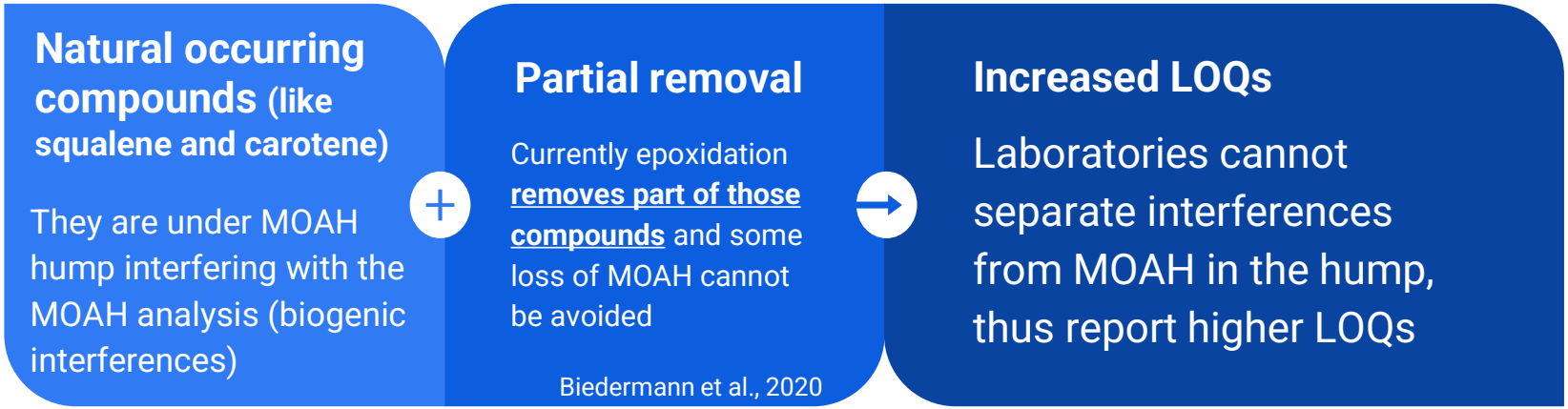
Analytical challenges remain (1/2)

- Analytical uncertainties: **poor reproducibility** due to different LOQs, clean-up steps and integration methods
- Certain oils remain **challenging matrices:**



- Drying practices of certain commodities: formation of certain compounds (PAHs) that fall under the MOAH hump >> **unclear what is under the MOAH hump**.

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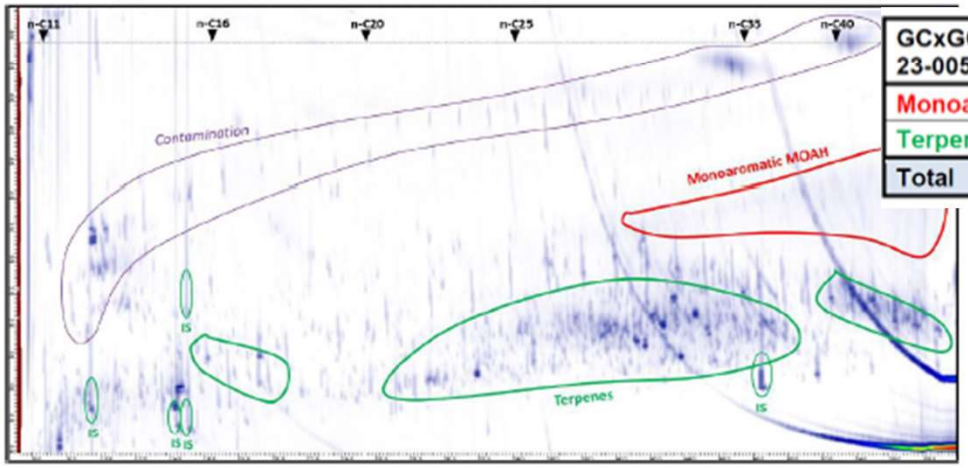
Analytical challenges remain (2/2)

- GCxGC analysis is **available in very limited number of commercial laboratories**
- Until there is a validated method for GCxGC analysis, **these results cannot be used to assess the presence of potential interferences and to show compliance with future MLs**
  - Matrix interferences observed for Palm Olein (~50% component in OM 732 and OM 146)
  - Challenge to determine true value of MOAH

Example

Lab	MOAH (ppm)	MOSH (ppm)	Comment
Lab 1 (LCxGC-FID)	1.6	14	
Lab 2 (LCxGC-FID)	2.4	12.8	
Lab 2 (**GCxGC**-FID)	0.3 (Monochromatic MOAH)	-	Terpenes – 1.31ppm



GCxGC-FID 23-00534 [mg/kg]	C11-C45	C11-C16	C16-C25	C25-C35	C35-C45
Monoaromatic MOAH	**0.30**	<0.10	<0.10	0.10	0.20
Terpenes	**1.31**	<0.10	0.19	0.80	0.32
Total	**1.61**	<0.10	0.19	0.90	0.52

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Are all commodities the same?

- EFSA updated opinion, including > 2,000 FEDIOL data: **differences between commodities**
- **Undertaken actions have tackled the issue for many commodities** (EFSA, 2023; BfR statement*), which can reach 2 mg/kg MOAH. However, **for other, this is still an issue**.
- Two groups
  - **Group 1:** Sunflower, rapeseed, soybean, maize, linseed: majority can reach 2 mg/kg
  - **Group 2:** Others, such as coconut, palm, palm kernel, groundnut, shea, grapeseed: sizable volumes will not reach 2 mg/kg at the moment
- There are other commodities, such as specialty or nut oils with **scattered information** not allowing an assessment of compliance. The same goes for fractionated products, such as different palm fractions.
- **Similar differences** are also observed in **MOSH levels**

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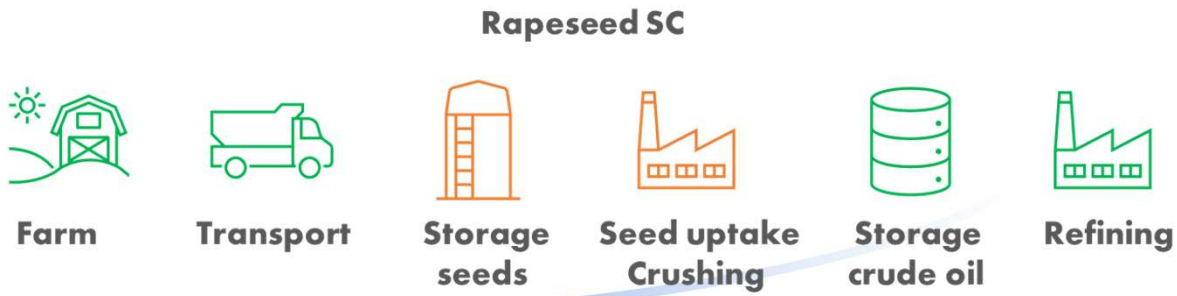
https://www.bfr.bund.de/cm/349/new-efsa-risk-assessment-some-mineral-oil-residues-in-food-remain-a-health-concern.pdf

Are all commodities the same?

Differences in these levels relate to the differences in the complexity of certain supply chains and the challenges emerging from that

Simplified examples

Many different smallholders, various intermediates collecting and transferring coconut/copra to drying/mills



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Challenges related to supply chains

Tropical oils

- **Lack of awareness on the health risks** and the need to change the practices to reduce MOAH contamination
  - Lack of knowledge on potential risks of MOAH, different level of awareness / understanding on the risks associated with MOAH contamination
  - Difficulty to contact stakeholders with the needed background
- **Difficult to change current practices** - time, engagement across the supply chain and investments are required for the change to best practices
- **Lack of capacity and testing know-how** in some producing countries

Other commodities

- **More investigation** on the sources is needed

Support mitigation in different supply chains

Engagement of the public authorities is needed to accelerate the progress in third countries and support mitigation through policy within EU

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Mitigation: What is possible?

- **Refining process can reduce MOH but to a limited extent** when crude oil is contaminated with MOH
  - Deodorisation process reduces the shorter molecules (complete removal or C10-C24 / partial removal for C25-C35)
  - Removal of 3- or more ring MOAH during refining of coconut oil based on recent studies (Bauwens et al. 2023)[1] but more research is needed
- **Prevent the initial contamination** is a crucial step for low MOH levels (challenge in very fragmented supply chains)
- Contamination needs to be **avoided / reduced throughout the supply chain**

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[1] Bauwens et al., Investigation of the effect of refining on the presence of targeted mineral oil aromatic hydrocarbons in coconut oil (2022). doi: 10.1080/19440049.2022.2164621 Available here

FEDIOL view on the proposal

- The **proposal for MOAH should consider**:
  - **EFSA conclusions** and **analytical uncertainties** (how to tackle samples with **interferences**, lack of **validated methods for GCxGC**, different MOAH toxicity).
  - **The proposed limits are NOT feasible for all oils**; proposal should take care of special cases, allowing higher MLs and appropriate time for adjustment.
  - **Blends of vegetable oils**, need to be treated separately.
  - Limits should be based on a set value and not on the limit of quantification (LOQ) – Apply ALARA principle
- Currently the two options do not seem to meet the sector's needs as it is unclear how they will work in practice and how they differ.
- Mitigation measures and required changes need to be initiated and put in place in third countries >> **high uncertainty when anticipating the time needed for these implementations**.

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FEDIOL views on the proposal

- **Measurement uncertainty** to be considered based on high analytical uncertainty. At least 50% - MU of the lab to be considered.
- Uncertainty on actions when **different results are provided on the same sample**.
- **A formal transition period** should be granted.
- A **written consultation on the final draft** is necessary, to allow sufficient time to stakeholders to comment.
- **To ensure maximum consumer safety, all sources should be considered,** thus levels to **be set on food placed on the market for the final consumer (bottled oils for our sector)**.

- Monitoring and indicative levels **for MOSH**
  - **Unclear how** the proposed **indicative levels were derived**
  - **If there is a need for indicatives levels, they should be based on** EFSA conclusions and data: current proposal is not in line
  - **Not all oils can reach the same limit**

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FEDIOL approach to tackle the MOH issue

- FEDIOL **reaffirms its commitment to continue tackling the MOH contamination** and to **support further EU discussions on the way forward**
- **Continue regular monitoring, yearly data collection** and **data sharing with EFSA** for **both MOSH and MOAH**
- Continue engagement and support of **analytical developments**
  - Investigate methods for MOAH hump characterisation and data collection when feasible do to so using reliable methods > support further EFSA risk assessment
  - Harmonisation of current analytical developments, especially to tackle biogenic interferences
- Work with third countries for **raising awareness** to **address the contamination across the supply chain**

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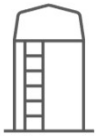
Annex

FEDIOL achievements and contributions

- Potential **entry points** identified (since 2008)
  - Complex and multiple sources
- Developed best practices to **prevent MOH contamination** in vegetable oil and fat crushing and refining plants **and** in their supply chains
  - **FEDIOL code of practice**: 1st in 2008, last updated in 2018[1]
  - **FEDIOL acceptable list of previous cargoes** and definition of foodstuff (2017)[2]
- **Engagement and collaboration** with a large number of stakeholders, incl. raw material producers and manufacturers of mineral oil-based products: Presence of MOH should be avoided from the start of the food chain
- Efforts to **engage with producing countries** of certain commodities to raise awareness of the MOH contamination at their stage



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[1] FEDIOL code of practice for the management of mineral oil hydrocarbons presence in vegetable oils and fats intended for food uses (2018). Available here; [2] FEDIOL list of acceptable foodstuff (2017) Available here

FEDIOL code of practice

- Prevention of MOH contamination in vegetable oil and fat crushing and refining plants
- HACCP plants include points of contamination and procedures are in place to keep risk under control
- Lubricants and special fluids (absorption oils, thermal heating fluids…) as possible contributors to the MOH contamination >> special attention is therefore paid to these products, especially from a MOAH perspective
  - Prevent/minimise leakage/contact
  - Only food grade lubricants are used
  - Hexane recovery system: control measures are implemented to minimize transfer in the crude vegetable oils
  - Steam is used in processing installations, as fluids used in indirect heating systems may incidentally contaminate vegetable oils
- Control possible sources in supply chains
  - FEDIOL CoP for the transport in bulk of oils (14COD152) into or within the EU
  - FEDIOL acceptable list of previous cargoes and definition of foodstuff
  - Understanding of mitigation from packaging materials to take appropriate measures
  - Monitoring commodities where white mineral oils are used as anti-dusting agents

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[1] FEDIOL code of practice for the management of mineral oil hydrocarbons presence in vegetable oils and fats intended for food uses (2018). Available here; [2] FEDIOL list of acceptable foodstuff (2017) Available here

FEDIOL achievements and contributions

- FEDIOL **supported risk assessment**: has been providing data on MOH to EFSA since 2020

- Contribution to **development of improved analytical methods** for vegetable oils and fats (CEN and ISO)
  - FEDIOL analytical and reporting recommendations (2019) for the analysis of MOH in vegetable oils and fats [3]
  - FEDIOL members participation in proficiency tests and inter-lab tests
  - FEDIOL supporting harmonisation: FEDIOL statement on the JRC guidance on MOH (2019)[4] and observations on reliability and reporting (2021)[5]

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[3] FEDIOL recommendations on the analytical methods to be used for the analysis of mineral oil hydrocarbons in vegetable oils and fats and as regards reporting of the results for such analyses (2019). Available here; [4] FEDIOL statement on JRC guidance on sampling, analysis and data reporting for the monitoring of mineral oil hydrocarbons in food and food contact materials (2019) Available here; [5] FEDIOL observations on Analyses of mineral oil hydrocarbons in vegetable oils and fats Reliability and reporting (2021) Available here

FEDIOL experience with analytical challenges

01	**Lack of harmonised reporting of results** by laboratories	• Different LOQs and clean up steps used by laboratories • GCxGC is used by some to separate interferences but not always / method is not validated • Different ways to integrated total hump
02	**Guidance of how to integrate** MOAH hump only since June 2022	• Wide range of ways to integrate the hump among different laboratories (JRC 2022)[6] • Variability of results due to the integration of chromatograms (JRC 2022)[6] • Same sample, different result by different labs
03	Current **lack of reproducibility** between results at low MOAH levels	• International Proficiency test: deviations in results for low MOAH concentrations samples improving, but still challenging[7] • Reproducibility of MOAH results at low concentrations remains uncertain based on FEDIOL's members experience

Important note: Time for MOH analysis can take long in EU laboratories and this time is expected to increase with the implementation of the regulation.

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[6] JRC technical report: Mineral oil in infant formulas - guidelines for integrating chromatograms (2022) Available here; [7] (multiple references) https://publications.jrc.ec.europa.eu/repository/handle/JRC133284; 28th DGF (Germany Society for Fat Science) Proficiency Test on Fat Analysis 2022; DRRR (German reference office for proficiency testing and reference materials) 2022 proficiency test

Methods for MOAH hump characterisation and separation of interferences

- Additional methods that allow the MOAH **hump characterisation** and the **differentiation of interferences** starts being available in commercial laboratories
- Each laboratory has different analytical equipment allowing:
  - Differentiation of interference and ability to tackle increased LOQs (GCxGC-TOF-MS)
  - Qualification of MOAH based on the number of rings (GCxGC-TOF-MS)
  - Quantification of MOAH based on the number of rings (GCxGC-TOF-MS-FID or GCxGC-FID)
- Not all laboratories can perform these new analysis
- **No official method is available.** Methods are not standardised or validated
- **Time will be needed until these methods can be validated and widely used**
- Until there is a validated method for 2-dimensional GC analysis, these results cannot be considered to prove presence of interferences and compliance with future MLs

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