Improving palm oil quality and oil palm biomass until final product: Case study

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R&D and Innovation Director

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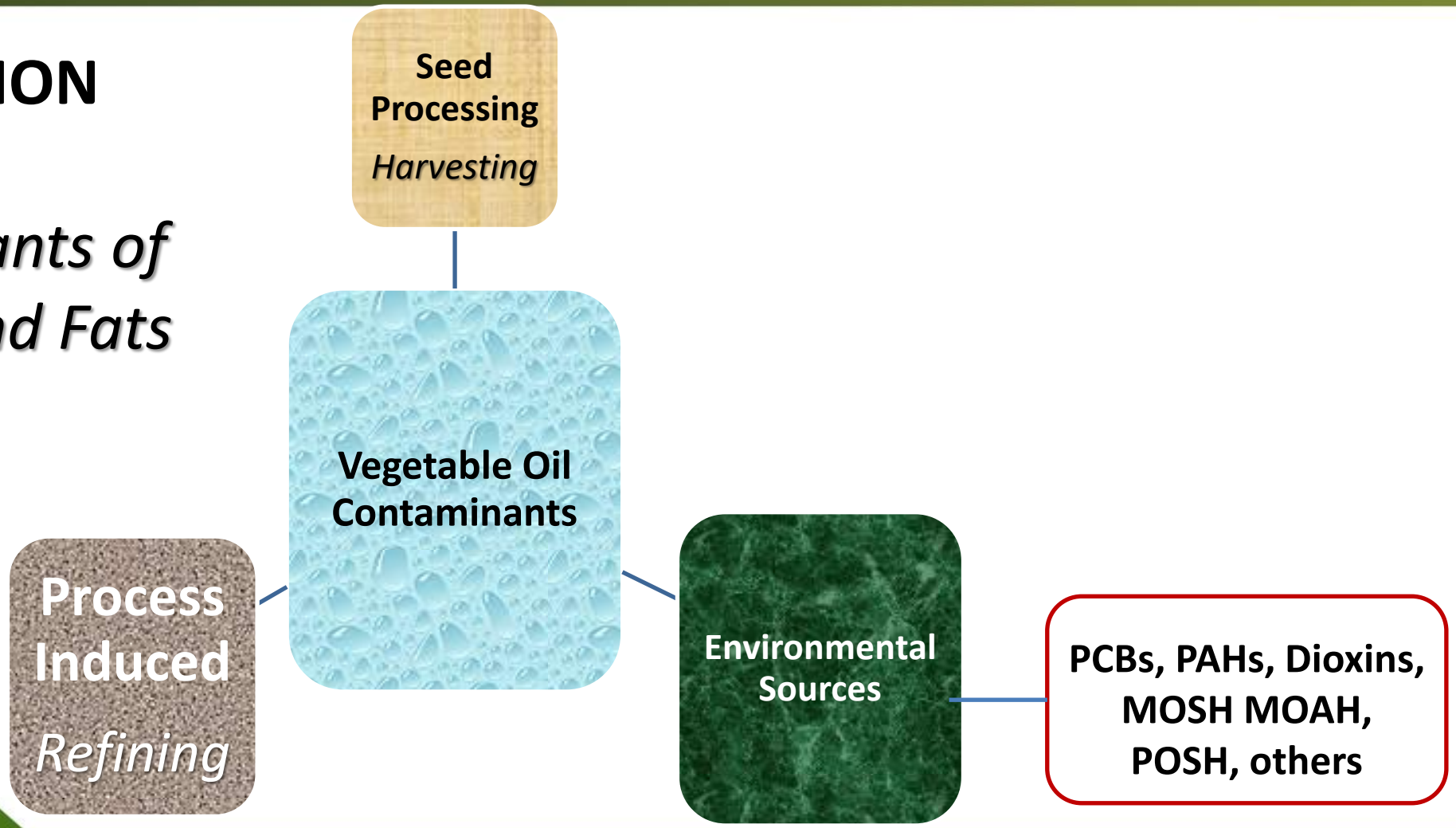
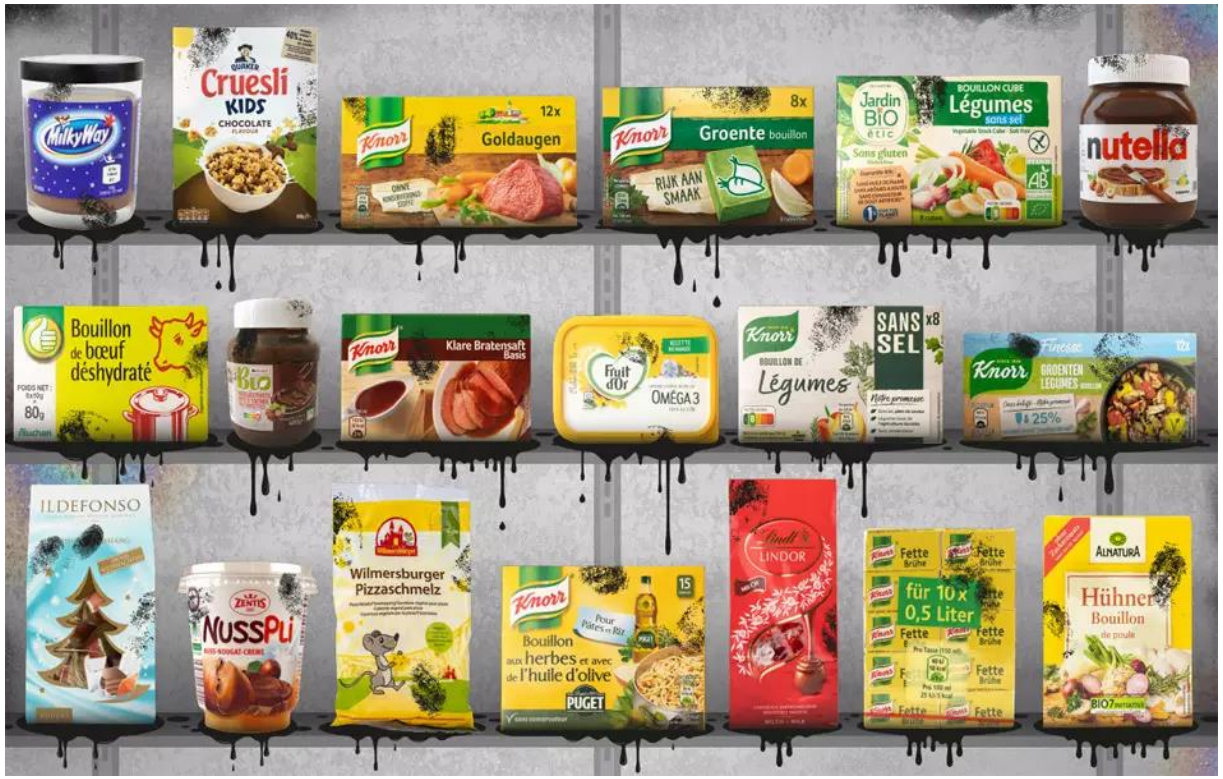
I. INTRODUCTION

Major contaminants of Vegetable Oils and Fats





Pictures: Foodwatch

I. INTRODUCTION – *PROBLEM ASSESSMENT*

I. INTRODUCTION

Risk Assessment

Final packaging and storage

Processing

Transport

Harvesting and storage

Food production and breeding

PRODUCT PATHWAYS

Laboratory Lommatzsch & Säger

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I. INTRODUCTION

A world of opportunities

Overall Goal

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II. IMPROVING QUALITY

R&D sources
New processes
New products

II. IMPROVING QUALITY

German orientation values for mineral oil hydrocarbons in foodstuffs
(Eurofins)

No.	Product group food category	MOSH and analogues [mg/kg] C_{10}-C_{50}	MOAH [mg/kg] C_{10}-C_{50}	Notes on application (notes on the food groups covered / on products not covered and deferrals/ on justifications, database or other special features, if applicable)
1	Vegetable oils (such as rapeseed oil, sunflower oil, linseed oil, olive oil) (except tropical vegetable oil/fats and soya oil)	13	n.d.	these guidance values are not intended to be used for oils and fats derived from tropical plants (e.g. coconut oil) due to insufficient statistical database (Dec 2018)
2	Bread and biscuits, fine bakery products, grain products and cereal-based products, cereals	6	n.d.	only applicable to final products for consumers; not for raw materials or raw dough
3	Confectionery (sugar confectionery other than chewing gum), chocolate and cocoa-based confectionery	9	n.d.	

DIN EN 16995:2017-08

- This Standard specifies a highly efficient method for the determination of saturated and aromatic hydrocarbons (from C10 to C50) in vegetable fats and oils and foodstuff on basis of vegetable oils for which it has been interlaboratory validated.

- The method can be used for the analysis of mineral oil hydrocarbons (MOSH) and/or (MOAH).

III. METHODOLOGY

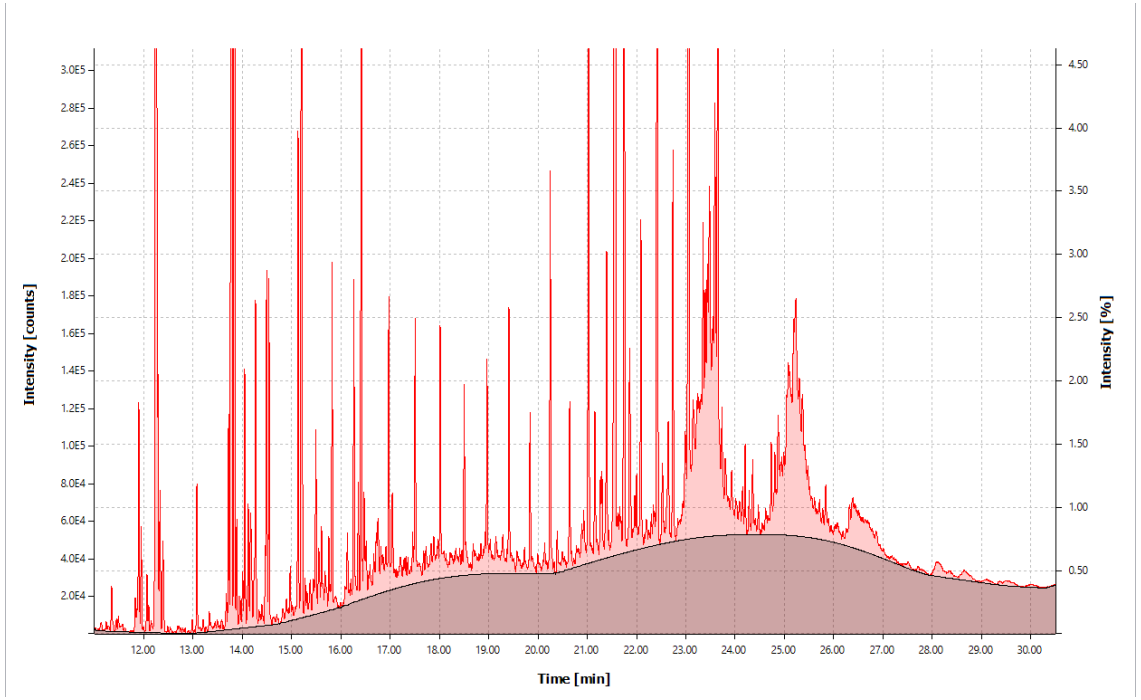
S. Bratinova, E. Hoekstra (Editors), 2019

European Commission

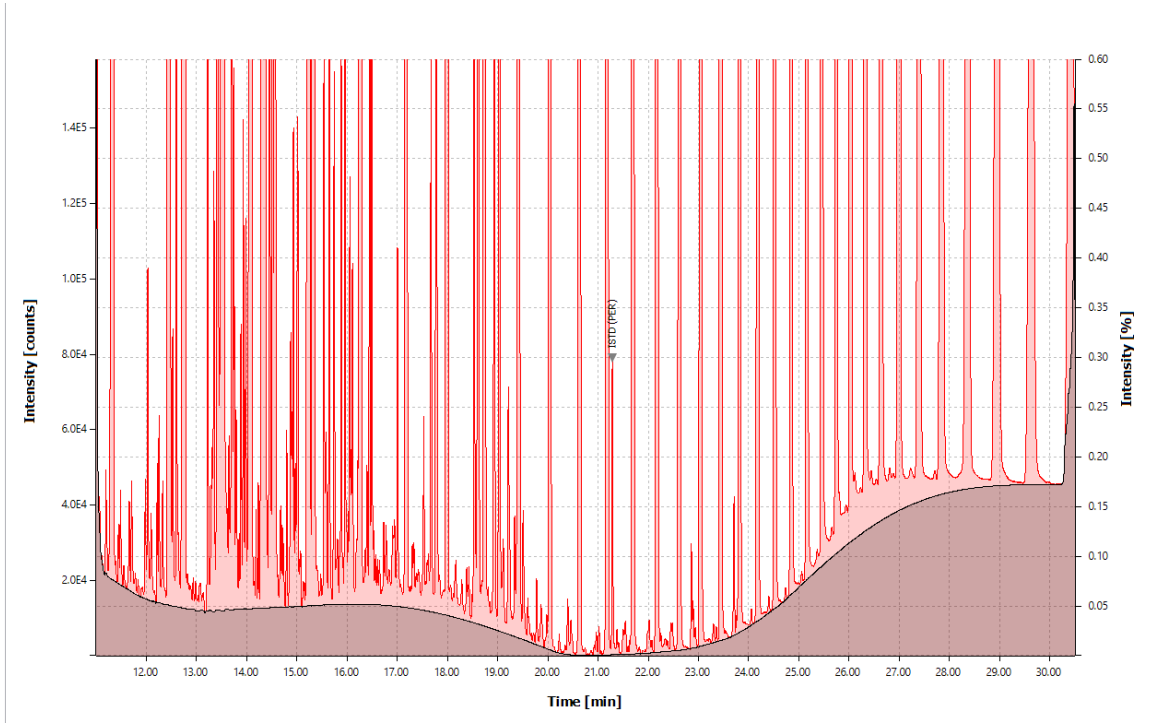
JRC TECHNICAL REPORTS

Guidance on sampling, analysis and data reporting for the monitoring of mineral oil hydrocarbons in food and food contact materials

MOSH of a CPO_1 meeting orientation values < 8 ppm



MOAH of a CPO_1 meeting orientation values < 1 ppm

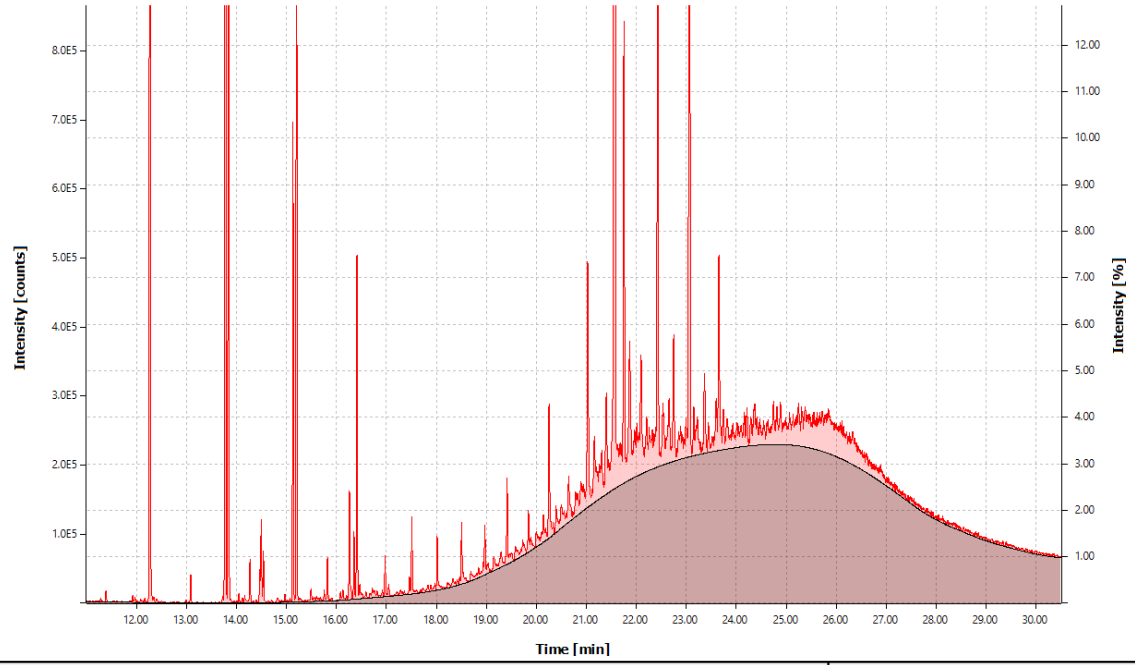


MOSH (ppm)								MOAH (ppm)				
≥C10 - ≤C16	>C16 - ≤C20	>C20 - ≤C25	>C25 - ≤C35	>C35 - ≤C40	>C40 - ≤C50	Total Calculado	Total Integrado	≥C10 - ≤C16	>C16 - ≤C25	>C25 - ≤C35	>C35 - ≤C50	Total Integrado
<1	1,04	1,47	2,93	1,25	0,53	7,22	7,23	<1	<1	<1	<1	<1

IV. Case Study

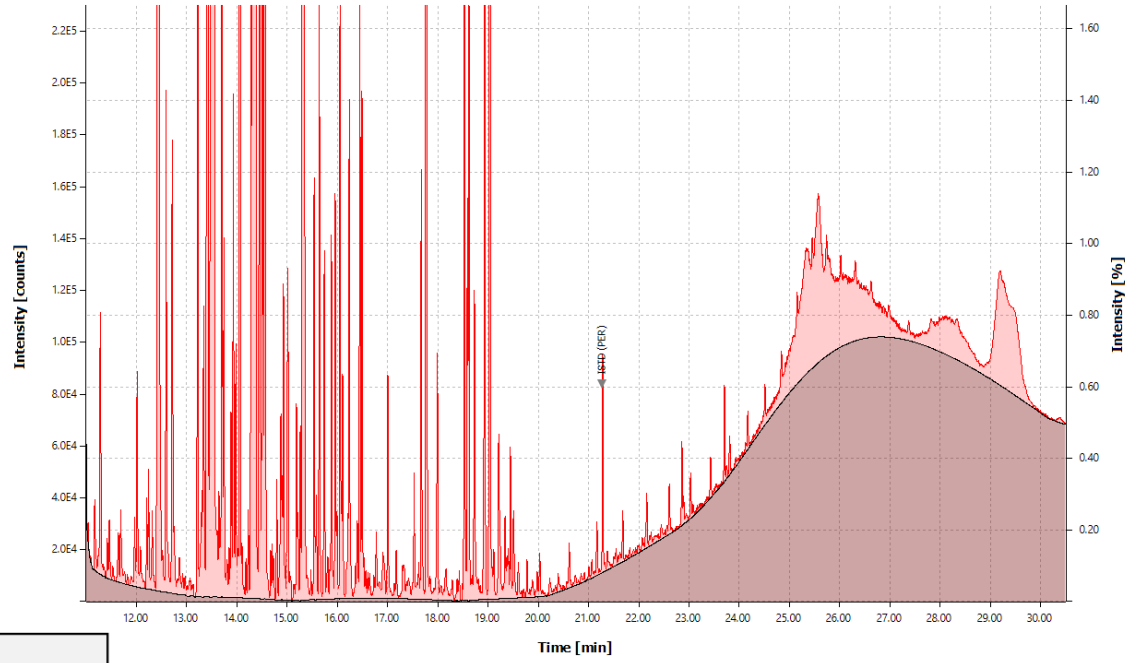
MOSH of a non-compliant CPO_2

< 35 ppm



MOAH of a non-compliant CPO_2

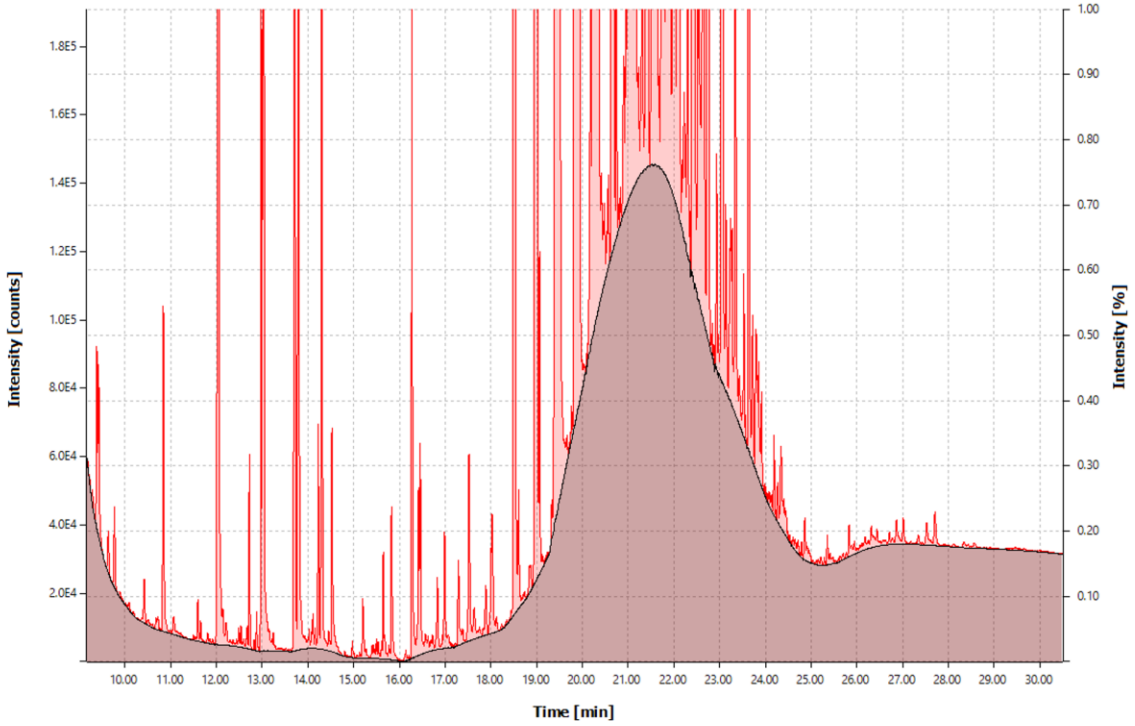
< 7 ppm



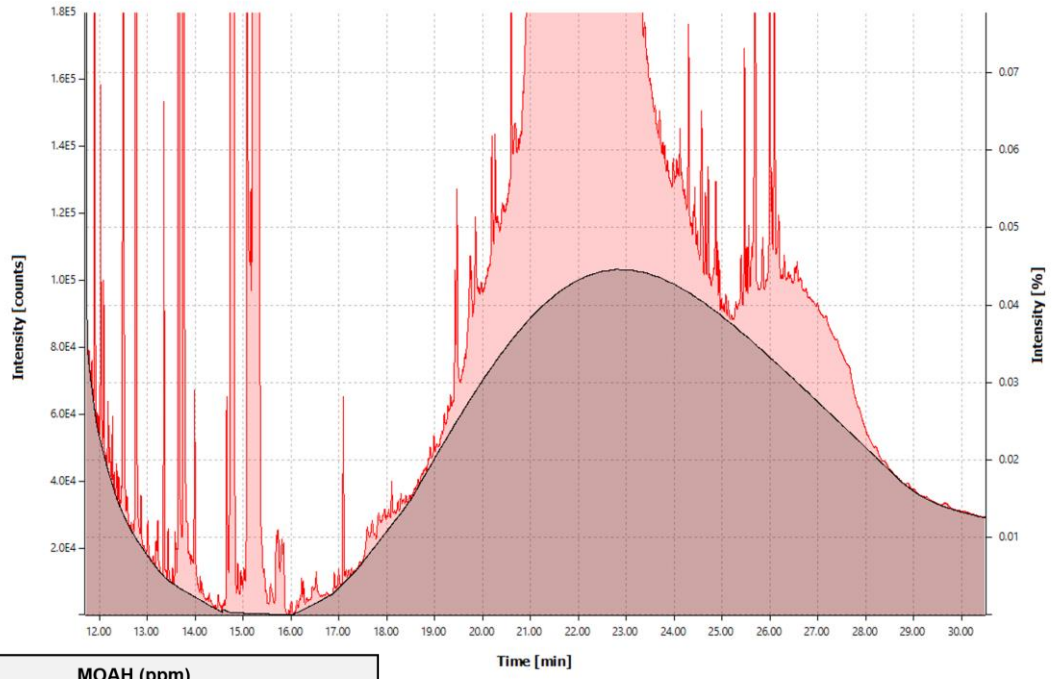
MOSH (ppm)								MOAH (ppm)				
≥C10 - ≤C16	>C16 - ≤C20	>C20 - ≤C25	>C25 - ≤C35	>C35 - ≤C40	>C40 - ≤C50	Total Calculado	Total Integrado	≥C10 - ≤C16	>C16 - ≤C25	>C25 - ≤C35	>C35 - ≤C50	Total Integrado
<1	1,04	1,47	2,93	1,25	0,53	7,22	7,23	<1	<1	<1	<1	<1
<1	<1	2,53	13,53	6,93	11,58	34,57	35,06	<1	<1	1,41	5,12	6,53

IV. Case Study

MOSH of an olive oil_B meeting orientation values < 11 ppm



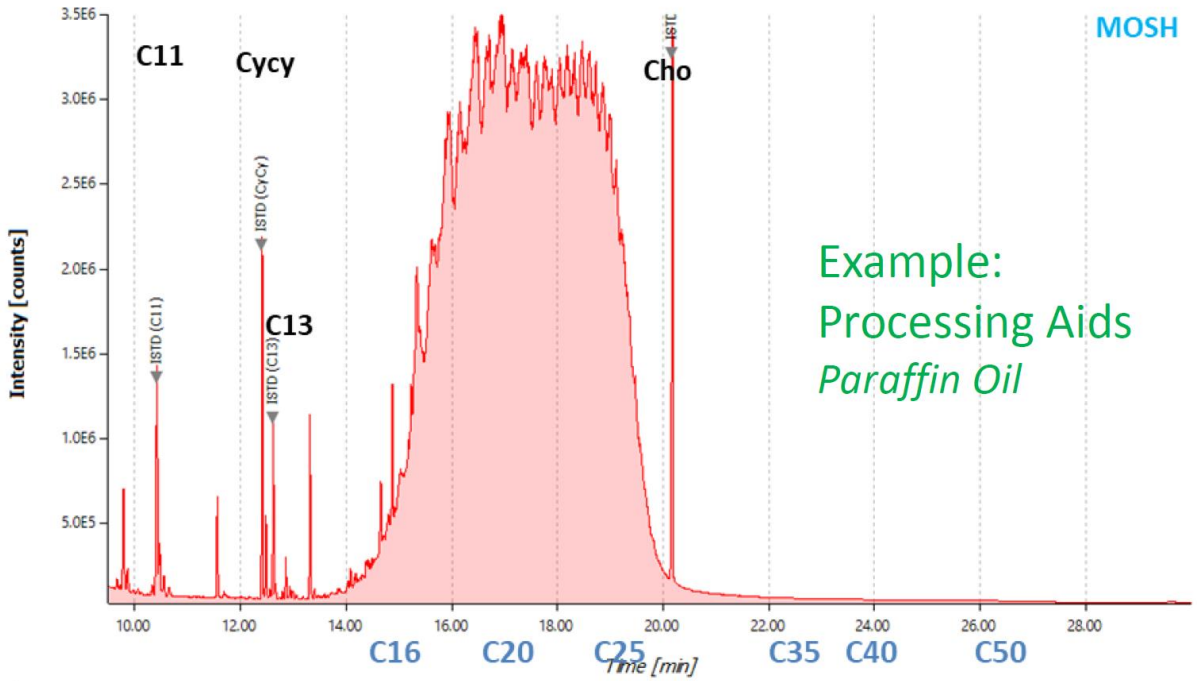
MOAH of a non-compliant olive oil_B < 12 pm



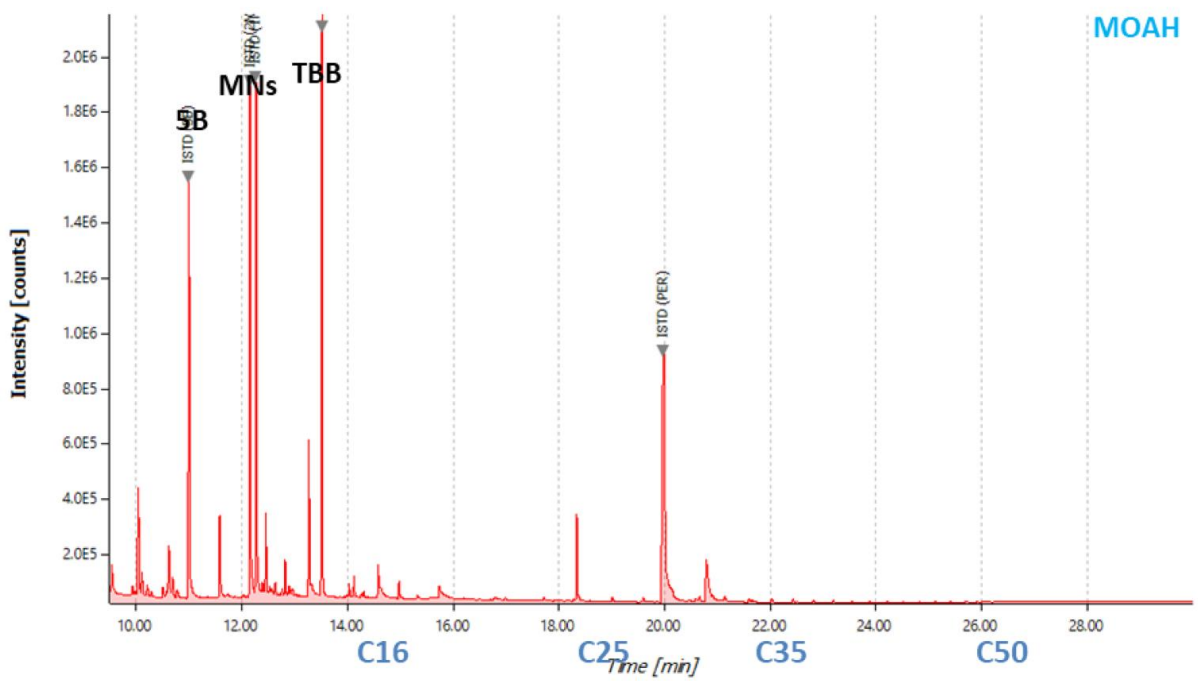
Nombre de la muestra	Contenido MOSH (ppm)	Contenido MOAH (ppm)	MOSH (ppm)								MOAH (ppm)				
			≥C10 - ≤C16	>C16 - ≤C20	>C20 - ≤C25	>C25 - ≤C35	>C35 - ≤C40	>C40 - ≤C50	Total Calculado	Total Integrado	≥C10 - ≤C16	>C16 - ≤C25	>C25 - ≤C35	>C35 - ≤C50	Total Integrado
A – Triglyceride mixture	11	11	<1	<1	2,09	9,45	1,15	<1	12,69	12,97	<1	2,38	8,41	<1	10,79
B – Olive Oil	11	11	<1	<1	1,64	8,04	<1	<1	9,68	10,82	<1	2,80	5,84	3,66	12,31

IV. Case Study

The presence of processing aids coming from packaging

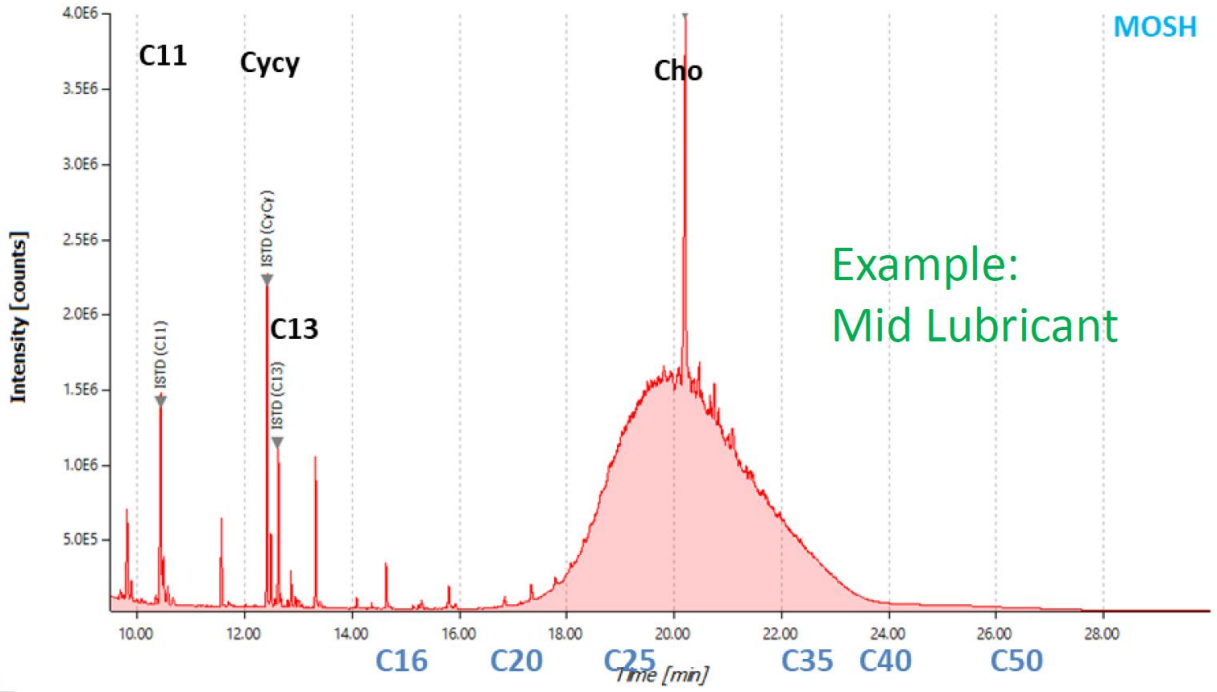


Example:
Processing Aids
Paraffin Oil

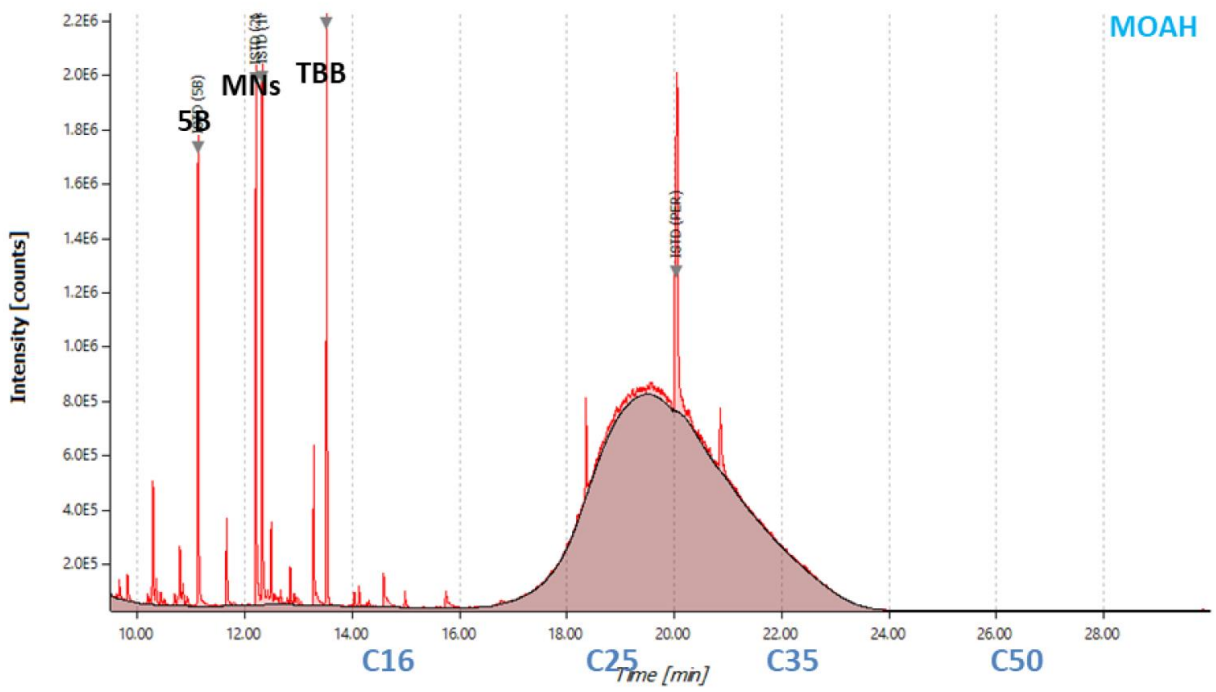


IV. Case Study

The presence of lubricanting oils

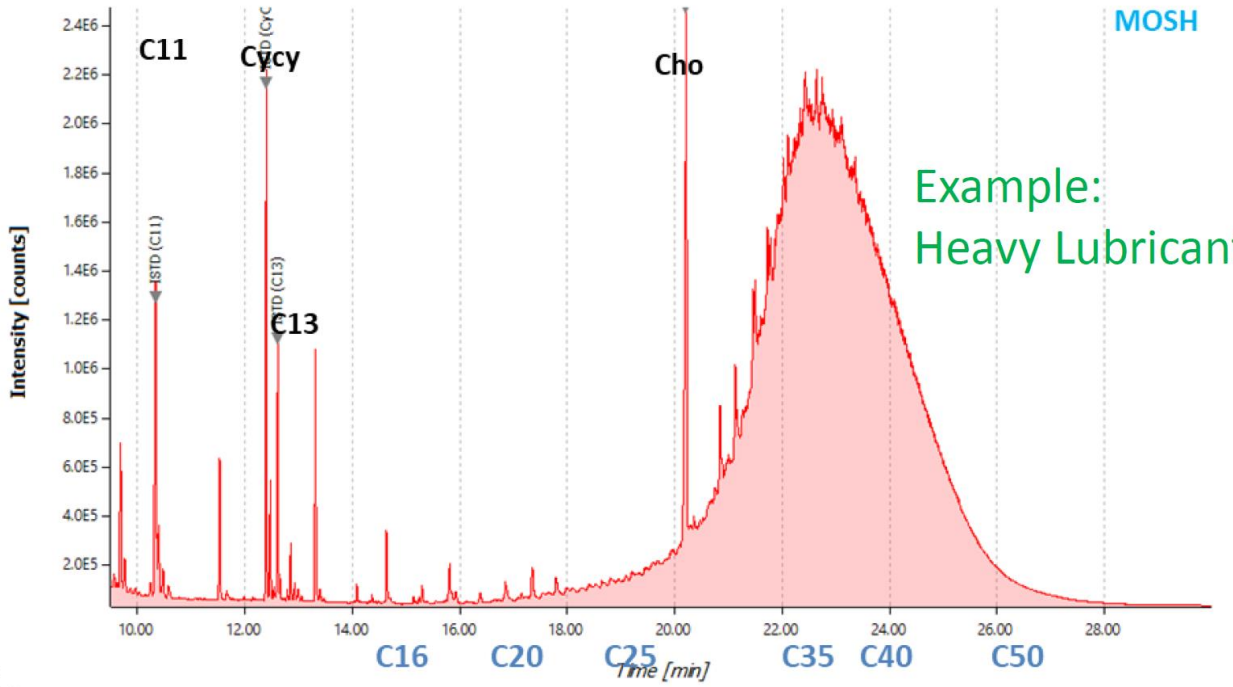


Example:
Mid Lubricant

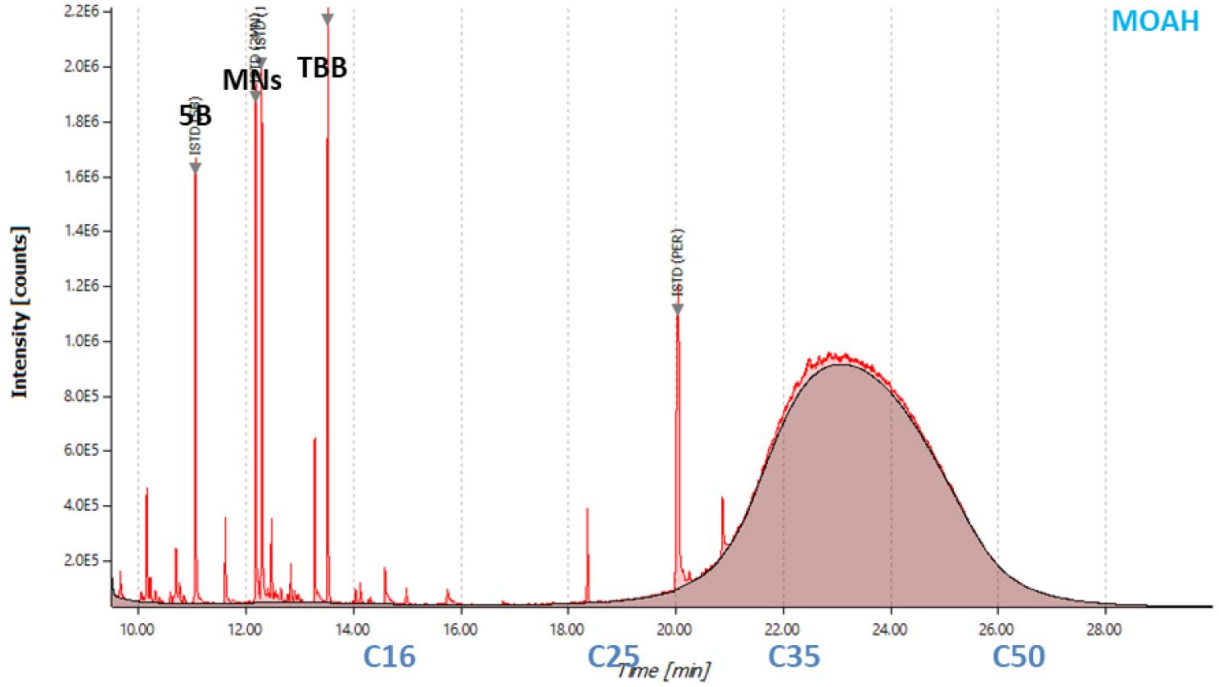


IV. Case Study

The presence of lubricanting oils



Example:
Heavy Lubricant



IV. Case Study

V. Conclusions

- ✓ *Efficient data monitoring, processing and reporting of MOSH and MOAH is useful for the reliable risk assessment of contaminants in oils and fats.*
- ✓ *The possibility of analyzing CPOs for monitoring the presence of MOSH and MOAH in the process (i.e. oil palm mills) is an opportunity to improve procedures and product quality.*
- ✓ *High values of MOSH and/or MOAH in foods are also related to the incidental presence of lubricating oils, whether hydrocarbon based or not.*

VI. REFERENCES

- *Aromatic hydrocarbons of mineral oil origin in foods: Method for determining the total concentration and first results; M. Biedermann, K. Fiselier und K. Grob; J. Agric. Food Chem. 57 (2009)*

- *On-line coupled high performance liquid chromatography – gas chromatography (HPLC-GC) for the analysis of mineral oil; Part 1: method of analysis in foods, environmental samples and other matrices. A review; K. Grob & M. Biedermann; J. of Chromatography A 1255 (2012)*

- *Determination of mineral oil aromatic hydrocarbons in edible oils and fats by online liquid chromatography–gas chromatography–flame ionization detection – Evaluation of automated removal strategies for biogenic olefins; M. Nestola & T. Schmidt; J. of Chromatography A 1505 (2017)*

PKS

MC

PKE

EFB

¿ What's Next ?

Oil Palm Biomass

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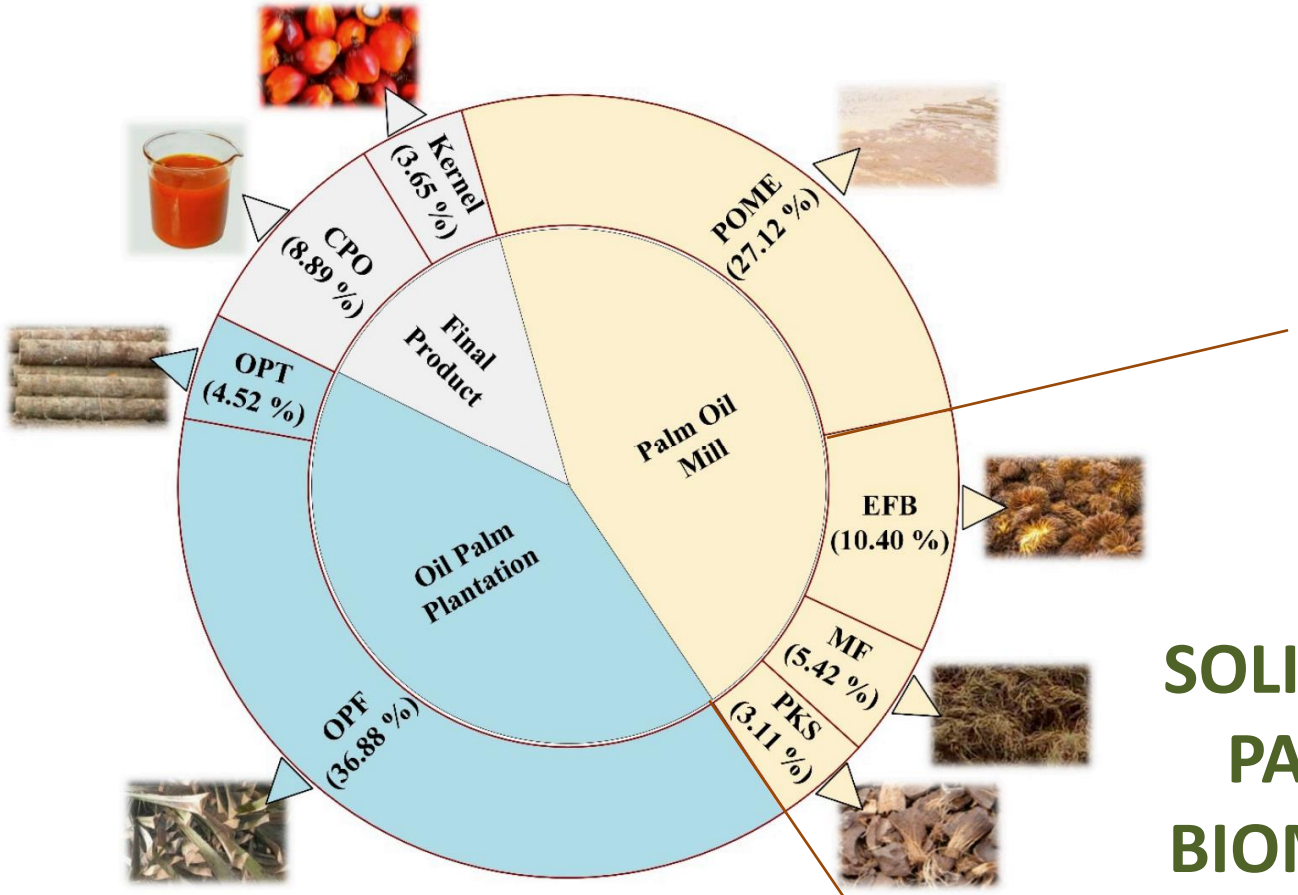
IMPROVING QUALITY

R&D sources
New processes
New products



SOLID OIL PALM BIOMASS

Picture: Sustainability 2020, 12, 8081

Sustainable Oil Palm Biorefinery Tequendama

IMPROVING QUALITY

Orientation standards for solid biomass

Determination of total content of carbon, hydrogen and nitrogen
UNE-EN ISO 16948:2015

Determination of total content of sulfur and chlorine
UNE-EN ISO 16994:2017

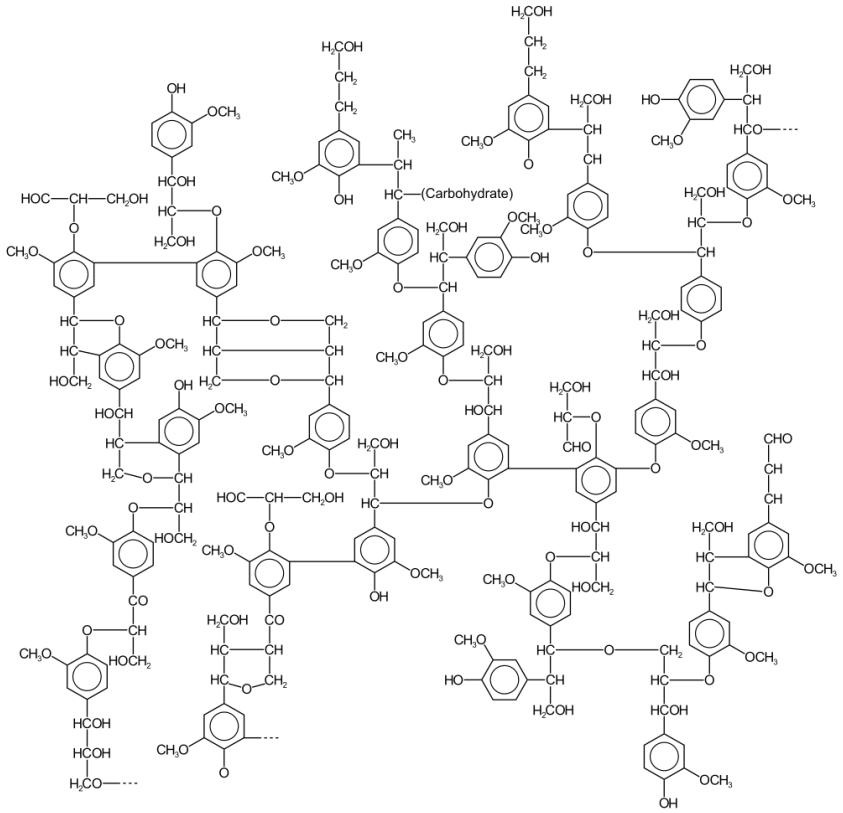
Determination of the content of volatile matter
UNE-EN ISO 18123:2016

Determination of minor elements
UNE-EN ISO 16968:2015

Determination of major elements - Al, Ca, Fe, Mg, P, K, Si, Na and Ti
UNE-EN ISO 16967:2015

Determination of the water soluble chloride, sodium and potassium content
UNE-EN ISO 16995:2015

Chemical Composition of Biomass



IMPROVING QUALITY

Orientation standards for solid biomass

Moisture content
UNE-EN ISO 18134-1:2016
UNE-EN ISO 18134-2:2017

Length and diameter of pellets
UNE-EN ISO 17829:2016

Mechanical durability
UNE-EN ISO 17831-1:2016

Bulk density
UNE-EN ISO 17828:2016

Particle density
UNE-EN ISO 18847:2017

Ash content
UNE-EN ISO 18122:2016

Calorific Value
UNE-EN ISO 18125:2018

Self-heating
UNE-EN ISO 20049-1:2021

Fines
UNE-EN ISO 18846:2017

Particle size distribution for uncompressed fuels
UNE-EN ISO 17827-2:2016

Particle size distribution of disintegrated pellets
UNE-EN ISO 17830:2016

Test sieves
ISO 3310-1
ISO 3310-2

Physical and Thermal Properties of Biomass

VII. ACKNOWLEDGEMENTS

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Chem. Eng. Luis Caicedo

Manuel Julián Dávila (CEO)

XX Conferencia Internacional sobre PALMA DE ACEITE

EL PODER TRANSFORMADOR DE LA PALMA DE ACEITE

Gracias

Thank you

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