

TEA & HERBAL INFUSIONS EUROPE



MOSH/MOAH in tea, herbal and fruit infusions – insights by THIE

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Virtual stakeholder forum on mineral oil hydrocarbons in food



THIE - Tea and Herbal Infusions Europe

European Tea Committee (ETC)

European Herbal Infusions Association (EHIA)

Tea and Herbal Infusions Europe (THIE)

- THIE is the European association representing the interests of producers and traders of tea (*Camellia sinensis*) and herbal and fruit infusions (HFI) as well as extracts thereof
- Founded as successor of ETC & EHIA with a long history of more than 60 years
- Members in 14 countries
- Aim: to ensure there is an appropriate and sustainable legal framework for tea and herbal infusions to offer safe products
- Quality assurance is considered a very high priority
- Internal Databases: 5 for tea and 5 for herbal and fruit infusions

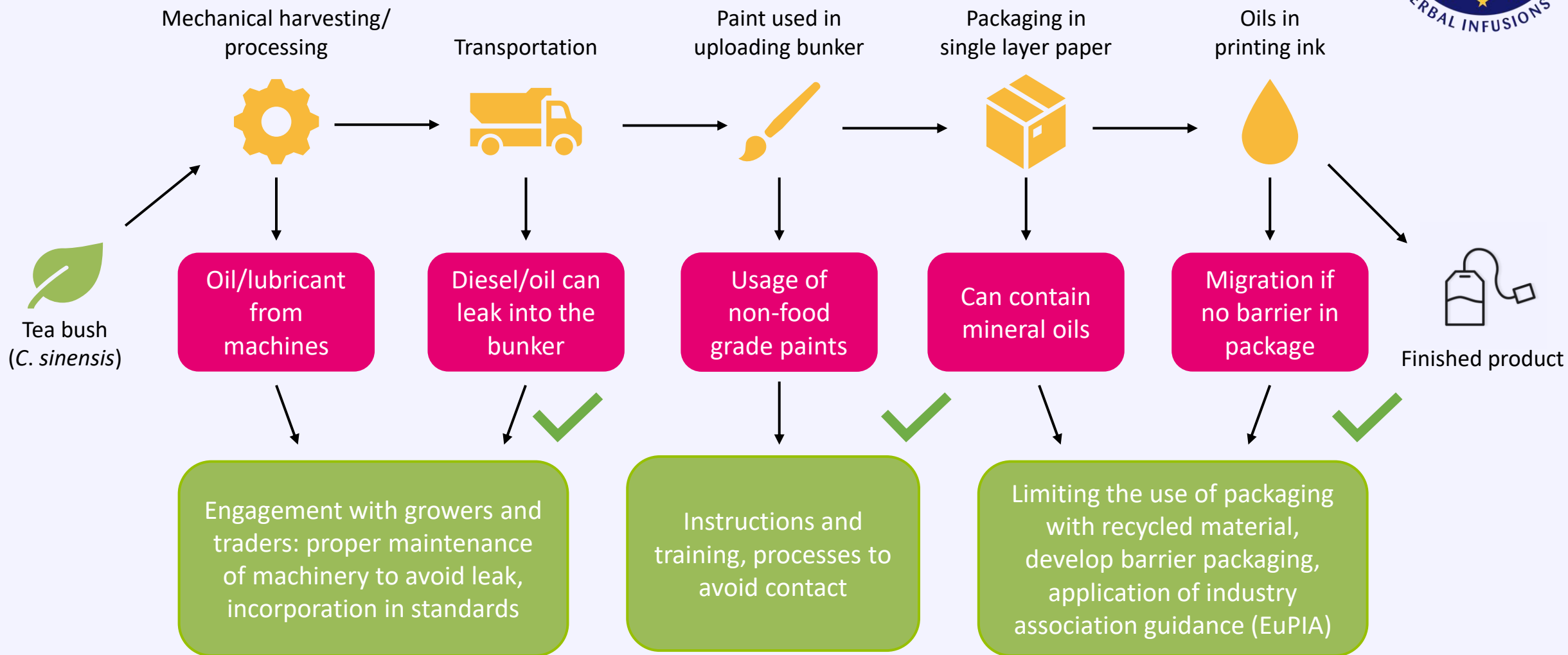


How do MOHs get into our products?

- Wide variety of different raw materials
 - Over 400 different parts of plants (cf. [THIE Inventory List](#))
 - Many of them are naturally high in essential oils
- Most raw materials come from developing countries
- A large number of different processing steps
- Not one specific entry of MOH in tea (*Camellia sinensis*) and HFI products
 - **Sum of different entry routes**



Possible entry routes for tea – from bush to cup



Difficulties of MOH analysis in tea and HFI

- A very inhomogeneous group due to the great diversity of the products
- No standardized methods or proficiency tests available for tea and herbs

Table II Performance requirements for MOSH and MOAH analysis: maximum LOQ for each C-fraction (LOQ-max), target LOQ for each C-fraction (LOQ-t), acceptable ranges for recovery (R_{rec}) of mineral oil from samples, and intermediate precision

Categories	Associated foods #	LOQ - max [mg/kg]	LOQ - t [mg/kg]	R_{rec} [%]	intermediate precision [%]
Dry, low-fat content (< 4% fat/oil)	bread and rolls; breakfast cereals; grains for human consumption; pasta, products derived from cereals	0.5	0.1	80 - 110	15
Higher fat/oil content (> 4% fat/oil)	fine bakery ware; confectionery (incl. chocolate) and cocoa; fish meat, fish products (canned fish); oilseeds; pulses; sausages; tree nuts	1	0.2	70 - 120	20
Fat/oils	animal fat (e.g. butter); vegetable oils	2	0.5	70 - 120	20
Paper and Board	Reporting only up to C ₃₅ (extraction optimised up to C ₃₅)	10	5	80 - 110	10

In some cases, a shift to another category may be necessary due to different fat content. This has to be stated and justified for each case.

- LOQs of JRC method refer only to fat content
 - Matrix based interferences are not included
 - Even the JRC is considering possible adjustments for difficult matrices
- Problematic: herbs with essential oils
 - Laboratories usually raise the LOQ for certain herbs (up to 5 mg/kg)
- A required LOQ of 0.5 mg/kg would mean that the legal assessment would not be conclusive in some cases → Higher LOQ of tea and HFI is needed



EFSA's risk assessment; comments by THIE

- In 2023 THIE participated in EFSA's stakeholder consultation to comment on the draft risk assessment of MOH in food → **tea is incorrectly listed as a main contributor**

THIE comments in a nutshell

- The application of a dilution factor to be able to conclude from the dry product to the ready to drink beverage is not suitable
 - Hardly occurring transfer of MOSH/MOAH into brew
- Grouping as „coffee, cocoa, tea and infusions“ according to FoodEx2 Level 1 is surprising
- The number of samples for tea and herbal infusions are very small and do not allow reliable conclusions to be drawn

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Comments by the Tea and Herbal Infusion Industry on EFSA's Draft Scientific Opinion on the update of the risk assessment of mineral oil hydrocarbons in food

THIE as the representative of the European tea and herbal infusions industry has carefully reviewed EFSA's Draft Scientific Opinion on the update of the risk assessment of mineral oil hydrocarbons in food. THIE would like to take the opportunity of the stakeholder consultation to comment on some aspects of the Draft Scientific Opinion that will lead to a significant improvement of the assessment basis for EFSA with regard to the products tea and herbal infusions. Regarding aspects of analytics and toxicology, we refer to the comments of FoodDrinkEurope, which we fully support.

Our comments in a nutshell:

- The grouping of lipophilic and lipophobic food matrices into the "coffee, cocoa, tea and infusions" group is unsuitable, especially in the case of MOSH/MOAH, as it does not allow a differentiated consideration of the exposure contribution despite completely different contents of MOSH/MOAH in the individual product groups. An erroneous conclusion is the result.
- The number of samples for tea and herbal infusions considered by EFSA are very small and do not allow reliable conclusions to be drawn for these products.
- The application of a dilution factor in order to be able to conclude from the dry product to the ready to drink beverage is not acceptable from a scientific point of view due to the hardly

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Comment by
CONTAM panel

No specific studies were found in the literature on the transfer of MOAH/MOSH during tea brewing. Therefore, although it is acknowledged that a complete transfer of MOSH and MOAH in the infusion is not expected, a 100% transfer was assumed in the absence of specific data.

Need to close the knowledge gap through transfer studies conducted by the sector



Transfer study of MOH to the infusion by UKTIA*

* UK Tea and Infusions Association

- **Phase 1: determine typical levels of mineral oils in tea & HFI**
- Phase 2: confirm minimal/or no transfer of MOH into the infusion

Summary of phase 1

- 33 samples were tested (17 teas and 16 HFI)
 - Results were compared against the maximum LOQ of 0.5 mg/kg for dry foods with low fat
- For tea:
- MOAH with 41% (7/17) samples exceeding 0.5mg/kg (Range: 2.5-14 mg/kg)
- For Herbals:
- Issue with high LOQ for Lemon balm & Chamomile, LOQs were set at 3 and 5 mg/kg
 - 1 sample exceeded 0.5 mg/kg; liquorice root with 1.4 mg/kg

Conclusion of phase 1

- Most positives were detected in samples that had been machine harvested
- Testing lab was only able to quantify most of the herbal infusions to a limit of 1 or 2 mg/kg
- Pattern of fractions suggested mineral oil of technical quality from the supply chain, as a possible source
- Phase 2 infusion/transfer study will show the actual exposure to the consumer



Transfer study of MOH to the infusion by UKTIA

- Phase 1: determine typical levels of mineral oils in tea & HFI, import into the UK
- **Phase 2: confirm minimal/or no transfer of MOH (MOAH/MOSH) into the infusion**

Design of experiment

- 6 samples with considerable levels of MOH from phase 1
 - Black Tea, Green Tea, Spearmint, Ginger, Lemongrass
- 5 g of tea was brewed in 100 ml of boiling water for 5 min
- Tea leaves were filtered and dried in a drying oven at 100 °C
- Both, brew and the dried leaves were analyzed for MOH



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MOAH (aromatic, total) C10-62

	Phase 1		Test for plausibility of Phase 2 results & concentration of the dried leaves after infusion	
	dry leaf 1 [mg/kg]	dry leaf 2 [mg/kg]	Infusion [mg/kg]	leaves post-infusion (dried) [mg/kg]
Green Tea	14.0	9.4	<LOD	1.5
Green Tea	4.8	4.2	<LOD	5.2
Spearmint	<1 *	<1 *	<LOD	1.1
Ginger	<1 *	<1 *	<LOD	<1
Tea black	8.8	11.0	<LOD	15.0
Lemongrass	<1 *	<1 *	<LOD	<3

MOSH/POSH (saturated, total) C10-62

	Phase 1		Test for plausibility of Phase 2 results & concentration of the dried leaves after infusion	
	dry leaf 1 [mg/kg]	dry leaf 2 [mg/kg]	Infusion [mg/kg]	leaves post-infusion (dried) [mg/kg]
Green Tea	29.00	28.0	<LOD	22.0
Green Tea	18.0	17.0	<LOD	19.0
Spearmint	8.9	8.6	<LOD	8.9
Ginger	14.0	16.0	<LOD	11.0
Tea black	69.0	77.0	<LOD	70.0
Lemongrass	12.0	15.0	<LOD	16.0



Transfer study of MOH to the infusion by UKTIA

- Phase 1: determine typical levels of mineral oils in tea & HFI, import into the UK
- **Phase 2: confirm minimal/or no transfer of MOH (MOAH/MOSH) into the infusion**

Conclusion from Phase 2

- **No detectable levels of MOAH or MOSH/POSH** in prepared tea or HFI despite using 4x more concentrated ratio of tea/HFI to water
- Levels of MOAH and MOSH/POSH in the dried leaf after infusion are at similar levels to raw material
- **No transfer of MOH into the consumed infusion**

Verification by STEPI*: no transfer of MOH

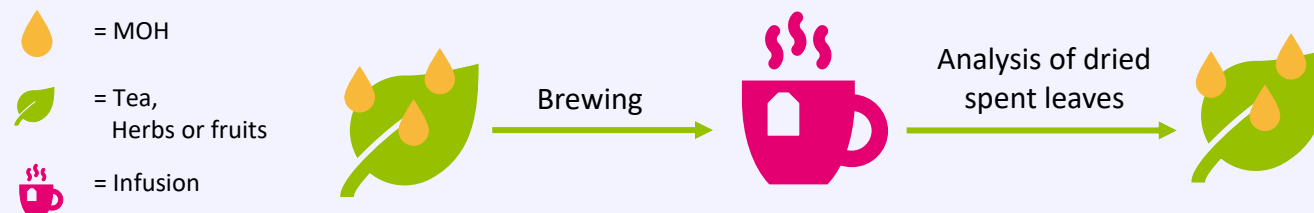
* Syndicat du Thé et de Plantes à Infusion

- Independent investigation performed by STEPI confirms the conclusion that there is no transfer from MOH into the infusion

MOAH (C10-50) – mg/kg						
	Product as sold		Infusion		Leaves post-infusion (dried)	
	Measure 1	Measure 2	Measure 1	Measure 2	Measure 1	Measure 2
Black Tea	1.2 (± 0.6)	2.5 (± 1)	<0,15	<0,15	2.5 (± 1)	2.2 (± 0.9)
Spearmint	3.7 (± 1.5)	3.7 (± 1.4)	<0,15	<0,15	5 (± 1.9)	4.3 (± 1.7)

Conclusion

- The MOAH levels in dried leaves after infusion is similar to that of the raw material (product as sold)
- Considering the results obtained in the dried leaves, it is very unlikely that MOAH will transfer into the infusion (product consumed by consumer)



THIE Statement on MOSH/MOAH

TEA & HERBAL INFUSIONS EUROPE
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Hamburg, 17th January, 2024

THIE position on MOSH/MOAH

The position of the tea and herbal infusions industry regarding mineral oil hydrocarbons in tea and herbal and fruit infusion raw materials.

- Members of THIE take the concerns related to the presence of mineral oils in the food and drink supply chain very seriously and they have been investigating potential sources and approaches to mitigation at all stages of the supply chain.
- With regard to MOSH/MOAH analysis, there are major analytical problems for the product group tea (*Camellia sinensis*) and herbal and fruit tea products, especially for herbal and fruit infusions, some of which have a LOQ of 3-5 mg/kg.
- In 2023, THIE participated in the stakeholder consultation of EFSA's Draft Scientific Opinion on the risk assessment of MOH in food.
- The grouping of lipophilic and lipophobic food matrices into the "coffee, cocoa, tea and infusions" group is surprising, especially in the case of MOSH/MOAH, as it does not allow a differentiated consideration of the exposure contribution despite completely different contents of MOSH/MOAH in the individual product groups. An unfavourable conclusion is the result.
- EFSA's CONTAM-Panel has stated that there is no analytical evidence for THIE's comments on the lack of transfer of MOH to the infusion.
- The National Associations, UKTIA (UK Tea & Infusions Association) and STEPI (Syndicat du Thé et de Plantes à Infusion), have each conducted an independent study to investigate the transfer of MOH in the infusion of tea and herbal and fruit tea products.
- Result of both studies: **No transfer of MOH was observed into the brewed infusion.**



More information on

- Analytical difficulties
- Transfer studies
- and sector specific aspects

can be found in the [THIE position on MOSH/MOAH](#)



Request from THIE

- Plant material of Tea (*Camellia sinensis*) and herbal and fruit infusion products are not consumed directly but only the infusion, which in turn is heavily diluted
- Our studies have shown that there is **no transfer of MOH into the infusion**
- Tea and HFI do not contribute to consumer exposure from MOH and therefore do **not pose a risk to the consumer**

for tea and herbal and fruit infusions:
→ no necessity of MLs for MOAH or indicative values for MOSH





Many thanks for your attention!

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