OCL 2026, 33, 7

https://doi.org/10.1051/ocl/2025039

OCL Oilseeds & fats Crops and Lipids

Available online at:
www.ocl-journal.org

RESEARCH ARTICLE OPEN ACCESS

Contaminants in edible vegetable oils and fats for human consumption: evolution of EU law and its impacts for the vegetable oil and fat sector☆

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Received 28 August 2025 – Accepted 24 November 2025

Abstract – Vegetable oils and fats play a key role in a healthy diet. As for any foods, during the journey from the raw material until their processing, several contaminants can be encountered. The present article looks at the evolution of the EU regulatory framework for contaminants in vegetable oils and fats and their raw materials and the different types of contaminants from "known" to "emerging". It identifies several trends, from the wording used, to regulatory exemptions and the implementation of the EU Maximum Levels (MLs) at national level. It also assesses the impact this is having for the vegetable oil and fat sector. With the growing number of topics to address simultaneously across the years, the challenges for this sector have considerably increased, considering "known" and "emerging" contaminants and other EU policy objectives. The supply chain management and the vegetable oil and fat processing can reduce some contaminants levels and will remain key factors in the mitigation route to further explore in the future.

Keywords: contaminants / vegetable oil and fat / EU food law

Résumé – Contaminants dans les huiles végétales et corps gras destinés à la consommation humaine : évolution de la législation européenne et ses impacts sur le secteur des huiles végétales et corps gras. Les huiles et les graisses végétales jouent un rôle clé dans une alimentation saine. Comme pour tous les aliments, au cours du voyage de la matière première jusqu'à leur transformation, plusieurs contaminants peuvent être rencontrés. Le présent article examine l'évolution du cadre réglementaire de l'UE concernant les contaminants dans les huiles et graisses végétales et leurs matières premières et les différents types de contaminants – des « connus » aux « émergents ». Il examine en outre plusieurs orientations spécifiques au secteur, des termes précis utilisés, aux exemptions réglementaires et à l'implémentation des teneurs maximales européennes au niveau national. Il examine également l'impact que cela génère pour le secteur des huiles et des graisses végétales. Avec le nombre croissant de sujets à aborder simultanément au fil des ans, les défis pour un tel secteur se sont considérablement accrus, compte tenu des contaminants « connus » et « émergents ». La gestion de la chaine d'approvisionnement et la transformation des huiles et graisses végétales ont la capacité à réduire certains niveaux de contaminants et resteront des facteurs clés d'atténuation à explorer d'avantage à l'avenir.

Mots-clés : contaminants / huile et graisse végétale / droit alimentaire Européen

Highlights

- The article explores the evolution of EU food law and regulatory practices on contaminants – from "typical" to "emerging" - in vegetable oils and fats for human consumption. It identifies trends across the years, the challenges and required sector expertise in prevention and mitigation techniques.

1 Introduction

Vegetable oils and fats are indispensable part of the global diet, serving as a primary source of energy, essential fatty acids, and fat-soluble vitamins. Consuming vegetable oils and fats in reasonable amount ensures that the human body gains appropriate energy which is necessary for its proper development and functioning. This is recognised in WHO guidelines on fats and oils (WHO, 2023a), (WHO, 2023b). Botanical origins of vegetable oils and fats are plentiful and

☆ Contribution to the Topical Issue: "Contaminants in oils and fats / Contaminants des huiles et corps gras".

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vary from main crops like rapeseed or sunflower, to tropical oils like palm, shea or coconut to niche sources like camelina, borage or tree nuts. Vegetable oils are essential components for human food, used either to cook or as a dressing, or as a key ingredient of numerous other food products.

The journey from the crop to the vegetable oil and fat comprises many different steps, from the planting of the seed at the very beginning to the processing at the very end, with different types of contaminants, ranging from agricultural, environmental, process or food contact contaminants (such as packaging). Raw materials are checked as to possible impacts of prior production processes and food business operators placing vegetable oils and fats on the market have in place detailed Hazard Analysis and Critical Control Points (HACCP) systems and food risk assessments that allow to identify the risks and critical points related to potential contaminations during the process.

To address concerns arising from such contaminants, EU regulators have put in place a comprehensive regulatory framework that ensures the safety of all food placed on the EU market. The present article explores how such contaminants are addressed in vegetable oils and fats, its evolution through the years from "known" contaminants to "emerging" and future contaminants and the challenges it poses to the vegetable oil and fat sector placing such foods on the market. This article will only consider vegetable oils and fats destined to human consumption within the meaning of "food"[2] under Regulation 178/2002 (EC, 2002).

2 Regulating contaminants in vegetable oils and fats under EU law: overall process, evolution and trend

For the purpose of this article, we will not discuss the definition of what is a "contaminant" as such. Whilst this discussion is extremely valid (Rientjens *et al.*, 2025), we will stick here to the definition of a "contaminant" as set out under Council Regulation (EEC) No 315/93 (EC, 1993), as food business operators are bound by EU law. A "contaminant" thus means "*any substance not intentionally added to food which is present in such food as a result of the production (including operations carried out in crop husbandry, animal husbandry and veterinary medicine), manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food, or as a result of environmental contamination. Extraneous matter, such as, for example, insect fragments, animal hair, etc, is not covered by this definition. "* Therefore, we will explicitly not cover other substances, such as pesticides residues, which are not *stricto sensu* "contaminants" under EU food law.

2.1 EU law on contaminants in foods

Before 1993, rules on contaminants were mainly governed by national laws. In practice, national authorities were relying on scientific risk assessments by national food safety bodies. The scope of contaminants was therefore not covered under EU law as such (MacMaolain, 2007). As from 1993, Council Regulation (EEC) No 315/93 (EC, 1993) came into play, where contaminants were considered as part of the implementation of the rules on the internal market. The Regulation established for the first time the possibility to set up EU provisions laying down limits/conditions for contaminants in food, following consultation with the Scientific Committee for Food (SCF). It also established the principle by which "*[f]ood containing a contaminant in an amount which is unacceptable from the public health viewpoint and in particular at a toxicological level shall not be placed on the market".* Besides, it also introduced the "*as low as can reasonably be achieved"* (ALARA) principle for contaminants by following good practices at all the stages of the food chain. This Regulation mandated the Commission to adopt Commission Regulation (EC) No 1881/2006 (EC, 2006), which specified Maximum Levels (MLs) for certain contaminants in foodstuffs. MLs are therefore to be understood as the maximum level acceptable for a contaminant in a food which will not have an impact in the human health. The legal act introduced Maximum Levels (MLs) for six categories of contaminants in food as follows - nitrate, mycotoxins, metals, 3-MCPD, dioxins and PCBs and polycyclic aromatic hydrocarbons (PAH) – this, for several foodstuffs. Such MLs were introduced following scientific assessments by the Scientific Committee on Food (SCF) at that time. Scientific risk assessments were later undertaken by the European Food Safety Authority (EFSA) (EC, 2002). Regulation (EC) No 1881/2006 was modified on numerous occasions to further cover new and emerging contaminants and/or revisions of MLs for existing contaminants, following EFSA risk assessments and its uptake through risk management. Due to such numerous alterations and for ease of readability, Commission Regulation (EC) No 1881/2006 was repealed and consolidated by Commission Regulation (EU) 2023/915 (EU, 2023). It remains today the current legal basis applicable for regulating contaminants and setting new MLs for contaminants in food or revising existing ones.

2.2 Contaminants in vegetable oils and fats regulated under EU law

2.2.1 From "typical" contaminants . . .

From the date of application of the law back in 2007, Regulation (EC) No 1881/2006 included the following typical contaminants in vegetable oils and fats: 1) Zearalenone in refined maize oil, 2) Lead in fats and oils, 3) Polycyclic aromatic hydrocarbons (PAH) in oils and fats intended for direct human consumption or use as an ingredient in foods as well as 4) and 5) sum of dioxins and sum of dioxins and dioxin-like PCBs in vegetable oils and fats. Such contaminants ranged essentially from environmental contaminants (lead, dioxin, dioxin-like PCBs, PAH) and agricultural contaminants (mycotoxin zearalenone). These are documented contaminants in vegetable oils and fats, from an analytical, toxicological and mitigation point of view. Such MLs were set based on SCF opinions, which were discussed in Standing Committees meetings to identify a *maximum tolerance* for such contaminants to protect public health, whilst at the same time to be considered achievable by food business operators using the best available technology following good practices along each step of the food chain.

2.2.2 . . .to more complex contaminants . . .

Since the first modification of Regulation (EC) No 1881/2006, several other contaminants have been introduced, targeting vegetable oils and fats or their raw materials. This included aflatoxins (2010), erucic acid (2014), Glycidyl fatty acid esters (GE) (2018), 3-MCPD fatty acid esters (3-MCPDE) (2020) and Ochratoxin A (OTA) (2022).

These modifications were due to a combination of multiple factors ranging from advances of scientific and technological knowledge, advances of EU scientific assessment and guidances, improvements in good agricultural and manufacturing practices, development of analytical methods and lowering of level of quantifications (LOQs), advances in food business operators own HACCP systems, *etc*. Whilst such factors are somewhat inevitable, some of them – like the continuous lowering of LOQs – progressively lead to increasingly sensitive methods, which are not always correlated with similar improvements in good agricultural and manufacturing practices. It can therefore lead to a competition for the lowest LOQ, implying that revision of the MLs should be implemented and if the technology or the supply chain does not follow, it will become difficult for food operators to cope with the revised MLs, and could also create market distortion.

To explain the complexity behind such contaminants, let us take the case of 3-MCPD fatty acid esters (3-MCPDE) and Glycidyl fatty acid esters (GE) as an example. Until Commission Regulation (EU) 2020/1322 (EU, 2020), MLs were, in the utmost majority of cases, applicable to all vegetable oils and fats, with sometimes different legal wordings, but independently of their botanical origins. The entry into force of MLs for 3-MCPDE marks a change in the approach. Depending on the botanical origin of the vegetable oil/fat, specific MLs apply. This is exemplified in Table 1. Such a trend is caused among others by the prevalence of precursors, known to contribute to 3-MCPDE formation (Codex Alimentarius, 2019), which are only present in some botanical origins.

Whilst this approach is not specific to such a food category, it demonstrates the level of details achieved by EU MLs over the years, compared to the beginning, based among other on EFSA occurrence data. We have further tried to illustrate this in Table 1, which provides a comparison of existing MLs in place for raw materials destined for further crushing and refining and for vegetable oils and fats. Such a table shows 2 important points: 1) a clear rise in setting of MLs across the years for additional contaminants, whilst keeping the contaminants included from the beginning and 2) a trend towards more and more precisions in the botanical origins targeted by specific MLs. Special care is therefore needed for food business operators to manage all such contaminants, requiring dedicated attention, specific mitigation techniques and implying more complexity in their storage and processing lines – depending on the botanical origin.

2.2.2.1 Cases of exemptions for raw materials destined for further crushing and refining and for refined oils

Whilst we can observe a clear trend towards increased complexity as highlighted above, another important point to pinpoint is the introduction of exemptions under EU law. Such exemptions have been introduced for raw materials used for the production of vegetable oils and fats such as oilseeds or for vegetable oils and fats. In several cases, the law has laid down explicit exemptions either for (1) raw materials destined for crushing for refined vegetable oil production, (2) crude oils destined for refining and/or (3) vegetable oils and fats. Such exemptions were introduced because it takes into consideration the further processing step that eliminates or reduces the contaminant level in the final product.

For a number of years, EFSA has organised a yearly call for continuous collection of chemical contaminants occurrence data in food and feed. Data providers can be national food authorities, research institutions, academia, food business operators and any other stakeholders. All data must be provided in line with strict EFSA templates and requirements. Once such criteria are met, data are included in EFSA occurrence databases, which are later used for calculations by the European Commission to derive possible MLs, which serve as a basis for discussions with Member States in Commission expert group meetings and in Standing Committee on Plants, Animals, Food and Feed (SCOPAFF) meetings. Thanks to this approach - and provided relevant occurrence data are shared by all relevant parties into the EFSA database - this can demonstrate what is behind the occurrence data. Talking about the specific case of vegetable oils and fats, the different steps of the processing of vegetable oils and fats – in particular the refining - have demonstrated to significantly reduce the levels of specific contaminants (Gharby, 2022), (FEDIOL, 2020).This is due to the chemical properties of some contaminants, which tend to accumulate in crude vegetable oils and fats and which are later on "refined out" through the refining steps. When comparing occurrence data in raw materials with data in refined vegetable oils and fats for the same contaminants in EFSA opinions, a clear reduction can be drown. This has led to the setting of exemptions for the following contaminants: aflatoxins (2010), cadmium (2021), ochratoxin A (2022), nickel (2024) and hydrocyanic acid (2024), which are included in Table 2.

2.2.2.2 The implementation of EU MLs at national level

One cannot avoid mentioning, even if only briefly, the implementation of EU MLs at national level. Once the EU law introducing new MLs becomes applicable, each Member States has the duty to implement them though official controls. Regulation (EU) No 2023/915 ensures a high level of harmonisation through the setting of the same MLs across the EU – applicable to all EU produced and third country produced destined to the EU market. However, its implementation still varies depending on national practices.

Let us take the case of the application of the measurement uncertainty. According to Regulation (EC) No 333/2007 (EC, 2007) as applicable today, whose legal basis is also Council Regulation (EEC) No 315/93, the measurement uncertainty is defined as follows: "*The analytical result shall be reported as x +/– U whereby x is the analytical result and U is the expanded measurement uncertainty, using a coverage factor of 2 which gives a level of confidence of approximately 95% (U = 2u)*." It highlights that: "*the lot or sublot is accepted if the analytical result of the laboratory sample does not exceed the respective maximum level as laid down in Regulation (EC) No 1881/2006*

taking into account the expanded measurement uncertainty." and that "*The lot or sublot is rejected if the analytical result of the laboratory sample exceeds beyond reasonable doubt the respective maximum level as laid down in Regulation (EC) No 1881/2006 taking into account the expanded measurement uncertainty and correction of the result for recovery if an extraction step has been applied in the analytical method used*." The need to take into consideration the measurement uncertainty is also indirectly recognised in the EFSA Rapid Assessment of Contaminant Exposure (RACE) (EFSA, 2019), which explicitly refers to Council Regulation (EEC) No 315/93 as cited above under which the measurement uncertainty is clearly highlighted. It is therefore clear that, when implementing EU MLs at national level for official controls, the measurement uncertainty must be considered.

Consideration of the same principle in case of autocontrols by food business operators has seen discrepancies across Member States. Whilst some countries like Belgium (AFSCA, 2025) have clear written guidance for food business operators, other countries either do not have written guidance or, like The Netherlands until now (NVWA, 2025), forbids the use of the measurement uncertainty in such cases. This adds another layer of difficulty for food business operators. The same tested food product can be considered compliant in country A but non compliant in country B. This can further lead to diverging approaches on how to handle the food, with a food lawfully placed on the market in country A to a potential recall in country B. To support EU harmonisation, industry associations like FEDIOL have issued their own guidance (FEDIOL, 2025). With the increasing number of contaminants regulated under EU food law, a guidance from the Commission would be very welcomed to avoid such types of market distortions.

2.2.3 . . .to emerging and future contaminants . . .

Following combined advances in analytics and toxicology, new EU risk assessments have recently been published or are in the pipeline. This is the case of mineral oil hydrocarbons, for which an EFSA opinion was published in 2023 (EFSA, 2023). The European Commission and Member States are currently discussing the setting of MLs in several food products including vegetable oils and fats. For the time being, the same approach as the one followed for 3-MCPDE is applied – targeting specific MLs for specific botanical origins. This stems again from the fact that a one-fits-all ML category does not function anymore for such complex contaminants, which require dedicated prevention and mitigation techniques depending on their botanical origins, which are in turn reflected under EU law.

Other contaminants in the EFSA pipeline include mycotoxins. In the past years, the European Commission has tasked EFSA to look at mycotoxins such as alternaria toxins (EC, 2024), or beauvericin (EC, 2025a) and enniatins (EC, 2025b). Once the EFSA opinions are available and depending on their outcomes, such compounds will also end up on the table for further considerations and possible risk management steps by the European Commission and Member States. Whilst it is too early now in absence of EFSA opinions to draw next step, we can speculate on whether the same approach of targeting specific botanical origins will be maintained – if specific risks are identified in the EFSA opinions.

Whilst we highlighted at the beginning of the article that we will not cover pesticides as such, the issue of "formerly used pesticides" or "still used pesticides", which end up in the food chain as environmental contaminants, is however critical. In such cases, pesticides can be one of the sources of the environmental contamination. This is for example the case of anthraquinone or of Trifluoroacetic acid (TFA), which is a type of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS). So far, the EU regulatory approach has always been to apply Regulation (EC) No 396/2005 (EC, 2005), if a substance was a "former pesticide" due to the definition of residue under the same legislation. With the growing number of substances falling under this scope, one could revisit whether the legal regulatory scope of Regulation (EC) No 396/2005 is still accurate and whether such substances should also not be treated as a real contaminant under Regulation (EU) No 2023/915. This is the approach that was followed for PFASs so far.

Whilst not aiming at being exhaustive, one has also to mention the general growing public concerns related to environmental contaminants stemming from anthropogenic sources and pollution. Some are in the public domain like PFASs, others are more in the scientific community field like brominated flame retardants or chlorinated paraffins. Such compounds add another layer of complexity as they are present in the environment, likely depending on the geographical area, and requiring a handling on their own. Further research on such compounds is required – starting from the analytics to the identification of prevention and/or mitigation steps.

The difficulty of all such "emerging" components can further be highlighted. Contrary to the well documented contaminants such as PAH, emerging contaminants often lack validated analytical methods implementable in a sufficient number of laboratories across the EU. Whilst efforts are made at EU level to set up EU Reference Laboratories (EURL) guidance, their implementation in labs requires time. Furthermore, the sources of the contamination are often multiple and complex. For example, climate change leads to an increase in mycotoxins (EFSA, 2020), but the exact mechanisms behind their occurrence in raw materials like oilseeds are not always fully known, yet. Research is still needed to understand the effect of storage and transport on specific mycotoxins to generate the best available preventive and mitigation techniques in return. It is critical to communicate about how to address such contaminants through prevention and mitigation, as it does not always prove to be straightforward and requires in-depth research and investigations. Again, this requires time at all stages of the food chain. Therefore, if EFSA finds they are posing a risk to health, addressing these further under EU law in the future will require due consideration of all such elements.

As we have seen above, there is a multiplicity of "emerging" contaminants, which are leading to the most urgent challenges which can be summarised as follows: 1) the need to increase the analytical and monitoring capabilities, 2) the need to research on the sources of occurrence of all such contaminants on case-by-case basis; 3) the need to have a robust and proactive system to track which possible "emerging" contaminants are next in the pipeline; 4) the need for research on how to prevent and/or mitigate occurrence.

Table 1. Comparison of MLs across the years for raw materials destined to crushing and refining and refined vegetable oils and fats.

Regulated contaminants	2007[1]	2013[2]	2025[3]
Zearalenone	**200** µg/kgRefined maize oil	**400** µg/kg Refined maize oil	**400** µg/kg Refined maize oil
Lead	-	**2,0** µg/kg Oils and fats intended for direct human consumption or use as an ingredient in foods	**2,0** µg/kg Oils and fats intended for direct human consumption or use as an ingredient in foods
Polycyclic aromatic hydrocarbons (PAH)	-	**2,0** µg/kg (benzoapyrene) **10,0** µg/kg Sum of benzo (a) pyrene, benz (a) anthracene, benzo (b) fluoranthene and chrysene Oils and fats intended for direct human consumption or use as an ingredient in foods	**2,0** µg/kg (benzoapyrene) **10,0** µg/kg Sum of benzo (a) pyrene, benz (a) anthracene, benzo (b) fluoranthene and chrysene Oils and fats intended for direct human consumption or use as an ingredient in foods
		2,0 µg/kg (benzoapyrene) **20,0** µg/kg Sum of benzo (a) pyrene, benz (a) anthracene, benzo (b) fluoranthene and chrysene Coconut oil intended for direct human consumption or use as an ingredient in food	**2,0** µg/kg (benzoapyrene) **20,0** µg/kg Sum of benzo (a) pyrene, benz (a) anthracene, benzo (b) fluoranthene and chrysene Coconut oil intended for direct human consumption or use as an ingredient in food
Sum of dioxins and dioxin-like PCBs (WHO-PCDD/F-PCB-TEQ)	**1,5** pg/g fat Vegetable oils and fats	**1,25** pg/g fat Vegetable oils and fats	**1,25** pg/g fat Vegetable oils and fats
Melamine	-	**2,5** mg/kg Food	**2,5** mg/kg Food
Aflatoxins		**2,0** µg/kg (B1) **4,0** µg/kg (Sum of B1, B2, G1 and G2) Oils from tree nuts	**2,0** µg/kg (B1) **4,0** µg/kg (Sum of B1, B2, G1 and G2) Oils from tree nuts
Sum of PCB28, PCB52, PCB101, PCB138, PCB153 and PCB180 (ICES – 6)		**40,0** ng/g fat Vegetable oils and fats	**40,0** ng/g fat Vegetable oils and fats
Erucic acid	-	-	**20,0** g/kg Vegetable oils and fats placed on the market for the final consumer or for use as an ingredient in food **50,0** g/kg Camelina oil, mustard oil and borage oil
Glycidyl fatty acid esters	-	-	**1000** µg/kg Vegetable oils and fats, fish oils and oils from other marine organisms placed on the market for the final consumer or for use as an ingredient in food except products listed in 5.4.2 **500** µg/kg Vegetable oils and fats, fish oils and oils from other marine organisms destined for the production of baby food and processed cereal-based food for infants and young children
Sum of 3-monochloropropanediol (3-MCPD) and 3-MCPD fatty acid esters	-	-	**1250** µg/kgoils and fats from coconut, maize, rapeseed, sunflower, soybean, palm kernel and olive oils (composed of refined olive oil and virgin olive oil) and mixtures of oils and fats with oils and fats only from this category **2500** µg/kg other vegetable oils, fish oils and oils from other marine organisms and mixtures of oils and fats with oils and fats only from this category*

Table 1. (continued).

Regulated contaminants	2007[1]	2013[2]	2025[3]
			[4] mixtures of oils and fats **750** µg/kg Vegetable oils and fats, fish oils and oils from other marine organisms destined for the production of baby food and processed cereal-based food for infants and young children
Ochratoxin A	-	-	**5,0** µg/kg Sunflower seeds, pumpkin seeds, hempseeds, soybeans **3,0** µg/kg Maize oil

[1] From Eurlex initial legal act.
[2] From Eurlex consolidated version 1/01/2014 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006R1881-20140101
[3] From Eurlex consolidated version 1/07/2025 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02023R0915-20250701
[4] The oils and fats used as ingredient for the mixture shall comply with the maximum level established for the oil and fat. Therefore, the level of the sum of 3-MCPD and 3-MCPD fatty acid esters, expressed as 3-MCPD in the mixture, shall not exceed the level calculated in accordance with Article 3(1), point (c). In case the quantitative composition is not known for the competent authority and the food business operator, not producing the mixture, the level of the sum of 3-MCPD and 3-MCPD fatty acid esters, expressed as 3-MCPD in the mixture shall in any case not exceed 2 500 µg/kg.

2.2.4 . . . to non-legally binding "EU" rules

To conclude this brief overview, one cannot avoid talking about the other ways to address contaminants at EU level, beyond EU MLs. A specific EU regulatory practice that started over the past years is the setting of EU indicative levels through Commission recommendations. Indicative levels do not have a formal legal definition. Whilst not legally binding, the recommendations can be considered as "benchmark values" for food industry to take proactive actions and to signal a certain level of concern, whilst not enabling (yet) the setting of formal EU MLs. One should not forget the fact that they often act as *de facto* MLs for the market and in clients/suppliers relationships. For example, EU indicative levels have been set for alternaria toxins in sunflower seeds and sunflower oil.

Another arising practice is the rise of *soft law*. This can take the form of published minutes or of joint statements by the SCOPAFF or by Member States. For example, the joint Member States' statement on mineral oils of April 2022 (Member States, 2022), clarified further in October 2022, considers maximum levels of quantifications (LOQs) above which Member States agreed to withdraw and possibly recall food products. Whilst the mentioned objective is to "*ensure a uniform enforcement approach throughout the EU*", they are not legally binding, and one can question whether or not they produce legal effects and can be validly contested under EU law (Boin, 2023). Irrespective of their legal nature, this is creating confusion in the market.

2.2.5 Consequences for the vegetable oil and fat sector

For the vegetable oil and fat sector, all contaminants – "known" or "emerging" – must be managed by the food sector, as part of their EU law responsibility. As briefly outlined above and in Table 1, the situation has dramatically evolved since 2013. From 5 contaminants to address under EU food law in 2007, the vegetable oil and fat sector has now to address multiple substances – 12 if only counting those regulated by EU MLs - *simultaneously*. In practice, this means that each single contaminant must be thoroughly assessed, *not in isolation but in combination* with other contaminants and food quality parameters, to determine how to best mitigate each compound with best manufacturing practices, in combination with other parameters. This requires a constantly evolving processing, to always add on top those "emerging" substances or remain up-to-date with scientific and analytical advances for "known" ones. This pursuit towards safer and safer products does come at a cost. It requires investments – in knowledge, in equipments, as well as in internal and external controls and supply chain adjustment - which affect product prices applied further in the food chain, and ultimately to the consumers, whilst price remains a key driver for food purchasing behaviour (EFSA, 2025; VALUMICS, 2021).

On top of that, food business operators further down the chain are often setting specifications – with more stringent levels than those set under EU Maximum Levels (MLs) – to achieve product differentiation through additional safety or quality requirements of their own products. This further increases the complexity for the vegetable oil and fat sector to not only assume legitimate responsibility for its own products as per EU law, but also to *de facto* get responsible in part for final food products through the setting of such additional specifications.

In such context, the expertise of the vegetable oil and fat sector is key. Particularly, the effect of the refining process of vegetable oils and fats remains a critical mitigation tool for specific contaminants. Whilst its impacts have been indirectly recognised under EU food law through the setting of specific exemptions in some *ad hoc* cases as shown in Table 2, it will be even more important to assess the effect of refining with the "emerging" contaminants. In parallel to this, other trends arise that trigger additional challenges such as the demand for more sustainable food products and less food waste or for less processed products. The effects of how sustainability requirements affect the whole vegetable oil and fat production, up to the processing steps, requires a full assessment on its own, including safety and quality parameters.

Table 2. Exemptions for raw materials destined for crushing and refining and vegetable oils and fats to date.

Regulated contaminants	MLs exemptions
Aflatoxins	– groundnuts (peanuts) and other oilseeds for crushing for refined vegetable oil production – crude vegetable oils destined for refining from groundnuts and other oilseeds – refined vegetable oils from groundnuts and other oilseeds
Cadmium	tree nuts/oilseeds for crushing and oil refining, provided that the remaining pressed tree nuts/oilseeds are not placed on the market as food. In case the remaining pressed tree nuts/oilseeds are placed on the market as food, the maximum levels apply, taking into account Article 3(1) and (2).
Ochratoxin A	refined oils except maize oil
Nickel	oilseeds for crushing and oil refining, provided that the remaining pressed oilseeds are not placed on the market as food. In case the remaining pressed oilseeds are placed on the market as food, the maximum level applies, taking into account Article 3(1) and (2).
Hydrocyanic acid	oilseeds for crushing for refined vegetable oil production, provided that the remaining pressed oilseeds are not placed on the market as food. In case the remaining pressed oilseeds are placed on the market as food, the maximum level applies taking into account Article 3(1) and (2)

With the growing number of topics and contaminants to be addressed at the same time, the vegetable oil and fat sector will need to be even more agile in the future. The setting of criteria to prioritise contaminants could be a potential route to explore. In parallel, a new EU approach, led by the EU Vision for Agriculture and Food (EC, 2025c), has been introduced, where the need for enhancing EU competitivity is highlighted. This approach could also influence the current way of regulating contaminants at EU level and one needs to watch this out closely.

3 Conclusions

Overall, the EU has put in place a robust regulatory system for contaminants in food, which protects public health. Exploring briefly the different modifications of the EU regulatory MLs and regulatory practices for contaminants in vegetable oils and fats has shown a clear trend towards more substances that need to be addressed *at the same time* in an ever-complex regulatory environment. The vegetable oil and fat sector is therefore continuously enhancing its intelligence about the "known" and "emerging" contaminants. In this more and more complex journey and trends that do not seem to stop, adapting to new scientific knowledge and emerging contaminants must be viewed in a forever-evolving context of broader food sustainability goals, EU competitiveness and safer food products.

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Cite this article as: Hajjar K. 2026. Contaminants in edible vegetable oils and fats for human consumption: evolution of EU law and its impacts for the vegetable oil and fat sector. *OCL* 33: 7. https://doi.org/10.1051/ocl/2025039