

Plant toxins

Plant toxins can appear in food crops, to ensure we keep food safe there is legislation and guidance in place on plant toxins. We also provide further guidance on cyanide in raw apricot kernels and opium alkaloids in poppy seeds.

Plant toxins are found naturally in certain plant species and are produced by plants as a defence mechanism. Sometimes plants with these toxins appear as weeds in food crops which means the seeds or leaves can get mixed accidentally with the main crop at harvest. Because of this, low levels of these toxins can be detected in cereals, herbal products, teas, salad crops, cereals and animal products. Common examples are pyrrolizidine alkaloids and tropane alkaloids.

Some other toxins are natural constituents of plant products such as erucic acid in some oils, hydrocyanic acid in apricot kernels and opium alkaloids in poppy plants.

Legislation

To protect consumer safety, maximum levels (MLs) have been established for some of these toxins (erucic acid, tropane alkaloids and hydrocyanic acid) in legislation.

- [retained EU Regulation 1881/2006](#) for England and Wales
- [EU Regulation 1881/2006](#) for Northern Ireland

Guidance

Guidance is provided to industry, including farmers, to advise on the agronomic practices to help reduce the contamination of food products with plant toxins. This is done to keep food safe. Codex produced [guidance on reducing contamination from pyrrolizidine alkaloids](#).

Cyanide in raw apricot kernels

Cyanide is a poisonous chemical that can cause nausea, fever, headaches, insomnia, thirst, lethargy, nervousness, joint and muscle aches and pains, falling blood pressure, and in extreme cases can be fatal.

Raw apricot kernels contain the naturally occurring substance amygdalin - a cyanogenic glycoside which results in the release of cyanide during digestion of the kernels in the human gut.

Raw, unprocessed apricot kernels, both bitter and sweet varieties, should not be sold for human consumption unless cyanide levels are compliant with the ML of 20 mg/kg as specified in:

- [retained EU Regulation 1881/2006](#) for England and Wales
- [EU Regulation 1881/2006](#) for Northern Ireland

These regulations also specify that it is the Food Business Operator's (FBO's) responsibility to provide evidence that cyanide levels for apricot kernels placed on the market are compliant with the maximum level.

This includes apricot kernels which appear in the following formats:

- chopped

- unprocessed
- whole
- ground
- milled
- cracked

Processed apricot kernels used as flavourings or ingredients in some foods, for example, persipan will have undergone heat treatment which reduces cyanide levels.

If there are consignments of apricot kernel meant for further processing, for example, persipan manufacture, the importer/food business operator (FBO) should provide clear evidence of intended use either on the label on each individual bag, box or in the original accompanying documents.

England, Northern Ireland and Wales

PDF

[View Update on advice to Food Business Operators \(FBO\) on the sale of apricot kernels and bitter almonds as PDF\(Open in a new window\)](#) (137.12 KB)

Opium alkaloids in poppy seeds

Poppy seeds are obtained from the opium poppy plant which contains narcotic alkaloids such as morphine and codeine.

Poppy seeds may contain very low levels of opium alkaloids, if at all, but they can become contaminated with alkaloids after insect damage or contamination during harvesting – when particles of dust from other parts of the poppy plant adhere to the seeds.

The application of good agricultural practices is known to reduce the levels of opium alkaloids in the poppy seeds. Further processing methods such as washing, soaking with water, grinding and heat treatment are known to substantially reduce the levels.

Pyrrrolizidine alkaloids

Pyrrrolizidine alkaloids are natural toxins produced by a wide range of plant species. Some plants consumed by humans contain pyrrrolizidine alkaloids naturally but other foods can also become contaminated with pyrrrolizidine alkaloids when weeds producing these toxins are accidentally harvested along with the crop. Cases of human poisoning have been reported following consumption of contaminated staple foods and some herbal remedies.

Consumption of food contaminated with pyrrrolizidine alkaloids can cause liver damage including the formation of liver tumours. Toxic effects can take time to develop and may be the result of long term, low level exposure. The European Food Safety Authority (EFSA) has concluded that some pyrrrolizidine alkaloids may be carcinogenic to humans.

The application of good agricultural practices is known to reduce the level of pyrrrolizidine alkaloid contamination in food. Codex Alimentarius have developed [a code of practice for weed control to prevent and reduce pyrrrolizidine alkaloid contamination in food and feed](#).

Some herbal infusions such as those made from comfrey roots and leaves are known to contain very high levels of pyrrrolizidine alkaloids. Based on [advice from the Committee of Toxicity of Chemicals in Food, Consumer Products and the Environment](#) we would recommend that these are not consumed. Herbal infusions of borage leaves are also known to contain very high levels of pyrrrolizidine alkaloids and we would also recommend against consumption of these.

Important

EU references in FSA guidance documents

The FSA is updating all EU references, to accurately reflect the law now in force, in all new or amended guidance published since the Transition Period ended at the end of 2020. In some circumstances it may not always be practicable for us to have all EU references updated at the point we publish new or amended guidance.

Other than in Northern Ireland, any references to EU Regulations in this guidance should be read as meaning retained EU law. You can access retained EU law via HM Government [EU Exit Web Archive](#). This should be read alongside any EU Exit legislation that was made to ensure retained EU law operates correctly in a UK context. EU Exit legislation is on legislation.gov.uk. In Northern Ireland, EU law will continue to apply in respect to the majority of food and feed hygiene and safety law, as listed in the [Northern Ireland Protocol](#), and retained EU law will not apply to Northern Ireland in these circumstances.