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 Regulation 1881/2006.

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 and opium 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 that is set in legislation. The regulation also specifies 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
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.

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 straw 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. The European Commission has provided guidance on good practices to prevent and to reduce the presence of opium alkaloids in poppy seeds and poppy seed products.

A target level of 10 mg/kg for the presence of morphine in poppy seed placed on the market destined for the final consumer has also been agreed.

The target level is applicable to poppy seeds at all stages of the food chain and when placed on the market, unless their labelling suggests the following:

- the need for physical treatment to reduce opium alkaloid levels before consumed by humans
- the produce is used as an ingredient in foodstuffs

Further recommendations from the commission can be found within 2014/662.

Pyrrolizidine Alkaloids

Pyrrolizidine alkaloids are natural toxins produced by a wide range of plant species. Some plants consumed by humans contain pyrrolizidine alkaloids naturally but other foods can become contaminated with pyrrolizidine 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 pyrrolizidine 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 pyrrolizidine alkaloids may be carcinogenic to humans.
The application of good agricultural practices is known to reduce the level of pyrrolizidine alkaloid contamination in food. Codex Alimentarius have developed a code of practice for weed control to prevent and reduce pyrrolizidine alkaloid contamination in food and feed.

There are currently no legal maximum levels set for pyrrolizidine alkaloids in food. However, levels are being discussed and it is expected that legal maximum levels will be introduced soon.

Some herbal infusions such as those made from comfrey roots and leaves are known to contain very high levels of pyrrolizidine 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 pyrrolizidine alkaloids and we would also recommend against consumption of these.