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Pesticides in coffee: ‘Banned’ and ‘highly toxic’?

Residues of plant protection products in imported foodstuffs and their assessment

Coffee sold in Germany is often contaminated with ‘banned’ and ‘highly toxic’ pesticides: headlines such as these have recently appeared in reports on a campaign by non-governmental organisations (NGOs) critical of pesticides. Time and again in the past, warnings have been issued that ‘banned’ pesticides in the European Union (EU) nevertheless end up on consumers’ plates (or in their cups) via imports, putting consumers at risk.

From the perspective of consumer health protection, the German Federal Institute for Risk Assessment (BfR) would like to make the following comments:

The fact that an active substance in plant protection products (PPP) is not approved (‘banned’) in the EU can have various causes. One of these may be the toxicological risk profile of an active substance, i.e. its ‘toxicity’. However, there are various other reasons why an active substance is not on the market in the EU. For example, an active substance may have little practical use in Europe because climatic conditions – and consequently the species of pests – differ. It is also possible that marketing is not profitable for the manufacturer, and no application for approval in the EU was ever submitted. This applies in particular to many new active substances in PPP. ‘Not approved’ is therefore often not synonymous with ‘toxic’.

Furthermore, in the case of imported foodstuffs such as coffee, bananas or hops, active substances in PPP that are not approved in the EU may well have been used legally in the country of origin – and the same apply in reverse. Nevertheless, to facilitate international trade and the mutual import of food, the globally applicable Codex maximum levels (internationally established maximum concentrations) are incorporated into EU legislation provided there are no health risks. In addition, an application for an ‘import tolerance’ may be submitted. This means that foodstuffs containing traces of an active substance not approved in the EU may also be imported.

Import tolerances are set in the same way as maximum residue levels (MRLs). A MRL refers to the legally prescribed maximum level of an active substance in or on food. The scientific basis for the MRL is a health risk assessment. Compliance with the MRL ensures, there is a low likelihood of adverse health effects. As there is a wide safety margin between the MRL and levels that pose a health risk, even exceeding the MRL does not usually lead to acute health effects.

Data from the food monitoring authorities of the German federal states show that only a very small proportion (two to three per cent) of green coffee samples exceed the respective MRL. Based on current knowledge, the applicable authorisation criteria for PPPs do not suggest that there are any health risks to consumers arising from the consumption of coffee.

What does 'toxic' mean?

Modern analytical methods can detect active substances in PPP in very small amounts. However, the mere fact that an active substance has been detected in a foodstuff is not, in itself, decisive. This is because whether an active substance has a toxic effect on the organism depends not only on its chemical composition. The decisive factor is the extent to which the body is exposed to it. In other words: it's the dose (of an active substance) that makes the toxin. This also applies to active substances in PPP. Before these active substances are approved for use in PPP at European level, they are comprehensively tested and assessed for potential health risks. They are safe when used as intended.

Even when PPP are used correctly, minimal residues of active substance may be present in the harvested crop and may be detectable in the foodstuffs produced from it. This is to be expected and is therefore explicitly taken into account in the safety assessment of these products and when setting MRLs. Minimal residues of active substances in food do not generally cause any health effects.

Is coffee safe in Germany with regard to plant protection product residues?

Based on current knowledge, the applicable authorisation criteria for plant protection products do not suggest that there are any health risks to consumers arising from the consumption of coffee.

Coffee is not grown in the EU. The MRLs for coffee in the EU are based on import tolerance applications from exporting countries and on Codex maximum levels. Codex maximum levels are internationally established maximum concentrations (in mg/kg) for residues of PPP, veterinary medicines or contaminants in food. They are published by the Codex Alimentarius Commission to facilitate global trade and protect consumer health.

Residues must not cause a risk

The incorporation of such a limit value into EU legislation always involves a health risk assessment. As a general rule, residues must not cause any risk to consumer health.

If the MRL for a PPP is exceeded, the food is not marketable and must not be sold. If no MRL has been set in the EU (and therefore neither an import tolerance exists nor have Codex maximum levels been adopted), the extremely low concentration of 0.01 milligrams of

substance per kilogram (mg/kg) of food is regarded as a 'limit value', above which a food product may not be imported or sold. The 0.01 mg/kg figure usually corresponds to the LOQ in modern laboratories. At levels below this, no adverse health effects are to be expected.

MRLs apply to green coffee (coffee beans). It is not sold in this form but is further processed in roasting plants. The incoming goods inspections carried out by roasting plants or other coffee-processing establishments are therefore of particular importance.

The roasting and brewing of coffee change the levels of PPP residues. The EU database on processing factors (<https://zenodo.org/records/15363279>) contains information for some substances on how residue levels change during roasting or during the production of instant coffee powder. This varies depending on the active substance.

Are multiple residues in coffee a problem?

The assessment of potential health effects of multiple active substances – whether these are already available as ready-formulated PPP or where their co-occurrence is foreseeable due to their scope of application – is part of good toxicological practice. There is a wealth of scientific evidence on the effects of multiple residues of PPP. Based on current knowledge, the applicable authorisation criteria sufficiently rule out any health risks to consumers.

How is coffee on the market monitored for plant protection product residues?

Anyone placing a food product on the market is obliged to ensure compliance with the legally prescribed MRL. Retailers and businesses in the food processing industry (including, for example, coffee roasters) carry out their own internal checks.

The German federal states' food monitoring authorities use monitoring and surveillance programmes, as well as risk-based inspections, to check whether businesses are fulfilling their duty of care and whether consumers are adequately protected. The results are published regularly by the German Federal Office of Consumer Protection and Food Safety (BVL) and the German Federal Office for Consumer Protection¹. Data from the food monitoring authorities of the German federal states show that only a very small proportion (two to three per cent) of green coffee samples exceed the relevant MRL. The vast majority of samples are within the limits.

Questions and answers on PPP residues:

<https://www.bfr.bund.de/en/service/frequently-asked-questions/topic/questions-and-answers-on-residues-of-plant-protection-products-in-food/>

¹https://www.bvl.bund.de/DE/Arbeitsbereiche/01_Lebensmittel/01_Aufgaben/02_AmtlicheLebensmittelueberwachung/07_PSMRueckstaende/Im_nbpsm_node.html

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). It protects people's health preventively in the fields of public health and veterinary public health. The BfR provides advice to the Federal Government as well as the Federal States ('Laender') on questions related to food, feed, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.

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