



Federal Office of
Consumer Protection
and Food Safety



“Pesticide residues in food”

National reporting 2019 Federal Republic of Germany –
condensed version



Summary

The report presents the results of the analysis of food for pesticide residues. In accordance with Regulation (EC) No 396/2005, the compliance with current legislation was checked and analyses to assess consumer exposure were carried out.

In 19 official laboratories of 16 federal states, 20,283 food samples were analysed for the presence of pesticide residues. 5,858 of these samples were taken at random in the framework of the monitoring programme, in order to be able to make representative statements about consumer exposure. However, with regard to the selection of the other 14,425 samples, foodstuffs known for presenting higher risks were preferred. For this reason, the results do not allow to draw conclusions on the contamination level of the entirety of all foodstuffs available on the market.

For reporting to the European Food Safety Authority (EFSA) and the European Commission, the samples are divided in "surveillance" and "follow-up enforcement" samples. The routine and monitoring samples are denominated as "surveillance" samples, while suspect samples, complaint samples and persecution samples are summarised as "follow-up enforcement" samples.

In the reporting year, a total of 19,898 samples fall under the category "surveillance" and 385 samples under the category "follow-up enforcement".

In 2019, 1,916 samples were analysed in the framework of the coordinated multi-annual Community control programme. These samples were part of the 20,283 samples analysed in total.

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1 Information about maximum residue levels

“Maximum Residue Level” (MRL) means the upper legal level of a concentration for a pesticide residue in or on food. For setting MRLs, data on the toxicology of the substance and on the intake quantity of the respective foodstuff as well as data from field studies carried out in accordance with good agricultural practice are taken into consideration.

The report distinguishes between the exceedance of a MRL and the objection (non-compliance) of samples. Not all samples with MRL exceedances are objected (non-compliant) by the respective responsible authority, as for an objection (non-compliance) further arguments like the analytical measurement uncertainty have to be taken into account.

When it is established that a consumer risk through pesticide residues in a foodstuff cannot be excluded, the European Rapid Alert System for Food and Feed (RASFF) is notified, so that all responsible authorities in the EU are informed accordingly.

In 2019, Germany issued 38 notifications due to pesticide residues; twelve of these were alerts.

2 Food-related view on the results

(only “surveillance” samples without substances which are proven to (mainly) not stem from pesticide use: chlorate and the quaternary ammonium compounds (QAC) didecyl-dimethylammonium chloride (DDAC) and benzalkonium chloride (BAC))

In total 194 different foodstuffs were analysed. As every year, the majority were fruit and vegetables.

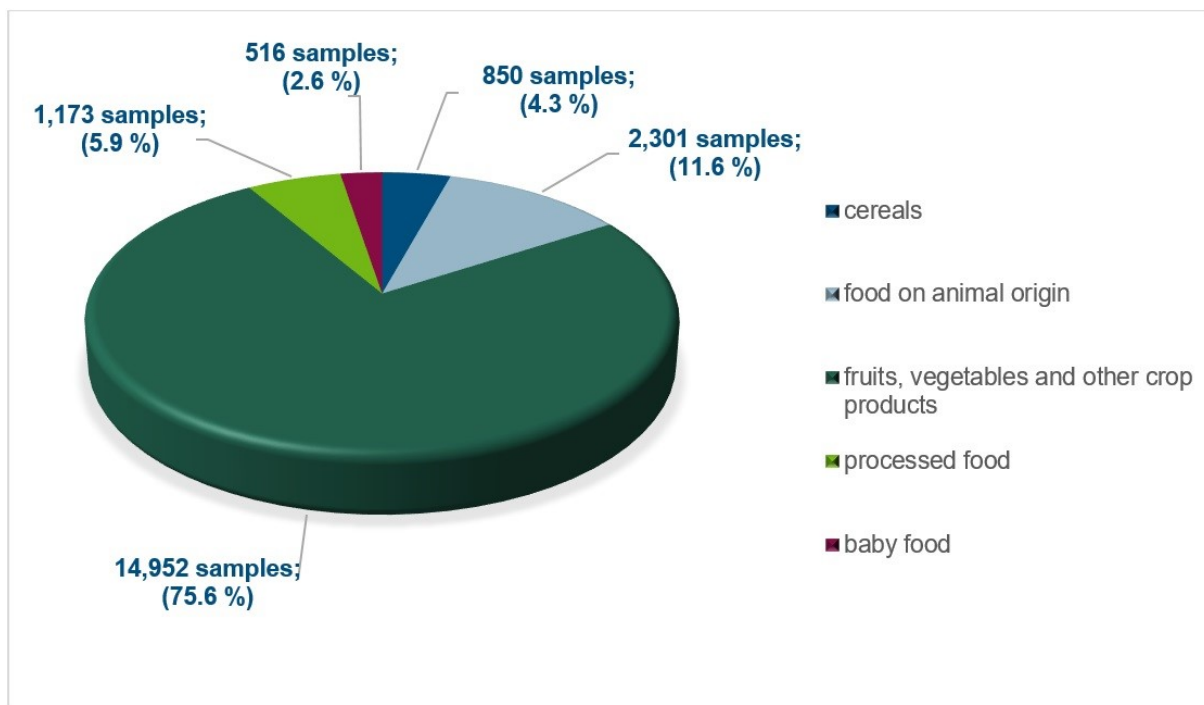


Figure 1: Distribution of sample numbers between food groups in 2019

Strawberries (835 samples), bovine milk and milk products (757 samples), apples (691 samples), potatoes (639 samples), lettuces (625 samples) and tomatoes (593 samples) were analysed the most frequently.

Table 1: Residues in food groups in 2019

Food group	Number of samples				
	total	with residues < LOQ (limit of quantification)	with residues < MRL	> MRL not objected	> MRL objected
Cereals	850	586 (68.9 %)	264 (31.1 %)	27 (3.2 %)	16 (1.9 %)
Food of animal origin	2,301	1,512 (65.7 %)	789 (34.3 %)	20 (0.9 %)	1 (< 0.1 %)
Fruit, vegetables and other products of plant origin	14,952	5,147 (34.4 %)	9,805 (65.6 %)	370 (2.5 %)	189 (1.3 %)
Processed food	1,173	595 (50.7 %)	578 (49.3 %)	17 (1.4 %)	6 (0.5 %)
Food for infants and young children	516	431 (83.5 %)	85 (16.5 %)	15 (2.9 %)	12 (2.3 %)
Total	19,792	8,271 (41.8 %)	11,521 (58.2 %)	449 (2.3 %)	224 (1.1 %)

In the category food for infants and young children, 2.9 % of the samples contained residues above the MRL. Twelve of 15 samples were objected. These twelve samples (eleven of them were processed fruit for infants and young children) were objected due to the residue definition for the fungicide fosetyl (sum).

Residue definition of fosetyl includes the lead compound fosetyl as well as the metabolite phosphonic acid and their salts. It should be noted that phosphonic acid can be present as a degradation product of the fungicide fosetyl but can also originate from other sources such as authorised fertiliser. In general, predominantly phosphonic acid was detected in all food groups. Fosetyl was actually only detected in approx. 5 % of the samples.

For fruit and vegetable, the range of pesticide contaminations was particularly large, spanning from foodstuffs in which no residues were quantified, to products with objection rates of 38.9 % (okras). However, the foodstuffs with objection rates of more than 10 % were mainly exotic fruits and vegetables like the mentioned okras as well as cactus fruits, guavas and passion fruits.

Fortunately, many foodstuffs with particularly high intake like potatoes, carrots, bananas or apples only had few MRL exceedances and objections.

Table 2 summarises the fruit and vegetable products without any objections or less than 0.5 % objections in at least 100 analysed samples.

Table 2: Fruit and vegetables with objections less than 0.5 % in 2019 (≥ 100 samples)

Food	Number of analysed samples	Objections (%)
Asparagus	449	0
Plums	383	0
Head brassica	360	0
Brussels sprouts	325	0
Carrots	279	0
Kiwis	251	0
Avocados	244	0
Blueberries	197	0
Lemons	170	0
Apricots	120	0
Peas (dried)	118	0
Currants (red, black and white)	110	0
Pistachios	107	0
Apples	684	0.3
Lettuce	622	0.3
Tomatoes	589	0.3
Peaches	383	0.3
Table grapes	383	0.3
Cultivated fungi	370	0.3
Leek	252	0.4

The ten foodstuffs with the highest objection rates are presented in Table 3 (at least 100 samples).

Table 3: Fruit and vegetables with the highest number of objections in 2019 (≥ 100 samples)

Food	Number of analysed samples	Objections (%)
Pomegranates	129	7.8
Tea	163	6.7
Beans (with pods)	206	4.4
Mangoes	163	3.1
Lentils	143	2.8
Spinach	338	2.4
Sweet peppers, chilis	476	2.3
Grapefruits, pomelos, sweeties	193	2.1
Fresh herbs	442	2.0
Lamb's lettuce	106	1.9

Also in 2019, organic products were controlled for residues. The contamination of these samples was much lower than that of conventionally produced samples. Only 22.6 % of the products stemming from

organic farming contained residues, which could be quantified analytically – compared to 62.2 % of other products.

3 View with regard to origin

(“surveillance” samples and “follow-up enforcement” samples without chlorate and QAC)

20,167 samples (surveillance sampling“- and „follow-up enforcement sampling) were controlled, 46 % thereof from Germany, 26 % from other EU-Member States and 17 % from Third Countries. 11 % of the samples were of unknown origin.

Nearly two thirds of the samples were purchased from retail food traders and about less than one fifths from wholesalers. The rest was bought from growers, manufacturers and packers as well as from service providers, e.g. restaurants or delivery services.

Big differences can be observed in the contamination level of foods with pesticide residues depending on their origin. In 2019 maximum residue levels were exceeded in 1.0 % of the analysed products (only “surveillance sampling“) from Germany (2018: 1.3 %) and in 1.3 % of the analysed products from other EU-Member States (2018: 1.5 %). With regard to products from Third Countries, this was the case in 6.5 % of the samples (2018: 8.8 %). Nevertheless, the percentage of samples without any quantifiable pesticide residues is still the highest in German foodstuffs.

4 Substance-related view on the results

(“surveillance sampling“ and “follow-up enforcement sampling“)

The range of pesticide substances tested for in 2019 comprised 1,006 different substances (including the legal residue definitions of sums, their metabolites and isomers). In the years before 2017, the number of active substances according to their legal residue definition was counted (without metabolites and isomers). Therefore evaluations since 2017 cannot be compared with previous years. This change became necessary due to an increasing number of complex residue definitions and varying residue definitions depending on the foodstuff. Only in this way was it possible to disclose all data without losses.

Obviously, no sample was analysed for all substances. On average, each food sample was analysed for 378 different substances.

579 of the 1,006 substances were not found in quantifiable quantities in any sample. On the other hand, for 153 substances residues above the valid maximum residue levels were detected.

The most noticeable substances among the 663 stated MRL exceedances were nicotine, fosetyl, dithiocarbamates and chlorpyrifos.

Since 2010 **nicotine** is banned for pesticide use in the EU due to its high toxicity. Natural causes of some plant species (nightshade family), contamination of nearby tobacco fields or tobacco processing plants and the contact of nicotine-contaminated hands of smokers are discussed as causes for the occasionally striking nicotine contents in fruit and vegetable products.

The determination of **dithiocarbamates** (Maneb, Mancozeb, Metiram, Propineb, Thiram, Ziram) occurs nonspecific as carbon disulfide (CS₂). Therefore, it cannot be concluded analytically which dithiocarbamates were used. Only contents of Propineb and Thiram can be determined separately from that

of CS₂. Besides even natural sources of CS₂ as certain plants with natural sulfur or carbon disulfide compounds (for example Brassicaceae such as cabbage and rapeseed or allium species) influence analysis. This can lead to false positive results.

Due to the fact that the fungicide **fosetyl** is analysed together with its degradation product phosphonic acid, it cannot be decided whether the positive findings are due to a treatment with the fungicide or stem from other sources.

Pesticides containing the active ingredient **chlorpyrifos** are no longer authorized in Germany, the exhaustion period ended on 2 April 2015 and 6 May 2015 respectively. In the EU, chlorpyrifos is still authorized as an active substance in plant protection products until 31 January 2020.

5 Findings of multiple residues

(“surveillance sampling“ and “follow-up enforcement sampling”)

In 24.7 % of all samples, more than one substance was detected in quantifiable quantities. The percentage distribution of the number of quantified residues is presented in the following figure:

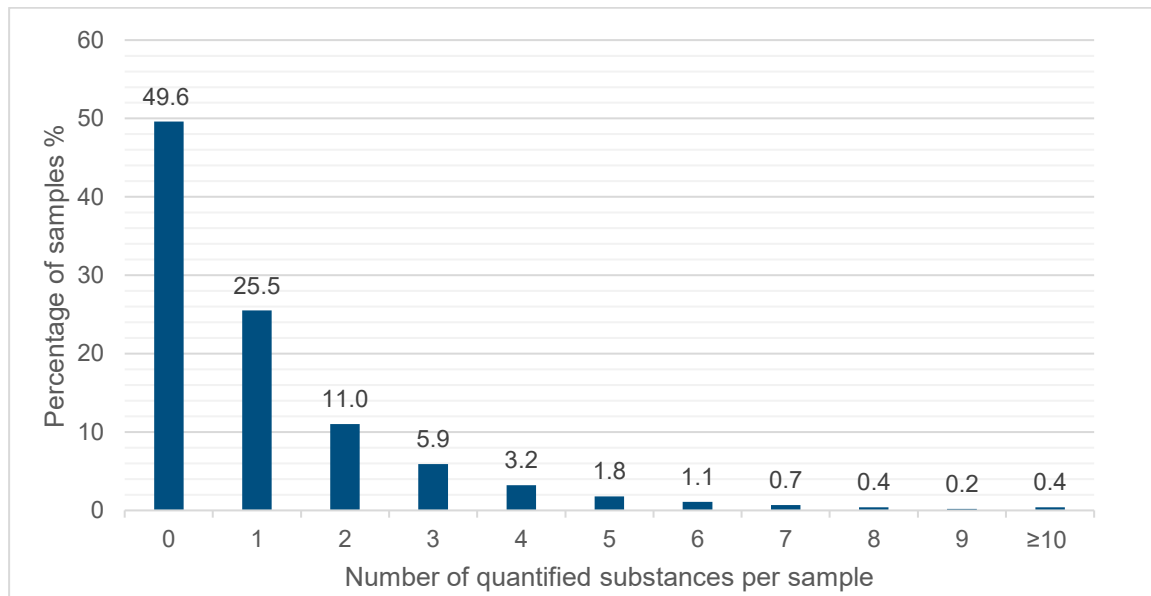


Figure 2: Percentage of samples without any residues or with residues of 1 to ≥10 substances.

Multiple residues above 50 % were found particularly in grapefruits/pomelos/sweeties, table grapes, roman rocket/rucola, tangerines and wine.

6 Substances which are proven to (mainly) not stem from pesticide use

Some substances are legally regulated as pesticides, but their residues mainly originate from other sources than pesticide treatments. In order not to distort the overall picture of pesticide contamination, the quaternary ammonium compounds didecyltrimethylammonium chloride (DDAC) and benzalkonium chloride (BAC) as well as chlorate are treated separately in the report.

Residues of chlorate can enter the food during processing, e. g. through washing and disinfection steps.

In 2019, chlorate was quantified in 13.3 % of the 5,548 samples tested for it. In 7.2 % of the samples, residues were evaluated as exceeding the MRL. Chlorate was objected in 2.1 % of the samples.

'Food of animal origin' (178 samples in total) was particularly noticeable with an objection rate of 6.2 %. 4,415 sample of 'Fruit, vegetables and other products of plant origin' were examined, 2.1 % were objected. In the case of 'Processed food' (405 samples in total) and 'Cereals' (322 samples in total), one sample each (0.2 % respectively 0.3 %) were objected because of excessively high chlorate levels. No sample of the category 'food for infants and young children' (228 samples in total) was objected for containing too much chlorate.

In products from organic farming, the residue situation with regard to chlorate is better than in conventional products. For only 4.7 % of samples of organic origin, the chlorate residues 'processed food' (a total of 191 samples) and 'food for infants and young children' (a total of 132 samples) several samples (2.6 %) respectively one sample (0.8 %) were/was objected for containing too much chlorate.

In products from organic farming, the residue situation with regard to chlorate is better than in conventional products. For only 3.9 % of samples of organic origin, the chlorate residues detected were evaluated as exceeding the maximum residue level.

Quaternary ammonium compounds are used for example to disinfect milking plants and tanks. For this reason, they are often detected in dairy products. In 2019, residues of DDAC and/or BAC above the maximum level were analysed in 1.6 % of foodstuffs of animal origin. Overall, the maximum levels for DDAC or BAC were exceeded in 0.2 % of the samples examined.

In products from organic farming, the residue situation with regard to DDAC and BAC is also better than in conventional products, none sample contained residues above the MRL.