SCIENTIFIC REPORT

EFSA Journal

ENDORSED: 21 June 2018

doi: 10.2903/j.efsa.2018.5348

The 2016 European Union report on pesticide residues in food

European Food Safety Authority

Abstract

This report provides an insight into the official control activities carried out by EU Member States, Iceland and Norway in 2016. Based on the analytical results provided by the reporting countries, a detailed data analysis was performed regarding pesticide occurrence in the most important food products consumed and the dietary risk related to the exposure of European consumers to pesticide residues. Overall, 96.2% of the 84,657 samples analysed fell within the legal limits (81,482 samples). In total, 50.7% of the tested samples were free of quantifiable residues (residue levels below the limit of quantification (LOQ)), while 45.5% of the samples analysed contained quantified residues not exceeding the maximum residue levels (MRLs). The findings on pesticide residues are described for the following categories: products of plant origin, products of animal origin, imported food, organic products and baby food. The acute and chronic dietary risk assessment indicated that the probability of European citizens being exposed to pesticide residue levels that could lead to negative health outcomes was low. Based on the analysis of the 2016 pesticide monitoring results, EFSA derived a number of recommendations to increase the efficiency of the European control systems to ensure a high level of consumer protection.

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Keywords: pesticide residues, food control, monitoring, maximum residue levels, consumer risk assessment, Regulation (EC) No 396/2005

Requestor: EFSA

Question number: EFSA-Q-2014-00103

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Acknowledgements: The Pesticides Unit wishes to thank Florence Gérault (Ministry of Agriculture, France) for her valuable proposals and the independent scientific review of this report.

Suggested citation: EFSA (European Food Safety Authority), 2018. The 2016 European Union report on pesticide residues in food. EFSA Journal 2018;16(7):5348, 139 pp. https://doi.org/10.2903/j.efsa.2018.5348

ISSN: 1831-4732

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Summary

This report provides an overview of the 2016 official control activities carried out in the European Union (EU) Member States, Iceland and Norway. It summarises the results of both the 2016 EU-coordinated control programme (EUCP) and the results of national control programmes (NP). While the national control programmes are mostly risk based – focussing on pesticides or products originating from countries where an increased number of violations have been observed in the past – the EUCP aims to present a statistically representative snapshot of the situation of pesticide residues in food products that are the most widely consumed in the EU. The report includes the outcome of a dietary risk assessment based on the results of the 2016 control programme.

The comprehensive analysis of the results of all reporting countries provides risk managers with a scientifically sound basis for designing future monitoring programmes, in particular for taking decisions on which pesticides and food products should be targeted in risk-based national programmes.

EU-coordinated control programme (EUCP)

In the framework of the EUCP, 12,168 samples were analysed covering 165 pesticides in 11 food products.

Overall, 98.3% of the samples analysed in the 2016 EUCP fell within the legal limits (11,965 samples); 6,367 samples (52.3%) were free of quantifiable residues (residues below the limit of quantification (LOQ)). The number of samples with quantified residues, but within the legally permitted level (at or above the LOQ but below the maximum residue level (MRL)) was 5,598 (46.0%). In 1.7% of the samples analysed the MRL was exceeded (203 samples). In total, 0.9% of the samples (107 samples) were considered to be not compliant with the legal limits taking into account the measurement uncertainty.

Compared with 2013, when the same commodities were analysed, the MRL exceedance rate in 2016 is higher (1.7% in 2016 compared to 0.9% in 2013). This significant increase was mainly driven by the high number of exceedances regarding residues of chlorpyrifos, an active substance for which the MRLs were lowered for many crops during 2016 (59 exceedances were reported out of the 10,212 samples analysed for this pesticide). In addition, a number of MRL exceedances were reported by France for dimethoate in tomatoes produced in the Mayotte oversea territory (32 exceedances in 9,618 samples reported). These samples have been taken by France following a more focussed control programme and are therefore not fully representative for tomatoes available to European consumers.

Of the 165 pesticides analysed in the EUCP regulation, 157 were sought in food of plant origin and 22 in food of animal origin.

- Among the 157 pesticides analysed in plant products, 28 pesticides were not found in quantifiable concentrations in any of the samples analysed; residues exceeding the legal limits were related to 56 pesticides.
- Among the unprocessed plant products analysed, the lowest MRL exceedance rate was recorded for rye, followed by head cabbage, strawberries, peaches, leek, lettuce, tomatoes and apples. A low MRL exceedance rate was found in wine.
- Regarding food products of animal origin (cow's milk and swine fat), 11 of the 22 pesticides covered by the EUCP were not found in quantifiable concentrations in any of the samples tested. The remaining 11 pesticides were detected in quantifiable concentrations. The most frequently quantified pesticides were dichlorodiphenyltrichloroethane (DDT), hexachlorobenzene and chlordane, i.e. persistent organic pollutants (POPs) and non-approved pesticides present in the food chain due to their persistence. No MRL exceedance was identified in cow's milk and a low MRL exceedance rate was found in swine fat.

EU-coordinated and national programmes (EUCP + NP)

In 2016, the reporting countries analysed 84,657 samples for 791 different pesticides. On average, 230 pesticides were analysed per sample. The majority of the samples (56,749, 67% of the total) originated from the reporting countries (EU, Iceland and Norway); 22,345 samples (26.4%) concerned products imported from third countries. For 5,563 samples (6.6%), the origin of the products was unknown.

Overall, 96.2% of the samples analysed in 2016 (EUCP and national programmes) fell within the legal limits (81,482 samples), i.e. the measured levels did not exceed the MRLs permitted in EU legislation; more specifically, 50.7% of the samples tested were free of quantifiable residues (residue levels below the LOQ), while 45.5% contained quantified residues below the MRLs. In 3.8% of the

samples, the residue levels exceeded the MRLs (3,175 samples).[1] Taking into account the analytical measurement uncertainty, 2.2% of the samples (1,833 samples) clearly exceeded these legal limits (non-compliance) triggering legal or administrative actions by competent authorities.

In the previous reporting year (2015), 97.2% of the samples fell within the legal limits and 53.3% were free of quantifiable residues. The difference in the MRL exceedance rate between 2015 and 2016 is mainly attributed to the finding of chlorate residues, a compound that was included for the first time in the pesticide data collection.

MRLs were exceeded in 7.2% of the samples from third countries; for 4.7% of the samples, the legal limit was clearly exceeded taking into account the measurement uncertainty (non-compliance). Products from reporting countries (EU, Iceland and Norway) had lower rates of MRL exceedance and non-compliance: 2.4% of the samples contained residues that exceeded the MRL, while 1.2% of the samples were non-compliant.

In 2016, 65,010 consignments of products covered by Regulation (EC) No 669/2009 on an increased level of official controls on imports of certain feed and food of non-animal origin were imported to the European Union. For laboratory analyses, 8,092 of these consignments were selected. A total of 343 (4.3%) were considered as non-compliant with EU legislation on pesticide residues MRLs, taking into account the measurement uncertainty.

In 2016, 1,676 samples of food intended for infants and young children were analysed. In 89.8% of the samples, no quantifiable residues were found (residues below the LOQ), whereas 171 samples (10.2%) contained quantifiable residues at or above the LOQ. Of these samples, 32 (1.9% of the baby food samples) exceeded the MRL of 0.01 mg/kg applicable for baby food.[2] The top three most frequently measured residues were copper, chlorates and fosetyl-Al.

In 2016, 5,495 samples of organic food (not including baby food samples) were taken; 4,568 samples (83.1%) were free of quantifiable residues. The percentage of organic samples containing residues in concentrations within the legal limits was 15.6% (856 samples); a significant portion of these samples contained only residues of substances that do not necessarily come from the use of pesticides (e.g. naturally occurring substances and persistent organic pollutants). The MRLs were exceeded in 1.3% of the organic samples analysed (71 samples) of which 0.7% (41 samples) were non-compliant after measurement uncertainty was taken into account.

In unprocessed food products, 50.1% of the samples were free of quantifiable residues, 46.9% of the samples contained quantified residues within legal limits and 3.9% exceeded the MRL. By comparison, processed products had a higher rate of samples without quantified residues (63.8%) and a lower occurrence of quantified residues (33.4%) as well as lower MRL exceedances rate (2.8%).

In total, 8,351 samples of products of animal origin were analysed. The majority of these samples was free of quantifiable residues (6,906 samples, 83%), while the MRL exceedance rate amounted to 1.9% of the samples. The MRL exceedances were mainly due to chlorate residues in milk. Chlorate is a substance that is formed as by-product of the use of chlorine disinfectants; thus, it is not necessarily related to the use as plant protection product. In 2016, chlorate was reported for the first time in the framework of the national pesticide monitoring programme.

Residues of more than one pesticide (multiple residues) were found in 30.1% of the samples. The frequency of multiple residues in unprocessed products (32.5%) is higher than in processed products (13.4%). In the unprocessed products, the highest frequency of multiple residues was found in gooseberries (85.7% of the total samples analysed), hops (81.8%), grapefruits (73.1%), currants (72%), blackberries (68.4%), table grapes (68.1%), raspberries (66.9%) and strawberries (65.4%).

[1] Throughout the report, results describing percentage of samples above the legal limit, within the legal limit and samples free of quantifiable residues are provided with one decimal. Due to the rounding to one decimal place, the added results for these three categories may slightly differ from 100%.

[2] Following the precautionary principle, the legal limit for food intended for infants and young children was set at a very low level equal or close to the limit of quantification; in general, a default MRL of 0.01 mg/kg is applicable unless lower legal limits for the residue levels are defined in Directives 2006/125/EC and 2006/141/EC.

Short-term dietary exposure assessment

The European Food Safety Authority (EFSA) performed the acute (short-term) dietary risk assessment for the pesticide/food product combinations covered by the EUCP. Overall, 122 pesticides were assessed. For 89 of those pesticides, the exposure was below the acute reference dose (ARfD). For the other 33 pesticides, the exposure assessment exceeded the ARfD in 209 samples (1.0% of the samples tested). The products with the highest number of exceedances of the ARfD were apples (76 samples), lettuce (46), peaches (39) and tomatoes (29). The pesticides which most frequently exceeded the ARfD were chlorpyrifos, iprodione and lambda-cyhalothrin. Considering these findings, EFSA concluded that the probability of being exposed to pesticide residues exceeding concentrations that may lead to negative health effects is low.

Long-term dietary exposure assessment

The long-term (chronic) exposure was calculated for all pesticides covered by the EUCP. For the first time, the calculations took into account results for all types of food products which are covered by the dietary intake model used for consumer risk assessment. Two scenarios were calculated, i.e. the adjusted upper-bound and the lower-bound scenario. The adjusted upper-bound exposure assessment methodology is a conservative screening, which is likely to overestimate the real risk as for samples without quantifiable residues it was assumed that residues were present at the numerical level of the LOQ. The lower-bound approach is based on assumptions that may underestimate the exposure to a certain extent, since it postulates that samples with residues reported as below the LOQ are completely free of the related pesticide.

According to the adjusted upper-bound scenario, the exposure amounted to less than 100% of the ADI for all pesticides except for dieldrin, dichlorvos, dimethoate (omethoate scenario) and the dithiocarbamates (ziram scenario, ziram being the dithiocarbamate with the highest chronic toxicity). For 142 pesticides out of the 165 covered by the EUCP, the estimated long-term exposure was less than 10% of the ADI; for 73 of these, exposure was lower than 1% of the ADI. In the lower-bound scenario, a wide safety margin to the ADI was observed for all pesticides assessed. The estimated exposure was significantly lower in the lower-bound scenario compared to the upper-bound approach. It is to be noted that the high proportion of samples with pesticide residues below the LOQ results in a significant difference in the total exposure calculated between the lower-bound and upper-bound scenarios. EFSA concluded that according to the current scientific knowledge, the long-term dietary exposure to pesticides covered by the 2016 EUCP was unlikely to pose a health risk to consumers.

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1. Background

1.1. Legal Basis

Pesticide residues resulting from the use of plant protection products on crops or food products that are used for food or feed production may pose a risk for public health. For this reason, a comprehensive legislative framework has been established in the European Union (EU), which defines rules for the approval of active substances used in plant protection products,[3] the use of plant protection products and for pesticide residues in food. In order to ensure a high level of consumer protection, legal limits, so called 'maximum residue levels' or briefly 'MRLs', are established in Regulation (EC) No 396/2005. EU-harmonised MRLs are set for more than 500 pesticides covering 370 food products/food groups. A default MRL of 0.01 mg/kg is applicable for pesticides not explicitly mentioned in the MRL legislation. Regulation (EC) No 396/2005 imposes on Member States the obligation to carry out controls to ensure that food placed on the market is compliant with the legal limits. This regulation establishes both EU and national control programmes:

- EU-coordinated control programme: this programme defines the food products and pesticides that should be monitored by all Member States. The EU-coordinated programme (EUCP) relevant for the calendar year 2016 was set up in Commission Implementing Regulation (EU) No 2015/595[4] hereafter referred to as '2016 monitoring regulation';
- National control programmes: Member States usually define the scope of national control programmes focussing on certain products, which are expected to contain residues in concentrations exceeding the legal limits, or on products that are more likely to pose risks for consumer safety (Article 30 of Regulation (EC) No 396/2005).

According to Article 31 of Regulation (EC) No 396/2005, Member States are requested to share the results of the official controls and other relevant information with the European Commission, the European Food Safety Authority (EFSA) and other Member States. EFSA is responsible for preparing an Annual Report on pesticide residues, analysing the data in view of the MRL compliance of food available in the EU and the exposure of European consumers to pesticide residues. In addition, based on the findings, EFSA should derive recommendations for future monitoring programmes.

Specific MRLs are set in Directives 2006/125/EC[5] and 2006/141/EC[6] for food intended for infants and young children. Following the precautionary principle, the legal limit for this type of food products was set at a very low level (limit of quantification); in general, a default MRL of 0.01 mg/kg is applicable unless lower legal limits for the residue levels are defined in these Directives. Regulation (EU) No 609/2013[7] repeals the aforementioned Directives; however, the pesticide MRLs of Directive 2006/125/EC and 2006/141/EC were still applicable in 2016. In the framework of the 2016 EUCP, each Member State had to take at least 10 samples of processed cereal-based baby food, according to the 2016 monitoring regulation.

It is noted that some of the active substances for which legal limits are set under Regulation (EC) No 396/2005 are also covered by Commission Regulation (EU) No 37/2010 on pharmacologically active substances.[8] For these so-called dual use substances, Member States perform controls in accordance

[3] Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. OJ L 309, 24.11.2009, p. 1–50.

[4] Commission implementing Regulation (EU) 2015/595 of 15 April 2015 concerning a coordinated multiannual control programme of the Union for 2016, 2017 and 2018 to ensure compliance with maximum residue levels of pesticides and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin. OJ L 99, 16.4.2015, p. 7–20.

[5] Commission Directive 2006/125/EC of 5 December 2006 on processed cereal-based foods and baby foods for infants and young children. OJ L 339, 6.12.2006, p. 16–35.

[6] Commission Directive 2006/141/EC of 22 December 2006 on infant formulae and follow-on formulae and amending Directive 1999/21/EC. OJ L 401, 30.12.2006, p. 1–33.

[7] Regulation (EU) No 609/2013 of the European Parliament and of the Council of 12 June 2013 on food intended for infants and young children, food for special medical purposes, and total diet replacement for weight control and repealing Council Directive 92/52/EEC, Commission Directives 96/8/EC, 1999/21/EC, 2006/125/EC and 2006/141/EC, Directive 2009/39/EC of the European Parliament and of the Council and Commission Regulations (EC) No 41/2009 and (EC) No 953/2009. OJ L 181, 29.6.2013, p. 35–56.

[8] Commission Regulation (EU) No 37/2010 of 22 December 2009 on pharmacologically active substances and their classification regarding maximum residue limits in foodstuffs of animal origin. OJ L 015, 20.1.2010, p. 1.

with Council Directive 96/23/EC[9] for veterinary medicinal products; results of the controls for dual use substances[10] are also reported in the framework of this report.

It should be highlighted that for organic products no specific MRLs are established. Thus, the MRLs set in Regulation (EC) No 396/2005 apply equally to organic food and to conventional food. However, Article 5 of Regulation (EC) No 889/2008[11] on organic production of agricultural products defines the restriction of using plant protection products.

Regulation (EC) No 669/2009[12] lays down rules concerning the increased level of official controls to be carried out on a list of food and feed of non-animal origin which, based on known or emerging risks, requires an increased level of controls prior to their introduction into the EU. The food products, the country of origin of the products, the frequency of checks to be performed at the point of entry into the EU territories and the hazards (e.g. pesticides residues, not approved food additives, mycotoxins) are specified in Annex I to this regulation which is regularly updated; for the calendar year 2016, three updated versions are relevant.[13,14,15]

1.2. Terms of Reference

In accordance with Article 32 of Regulation (EC) No 396/2005, EFSA shall prepare an annual report on pesticide residues concerning the official control activities for food and feed carried out in 2016.

The annual report shall include at least the following information:

- an analysis of the results of the controls on pesticide residues provided by EU Member States;
- a statement of the possible reasons why the MRLs were exceeded, together with any appropriate observations regarding risk management options;
- an analysis of chronic and acute risks to the health of consumers from pesticide residues;
- an assessment of consumer exposure to pesticide residues based on the information provided by Member States and any other relevant information available, including reports submitted under Directive 96/23/EC.[16]

In addition, the report may include an opinion on the pesticides that should be included in future programmes.

2. Introduction

This report provides a detailed insight in the control activities at the European level and the most relevant results on the official control activities performed by the EU Member States, including Iceland and Norway that are members of the European Free Trade Association (EFTA) and of the European Economic Area (EEA). The main purpose of the data analysis presented in this report is to give risk managers the necessary information to decide on risk management policy issues. At the same time, the report should also inform citizens who have an interest in food safety on the situation regarding pesticide residue in food. In particular, the following questions should be addressed:

[9] Council Directive 96/23/EC of 29 April 1996 on measures to monitor certain substances and residues thereof in live animals and animal products and repealing Directives 85/358/EEC and 86/469/EEC and Decisions 89/187/EEC and 91/664/EEC. OJ L 125, 23.5.1996, p. 10.

[10] The comprehensive results from the monitoring of veterinary medicinal product residues and other substances in live animals and animal products are published in a separate report (EFSA, 2017b).

[11] Commission Regulation (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control. OJ L 250, 18.9.2008, p. 1–84.

[12] Commission Regulation (EC) No 669/2009 of 24 July 2009 implementing Regulation (EC) No 882/2004 of the European Parliament and of the Council as regards the increased level of official controls on imports of certain feed and food of non-animal origin and amending Decision 2006/504/EC. OJ L 194, 25.7.2009, p. 11–21.

[13] Commission Implementing Regulation (EU) 2015/2383 of 17 December 2015 amending Annex I to Regulation (EC) No 669/2009 as regards the list of feed and food of non-animal origin subject to an increased level of official controls on imports. OJ L 332, 18.12.2015, p. 57–62.

[14] Commission Implementing Regulation (EU) 2016/443 of 23 March 2016 amending Annex I to Regulation (EC) No 669/2009 as regards the list of feed and food of non-animal origin subject to an increased level of official controls on imports. OJ L 78, 24.3.2016, p. 51–57.

[15] Commission Implementing Regulation (EU) 2016/1024 of 24 June 2016 amending Regulation (EC) No 669/2009 implementing Regulation (EC) No 882/2004 of the European Parliament and of the Council as regards the increased level of official controls on imports of certain feed and food of non-animal origin. OJ L 168, 25.6.2016, p. 1–6.

[16] Council Directive 96/23/EC of 29 April 1996 on measures to monitor certain substances and residues thereof in live animals and animal products and repealing Directives 85/358/EEC and 86/469/EEC and Decisions 89/187/EEC and 91/664/EEC. OJ L 125, 23.5.1996, p. 10–32.

- What actions were taken by the national competent authorities responsible for food control to ensure that pesticide residues in food comply with the European food standards?
- How frequently were pesticide residues found in food?
- Which food products frequently contained pesticide residues?
- Which pesticides were found?
- Compared with previous years, are there any trends?
- In which products were violations of the legal limits identified by the Member States?
- Did the residues in food pose a risk to consumer health?

This report, by its use of graphics aims to convey the answers to these questions in a way that can be understood without detailed knowledge of the subject.

Together with this report, EFSA has published an Excel file as a supplement, where detailed results on the determinations/samples exceeding the legal limit can be found. Some of the results presented in this document can also be visualised in an interactive on-line EFSA Pesticides Dashboard.

The following terminology is used throughout the report to describe the results for the analysed samples:

- Samples free of quantifiable residues: the term is used to describe results where the analytes were not present in concentrations at or exceeding the limit of quantification (LOQ). The LOQ is the smallest concentration of an analyte that can be quantified. It is commonly defined as the minimum concentration of the analyte in the test sample that can be determined with acceptable precision and accuracy;
- Samples with quantified residues within the legal limits (below or at the MRL): these samples contained quantified residues of one or several pesticides in concentrations below or at the MRL;
- Samples with quantified residues exceeding the legal limit (above the MRL) for one or several pesticides, as reported by the Member States;
- Non-compliant samples: Samples containing residue concentrations clearly exceeding the legal limits, taking into account the measurement uncertainty. The concept of measurement uncertainties and the impact on the decision of non-compliance is described in Figure 1 of the 2014 guidance document on reporting data on pesticide residues (EFSA, 2015a). It is required in official controls that the uncertainty of the analytical measurement is taken into account before legal or administrative sanctions are imposed on food business operators for infringement of the MRL legislation (Codex, 2006; Ellison and Williams, 2012; European Commission, 2018).

It is noted that a separate analysis of samples with residues below the limit of detection (LOD),[17] thus, samples free of any detectable residues, could not be performed, since this information is not reported consistently by the reporting countries. The possibility of accredited laboratories reporting the LOD depends on the need of having this parameter validated. EFSA recommends including this parameter under the validation criteria in the Guidance on Method Validation and Quality Control Procedures for Pesticide Residues Analysis in Food and Feed (European Commission, 2018). Alternatively, the LOD could be reported as an external parameter from the accredited scope. In each EU Member State and EFTA country, two control programmes are in place: an EU-coordinated control programme (EUCP) and a national control programme (NP). The results of the 2016 EU-coordinated programme, as defined in Commission Implementing Regulation (EU) No 2015/595 are summarised in Section 3 of this report. The purpose of this programme is to generate indicator data that are statistically representative of the MRL exceedance rate for food of plant and animal origin placed on the European common market, and which can be used to estimate the actual long-term consumer exposure of the European population.

In contrast to the EUCP, the national control programmes are mainly risk based and are complementary to the randomised/non-targeted controls performed in the context of the EU-coordinated programme; the design and results of the national control programmes are reported in Section 4. The results of samples taken in the framework of import control required under Regulation (EC) No 669/2009, as well as results for baby food and for organic products, are also reported in this Section 4. Major focus was put on samples that exceeded the legal limit in place.

[17] The LOD is the lowest concentration of a pesticide residue that can be identified in a sample with an acceptable degree of certainty. However, the amount of the analyte cannot be quantified reliably.

The results of the dietary exposure assessments for individual pesticides are described in Section 5. This section is intended to characterise the risks to consumers related to pesticide residues in food.

Additional information and more detailed results related to the 2016 monitoring activities can be found on the websites of the national competent authorities (see Appendix A). In addition, EFSA compiled a technical report (EFSA, 2018a) containing the national summary reports submitted by the reporting countries, where further details on the pesticide monitoring activities at the national level are provided.

3. EU-coordinated control programme

3.1. Design of the EU-coordinated control programme (EUCP)

According to the 2016 EU monitoring Regulation (EU) No 2015/595, reporting countries in accordance with Annex I, were requested to analyse in total 11 different food products: apples, head cabbage, leek, lettuce, peaches, strawberries, tomatoes, rye, wine, cow's milk and swine fat, and in accordance with Annex II, were requested to analyse a certain number of samples depending on their population that varied from 12 to 93 samples per food product.

In total, 12,168 samples (excluding the samples of processed cereal-based baby foods) were analysed in the framework of the 2016 EUCP. The breakdown of the number of samples taken by each country is reported in Figure 1. It is noted that not all the Member States submitted results for the number of samples as defined in the 2016 monitoring Regulation (Hungary and Bulgaria). Further clarification should be provided by these reporting countries.

The regulation defined a total of 165 pesticides to be analysed; 157 of these in food of plant origin and 22 in food of animal origin. The list of pesticides covered by the 2016 EUCP, including further details on the pesticides that had to be analysed in food of plant or animal origin, is presented in Appendix B, Table B.1. The pesticide list of the 2016 EUCP was reduced (n = 165) compared to the 2013 EUCP list (n = 209): thus, 45 substances[18] were no longer requested to be analysed as part of the 2016 EUCP.[19] Compared to 2013, one new substance (fenpropidin) was included in the 2016 EUCP. For the common 164 pesticides and food products, EFSA performed a comparative assessment of results reported in 2016 and 2013.

In 2013,[20] mostly the same food products were analysed as in 2016, with the exception of oats that was only analysed in 2013.

The EUCP requested each country to take at least one sample from organic production for each of the 11 food products in focus. For the 767 organic samples reported under the 2016 EUCP, EFSA pooled the results with the results of organic samples reported in the framework of national control plans. Readers interested in comparative results for conventional and organic products are referred to Section 4.2.7.

In addition to the food products mentioned above, each reporting country had to take at least 10 samples of baby foods for infants and young children other than infant formulae, follow-on formulae and processed cereal-based baby food. A comprehensive analysis of the results of these 423 samples is reported in Section 4.2.6 alongside with the results on other baby food products, such as infant formulae and follow-on formulae.

[18] 2,4-D (RD), amitraz (RD), amitrole, azinphos-ethyl, benfuracarb, bixafen (RD), bromuconazole, carbosulfan, clorfenvinphos, chlorobenzilate, cyromazine, dichlofluanid, dicrotophos, endrin, ethoprophos, flonicamid, fluazifop-P-butyl (RD), flubendiamide, formothion, haloxyfop-R (RD), ioxynil, isofenphos-methyl, isoprocarb, maleic hydrazide (RD), meptyldinocap (RD), metaflumizone, metconazole, metobromuron, nitenpyram, phenthoate, phosalone, phoxim, prochloraz (RD), propoxur, prothioconazole (RD), prothiofos, pyrazophos, pyrethrins, resmethrin (RD), rotenone, tetramethrin, trichlorfon, trifluralin, triticonazole and zoxamide.

[19] Some pesticides were removed from the EUCP because of a very low frequency of quantification or because of analytical difficulties. Many of the pesticides removed from the EUCP were included in the 'Working document on pesticides to be considered for inclusion in the national control programmes to ensure compliance with maximum residue levels of pesticides residues in and on food of plant and animal origin' (European Commission, 2016). For some of these substances, improvements of analytical methods were considered necessary, while for others it needs to be verified whether residues are found in a significant percentage of the samples. After an evaluation period under the national programmes, the inclusion of these substances in the EUCP will be reconsidered.

[20] Commission Implementing Regulation (EU) No 1274/2011 of 7 December 2011 concerning a coordinated multiannual control programme of the Union for 2012, 2013 and 2014 to ensure compliance with maximum residue levels of pesticides and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin, OJ L 325, 8.12.2011.

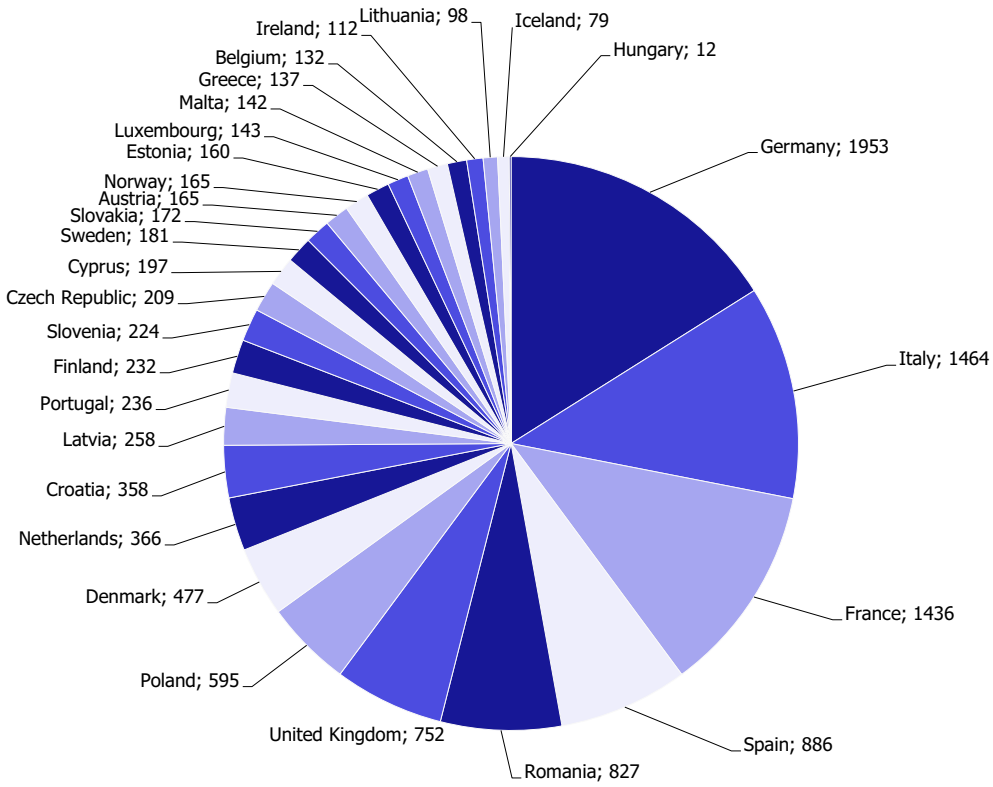


Figure 1: Number of samples taken by reporting country under the EUCP (excluding food for infants and young children)

3.2. Results by pesticide

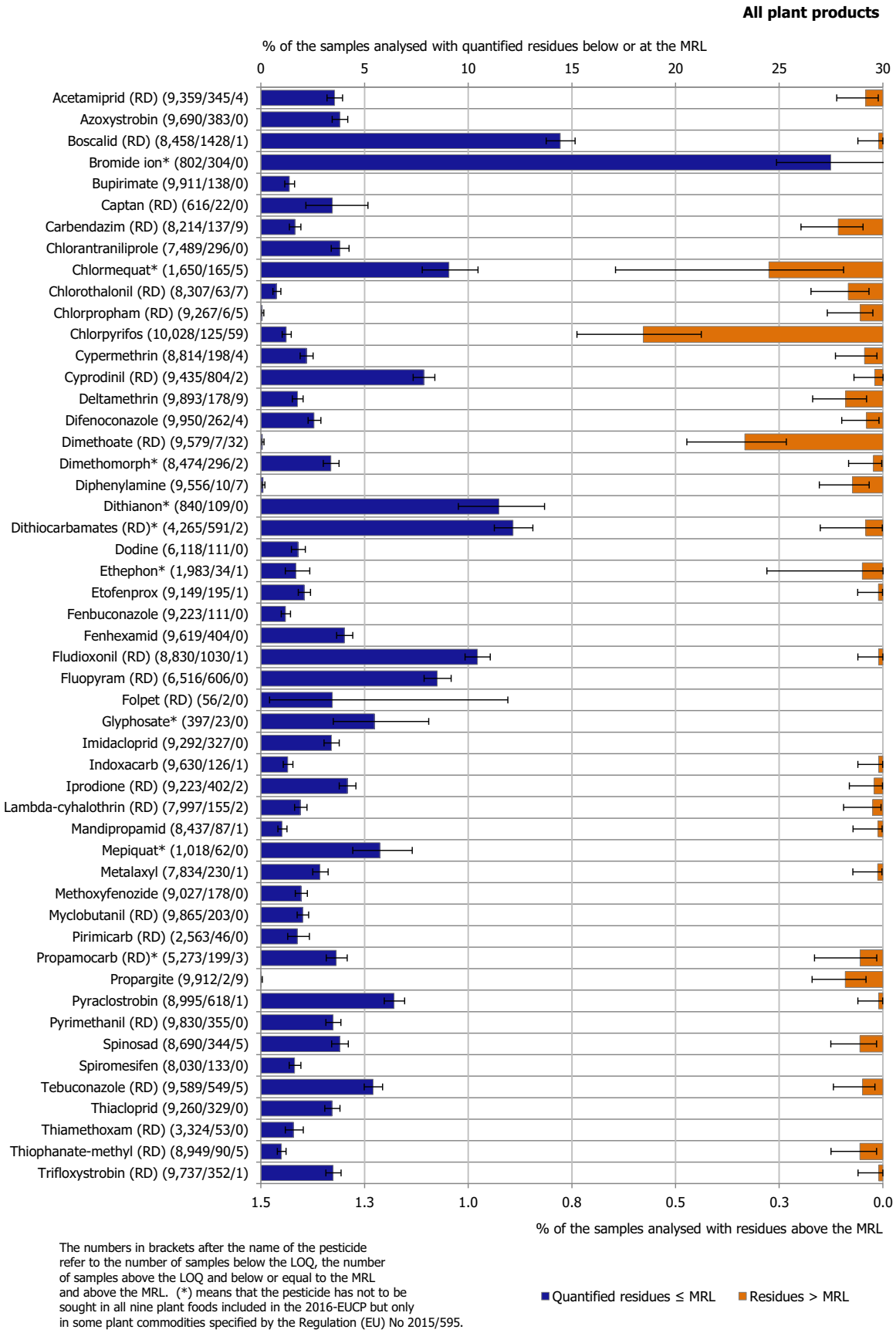
Among the 157 pesticides to be analysed in plant products, the following 28 have not been found in quantifiable concentrations in any of the samples analysed (the number in brackets refer to the total number of samples analysed for the given pesticide): abamectin (1,259), acephate (9,101), aldicarb (8,671), biphenyl (7,396), bitertanol (9,338), carbofuran (6,791), diazinon (10,176), dicloran (9,684), dieldrin (8,499), diniconazole (8,906), EPN (9,253), ethion (9,961), fenarimol (9,548), fenbutatin oxide (1,741), fenitrothion (9,866), fenpropidin (6,660), fenthion (7,883), fluquinconazole (9,067), flusilazole (10,044), methamidophos (9,447), methidathion (10,018), monocrotophos (9,442), oxydemeton-methyl (8,017), parathion-methyl (8,511), tefluthrin (8,921), tetradifon (9,084), tolylfluanid (7,033) and triazophos (10,218).

In plant products, 129 different substances were found in quantifiable concentrations. Residues exceeding the legal limits were related to 56 different pesticides. Pesticides which were quantified in at least 1% of the samples of plant products, or for which an exceedance was identified in at least 0.05% of the samples analysed, are presented in Figure 2. In this figure, the pesticides' findings are ordered alphabetically and the figures in brackets next to the name of the pesticide refer to the number of samples without quantified residues (residues below the LOQ), the number of samples with quantified residues within the MRL and the number of samples exceeding the MRLs, respectively.

Bromide ion – to be analysed only in lettuce and tomatoes – was by far the pesticides most frequently quantified (detected in quantifiable concentration in 27.5% of the samples tested for it). Among the pesticides that had to be analysed in all plant products, the most frequently found pesticides quantified in more than 5% of the samples analysed were boscalid (14.5%), fludioxonil (10.5%), fluopyram (8.5%), cyprodinil (7.9%), pyraclostrobin (6.4%) and tebuconazole (5.5%). Among the pesticides that were requested to be assessed only in selected food products, the most frequently quantified substances besides bromide ion were dithiocarbamates (residue definition (RD)) (12.2%), dithianon (11.5%), chlormequat (9.3%), mepiquat (5.7%) and glyphosate (5.5%). Further details on the pesticides analysed under the EU-coordinated control are reported in Appendix B and Section 3.3.

Regarding food products of animal origin (cow's milk and swine fat), the following 11 of the 22 pesticides covered by the EUCP were not found in quantifiable concentrations in any of the samples

tested (the number in brackets refers to the total number of samples analysed): bifenthrin (1,230), chlorpyriphos (1,249), diazinon (1,341), endosulfan (1,188), famoxadone (435), fenvalerate (493), heptachlor (982), hexachlorocyclohexane-beta (1,252), indoxacarb (237), methoxychlor (1,051) and parathion (1,205). The 11 other pesticides were found sporadically, dichlorodiphenyltrichloroethane (DDT), hexachlorobenzene and chlordane being the most frequently quantified compounds with respectively 2.8%, 1.8% and 1.0% of the samples of milk and swine fat analysed in the framework of the 2016 EUCP. The other pesticides were quantified in less than 0.4% of the samples, and they were mainly non-approved pesticides present in the food chain due to their persistence (i.e. the persistent organic pollutants (POPs) such as dieldrin, HCH-alpha and lindane), active substances authorised for use in livestock covered by Regulation (EC) No 37/2010 (cypermethrin and permethrin) and other approved compounds (chlorpyrifos-methyl, deltamethrin and pirimiphos-methyl).



The numbers in brackets after the name of the pesticide refer to the number of samples below the LOQ, the number of samples above the LOQ and below or equal to the MRL and above the MRL. (*) means that the pesticide has not to be sought in all nine plant foods included in the 2016-EUCP but only in some plant commodities specified by the Regulation (EU) No 2015/595.

Figure 2: Pesticides quantified in plant products (quantification rate > 1% and/or MRL exceedance rate > 0.05%), sorted alphabetically

3.3. Results by food products

In this section, detailed results concerning the 11 food products covered by the 2016 EUCP are reported. For each food product, the following analyses are presented:

- Key figures to describe the results for the matrices analysed, such as the number of samples analysed, the percentage of samples free of quantifiable residues (samples with residues below the LOQ), percentage of samples with multiple residues, the number/percentage of samples exceeding the legal limit and number/percentage of samples found to be non-compliant;
- Key characteristics regarding the pesticides found (e.g. number of pesticides quantified, the most frequently found pesticides and the number of pesticides with MRL exceedance);
- In a pie chart, the percentages of samples free of quantifiable residues (residues below the LOQ) and of samples with single and multiple residues (residues ≥ LOQ) are presented;[21]
- Bar charts present the pesticides found, sorted according to the frequency of quantification in 2016. The percentages of samples with one or several residues at or above the LOQ but below or equal to the MRL are included on the left part of the chart (blue bars; upper x-axis scale). In the same chart, the percentages of samples with one or several residues exceeding the MRLs are included on the right part of the chart (orange bars; lower x-axis scale). The figures in brackets next to the name of the pesticide refer to the number of samples without quantifiable residues (samples with residues below the LOQ), the number of samples with quantified residues within the legally permitted concentrations (MRLs) and the number of samples exceeding the MRLs, respectively. The number and percentage of samples exceeding the legal limit are based on the judgement of the reporting country. The light bars refer to the results of 2013, while the bars in the darker shade refer to the results of 2016. A maximum of 45 pesticides are plotted for each food product. The pesticides not quantified in 2016, but with MRL exceedances observed in 2013, are plotted at the bottom of the bar chart. Pesticides in the scope of the 2016 monitoring programme and not in the 2013 programme are marked with an asterisk. As a major change this year, confidence intervals (CI) associated to frequency of quantification and frequency of MRL exceedances were added. CI for a proportion (e.g. % of quantified samples) were estimated using the Clopper–Pearson (exact) method that is a common method for calculating binomial confidence intervals (Clopper and Pearson, 1934; Abraham, 2013). This method was selected because is the most conservative for estimating the CI based on the binomial distribution (which is a discrete distribution, thus cumulative probabilities have discrete jumps) but guarantee that the coverage is at least one minus the nominal level specified. The estimation is based on the total number of samples analysed (as indicated in each specific section and figure) and the number of samples quantified (e.g. number of samples with at least one quantification).
- Dot plot figures present the distribution of the measured residue levels, expressed as a percentage of the MRL applicable for the specific pesticide/crop combination. The figures in brackets next to the name of the pesticide refer to the number of samples without quantifiable residues, the number of samples with quantified residues within the legally permitted concentrations and the number of samples exceeding the MRLs, respectively.[22] Each result at or above the LOQ is depicted as a dot in the respective figure. Results above 300% of the MRL are mentioned on the right side of the chart. The MRL in place at the beginning of the calendar year 2016 was used as a reference value to re-calculate the reported residue concentration as percentage of the MRL or the one reported by the Member State in case of a change during the year.[23,24]
- Further information on the pesticides most frequently found in the concerned food products (pesticides found in at least 5% of the samples, unless stated differently).

[21] Due to the rounding of the numerical results, the total calculated sum may slightly differ from 100%.

[22] The number of samples within and exceeding the legal limit are based on the judgement of the reporting country.

[23] The MRLs applicable at the beginning of the reference period (January 2016) as reported in the MRL database of the European Commission were used for the calculation. Whenever a MRL changed during the calendar year, the MRL reported by the MS to be in place, was taken. The reason for this approach is that the exact date of sampling to decide which MRL is applicable is not reported to EFSA.

[24] The fact that the MRL used to express the residue concentration as percentage of the MRL (i.e. MRL in place at the beginning of the calendar year) and the MRL used by reporting country to decide on an MRL exceedance may be different, explains some inconsistencies between the bar charts and the dot plot figures and the results presented on the on-line Pesticides Dashboard.

In a separate Excel file published as a supplement to this report, the full list of samples exceeding the MRLs can be found, including information on the measured residue concentrations and the origin of the samples.

3.3.1. Apples

In 2016, 1,680 samples of apples were analysed. In 614 samples (36.5%), no quantifiable pesticide residues were found, while 1,066 samples (63.5%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 702 samples (41.8%); up to 10 different pesticides were reported in an individual apples sample (Figure 3). The overall quantification rate recorded in 2016 was slightly lower than the one in 2013 (67% of the 2013 samples contained pesticide residues).

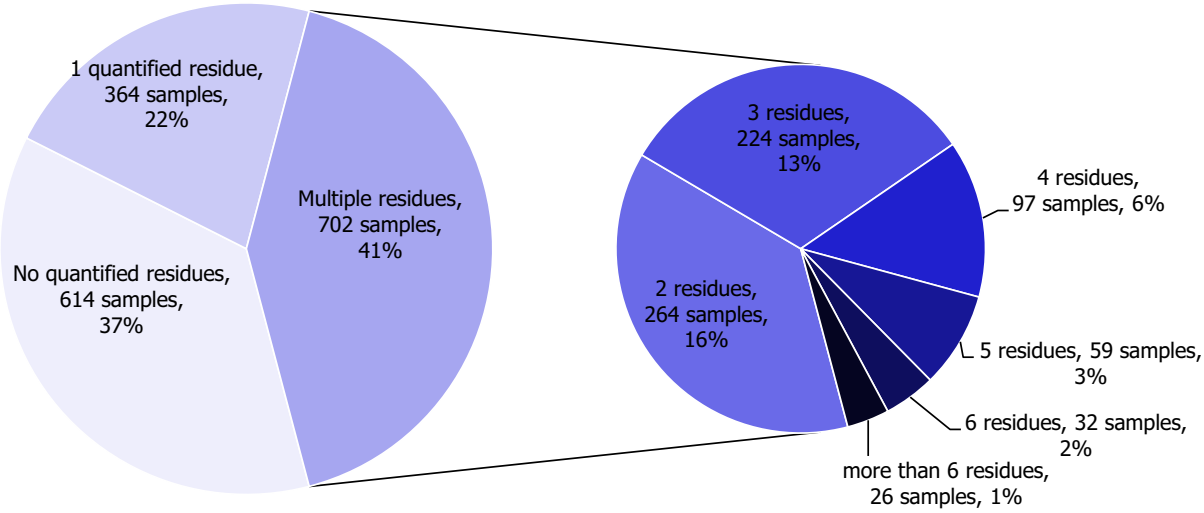


Figure 3: Number of quantified residues in individual apple samples

In 2.7% of the samples (46 samples), the residue concentrations exceeded the MRLs related to 11 pesticides; 1.7% of the samples (28 samples) were reported as non-compliant with the MRL, taking into account the measurement uncertainty. The MRL exceedances were mainly related not only to EU-produced apples (9 from Italy, 8 from Romania, 4 from Cyprus, 3 from Croatia, 3 from Poland, 2 from Spain, 2 from Greece, 1 from the Czech Republic, 1 from Malta, 1 from the Netherlands, 1 from Portugal, and 1 from Slovenia) but also to third countries (5 from Chile, 1 sample from Brazil, 1 from the Republic of Macedonia, 1 from Russia and 1 from the USA) and 1 sample with unknown origin.

In total, 79 different pesticides were quantified (residue levels equal to or greater than the LOQ). The most frequently quantified pesticides were captan (RD)[25] (quantified in 25.0% of the tested samples), boscalid (21.0%) and dithianon (19.8%). The MRL was exceeded for 11 different pesticides, most frequently for chlorpyrifos (26 samples mostly from the EU, 1.6% of the samples analysed), diphenylamine (7 samples from Chile, Greece and USA), dimethoate (4 samples from Romania and Malta) and carbendazim (4 samples from Cyprus).

Figure 4 depicts the 2016 and 2013 results for all pesticides with MRL exceedances and for the most frequently quantified pesticides. Compared to 2013, the quantification rate was in the same range for most pesticides. For dithiocarbamates, pirimicarb, chlorpyrifos, thiabendazole, diphenylamine[26] and propargite, a decreased quantification rate was observed in 2016. For fludioxonil and fluopyram, an increased quantification rate was observed in 2016.

An increased number of distinct pesticides with MRL exceedances were noted in 2016 (11 pesticides versus nine pesticides in 2013). MRL exceedances for lambda-cyhalothrin, diphenylamine, 2-phenylphenol, propargite, chlorpropham, propamocarb, dimethomorph and bromopropylate were only identified in 2016. On the contrary, no MRL exceedance was reported in 2016 for pesticides that

[25] Captan residue definition changed during the year 2016. Throughout the report, the report name 'captan (RD)' refers to results enforcing both definitions: 'captan' and 'sum of captan and THPI, expressed as captan'.

[26] The MRL for diphenylamine in apples was lowered in 2014 following a decision on non-approval of the active substance. However, it was noted that unavoidable cross-contamination affecting untreated apples still occur. The currently applicable MRL of 0.1 mg/kg will be re-considered in 2018. The residues found in apples produced in the EU ranged from 0.19 to 1.1 mg/kg.

were found to exceed the legal limit in 2013, e.g. fenvalerate, fenazaquin, fenbutatin oxide, fenthion, flusilazole and methomyl. For pesticides with MRL exceedances in the both years (chlorpyrifos, carbendazim and dimethoate), a significant increase of MRL exceedance rate was observed in 2016 for chlorpyrifos. This higher rate is assumed to be related to the modification of the MRL value for chlorpyrifos in apples (from 0.5 to 0.01 mg/kg) in 2016.

The individual residue concentrations, expressed as a percentage of the respective MRL are plotted in Figure 5. Further information on the most frequently quantified pesticides found in apples in 2016 in at least 10% of the samples is compiled in Table 1.

Table 1: Pesticides most frequently quantified in apples in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009)
Captan (RD)	25.0	All pesticides listed under the Pesticide column are approved fungicides
Boscalid (RD)	21.0	
Dithianon	19.8	
Fludioxonil (RD)	15.2	
Pyraclostrobin	12.4	
Dithiocarbamates (RD)	11.7	
Dodine	11.4	

LOQ: limit of quantification; RD: residue definition.

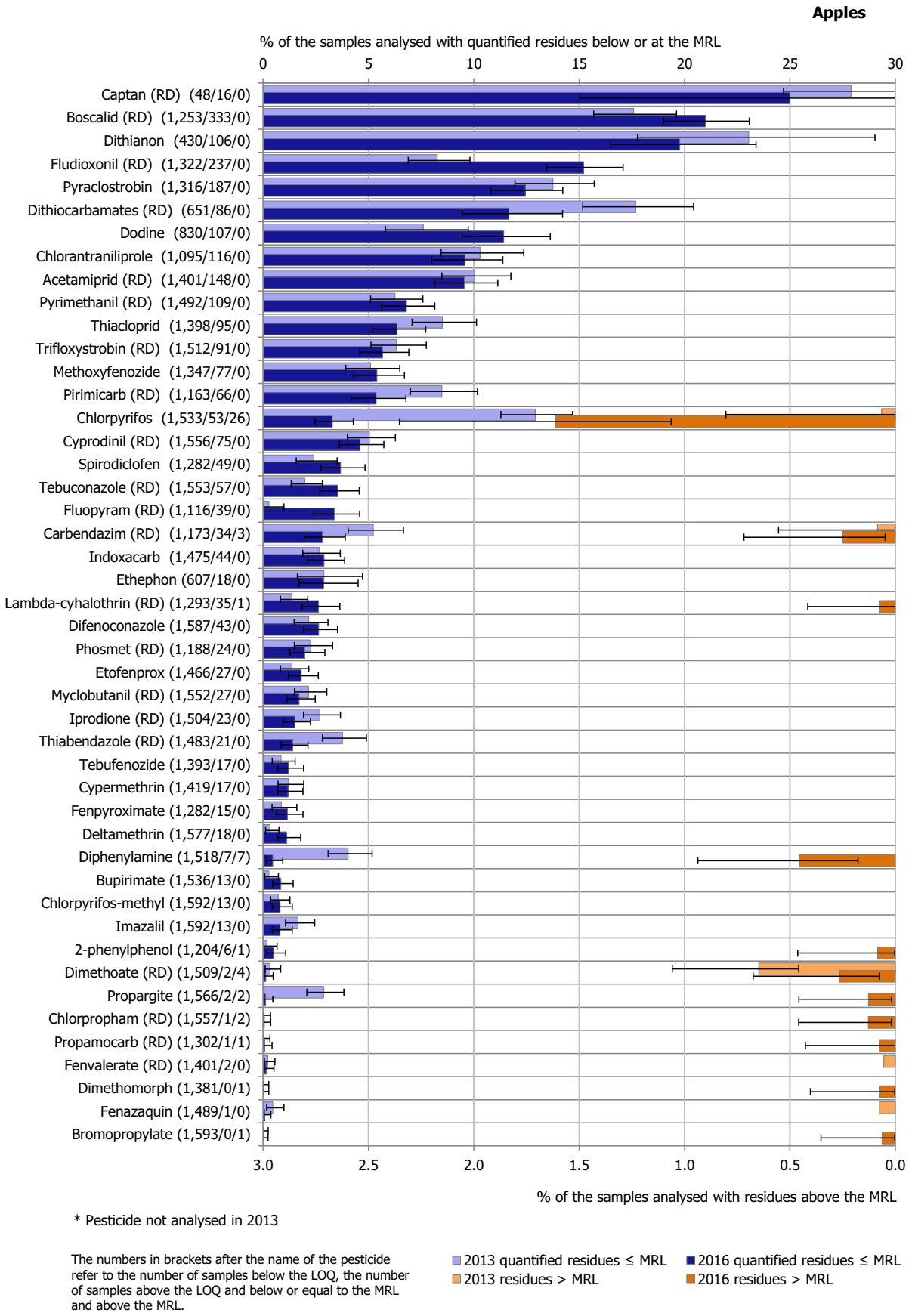


Figure 4: Percentage of apple samples with quantified residues below or equal to the MRL and with residues above the MRL

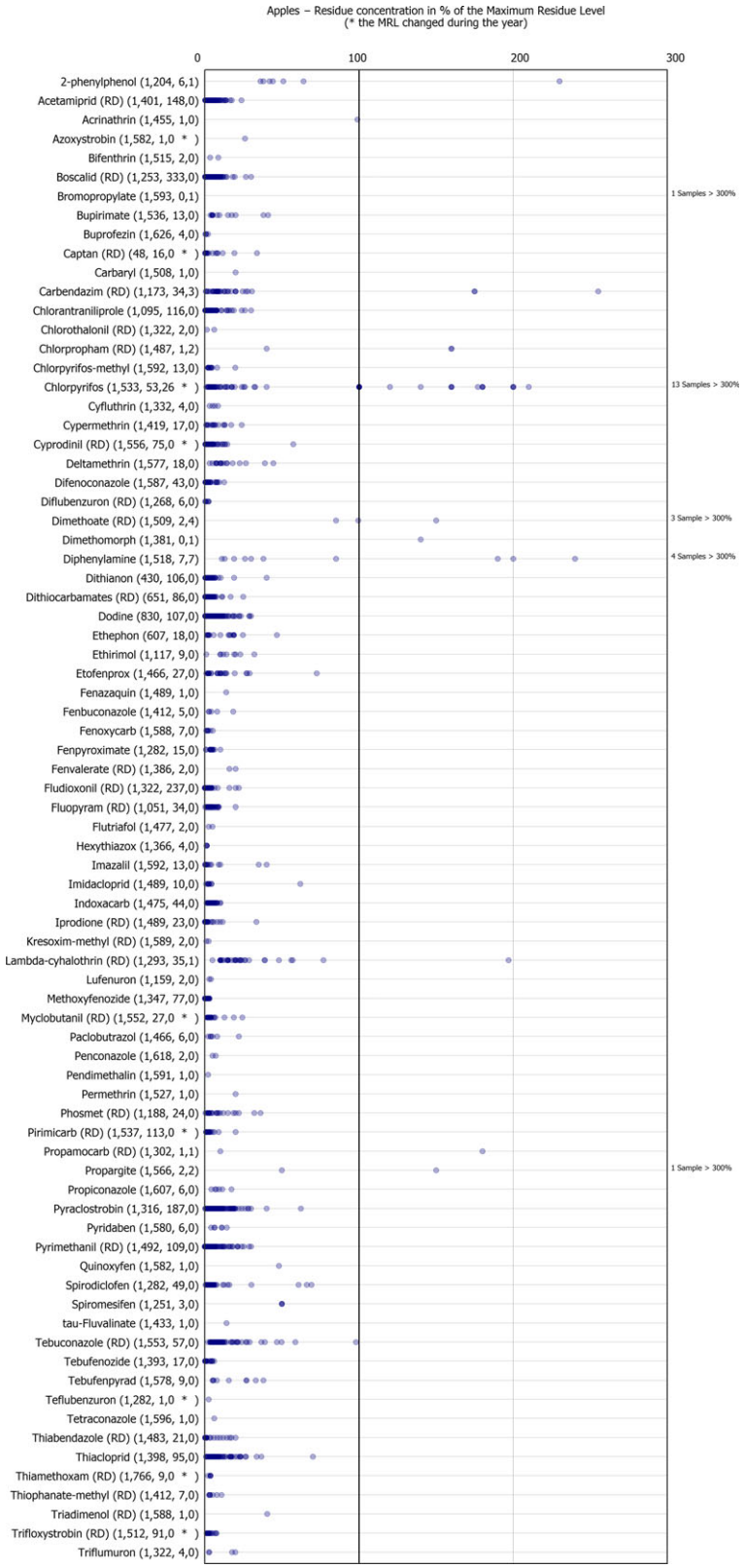


Figure 5: Residue concentrations measured in apples, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.2. Head cabbage

In 2016, 987 samples of head cabbages were analysed; in 837 samples (84.8%), no quantifiable pesticide residues were found, while 150 samples (15.2%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 63 samples (6.4%); up to 9 different pesticides were reported in an individual head cabbage sample (Figure 6). Compared to 2013, a decline of the overall quantification rate was observed in 2016 (in 2013, 23.5% of the samples contained pesticide residues).This decline can be justified by the fact that dithiocarbamates was not to be analysed during the 2016 EUCP.

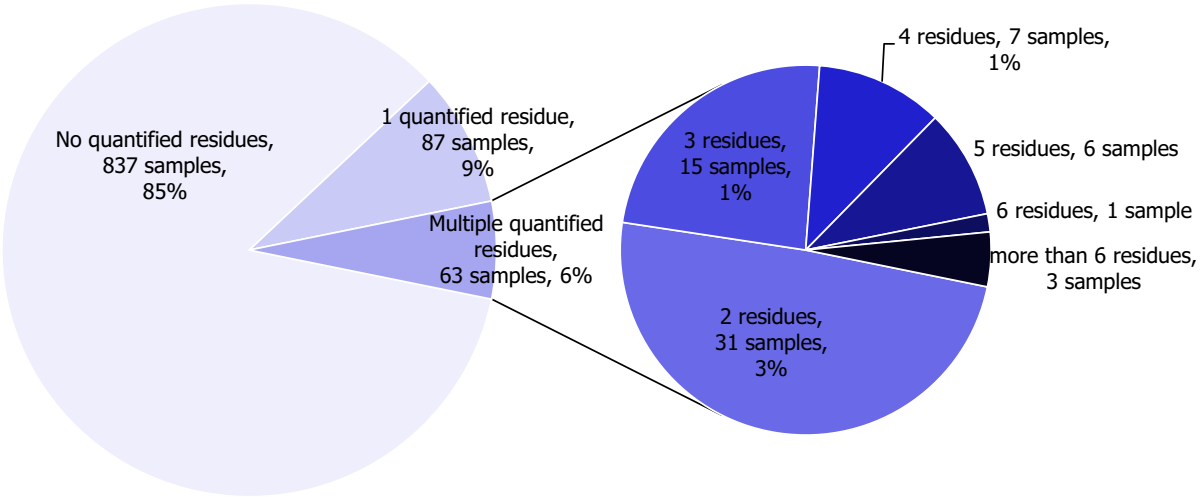


Figure 6: Number of quantified residues in individual head cabbage samples

In 1.1% of the samples (11 samples), the residue concentrations exceeded the MRLs; 5 samples were reported as non-compliant, taking into account the measurement uncertainty. The MRL exceedances were all related to EU products (4 from Germany, 3 from Malta, 1 sample from Austria, 1 from France, 1 from Poland and 1 from Portugal).

In total, 35 different pesticides were quantified (residue levels equal to or greater than the LOQ). The most frequently found pesticides were difenoconazole (quantified in 3.8% of the tested samples), azoxystrobin (3.7%) and boscalid (3.5%). The MRL was exceeded for 6 different pesticides: chlorpyrifos in 6 samples from Malta (N=3), France, Portugal and Poland; difenoconazole (4 samples from Germany), propamocarb (one sample from Austria), indoxacarb (one sample from Germany), pyraclostrobin (one sample from Germany) and propyzamide (one sample from Austria).

Figure 7 presents the 2016 and 2013 rates of quantification and MRL exceedance. Compared to 2013, the quantification rate was in the same range for most of the pesticides, except for difenoconazole, azoxystrobin and thiacloprid, for which a significant increased quantification rate was observed in 2016. Some substances were only found in 2013 (bifenthrin, clothianidin, dimethomorph, diphenylamine, fenhexamid, linuron, lufenuron, malathion, methiocarb, pyrimethanil, thiabendazole, trifloxystrobin) with the following only found in 2016: fluopyram, chlorantraniliprole, myclobutanil, spinosad, etofenprox, acetamiprid, mandipropamid, bupirimate and propyzamide, pyridaben. A number of pesticides were found exceeding the MRL where no such event was noted in 2013 (e.g. propamocarb, indoxacarb, chlorpyrifos, pyraclostrobin, propyzamide). Conversely, MRL exceedances were noted only in 2013 for thiophanate-methyl, chlorpropham, dimethoate, methiocarb and pyrimethanil.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 8. Further information on the most frequently quantified pesticides found in head cabbages in 2016 in at least 2% of the samples is compiled in Table 2.

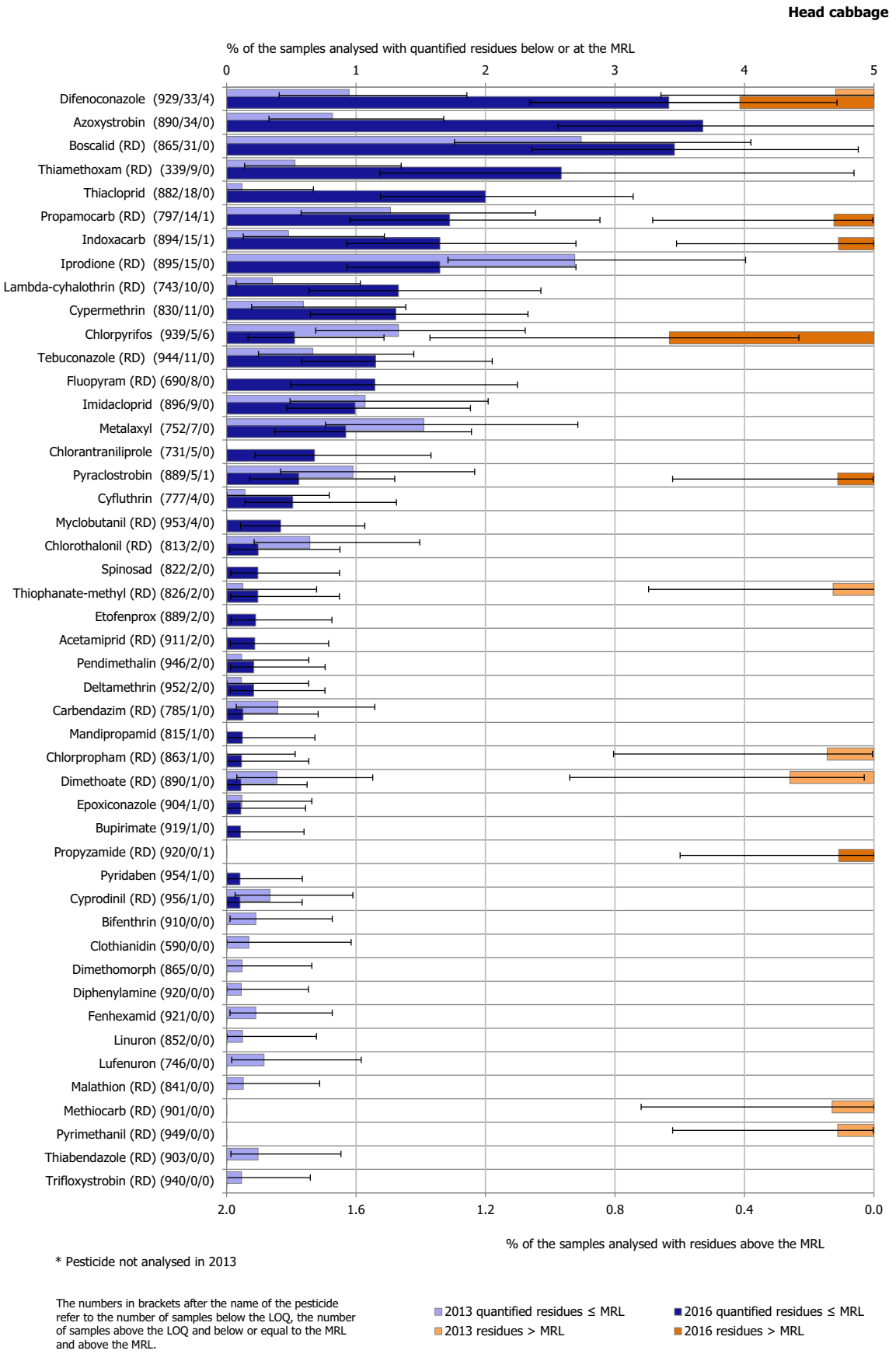


Figure 7: Percentage of head cabbage samples with quantified residues below or equal to the MRL and with residues above the MRL

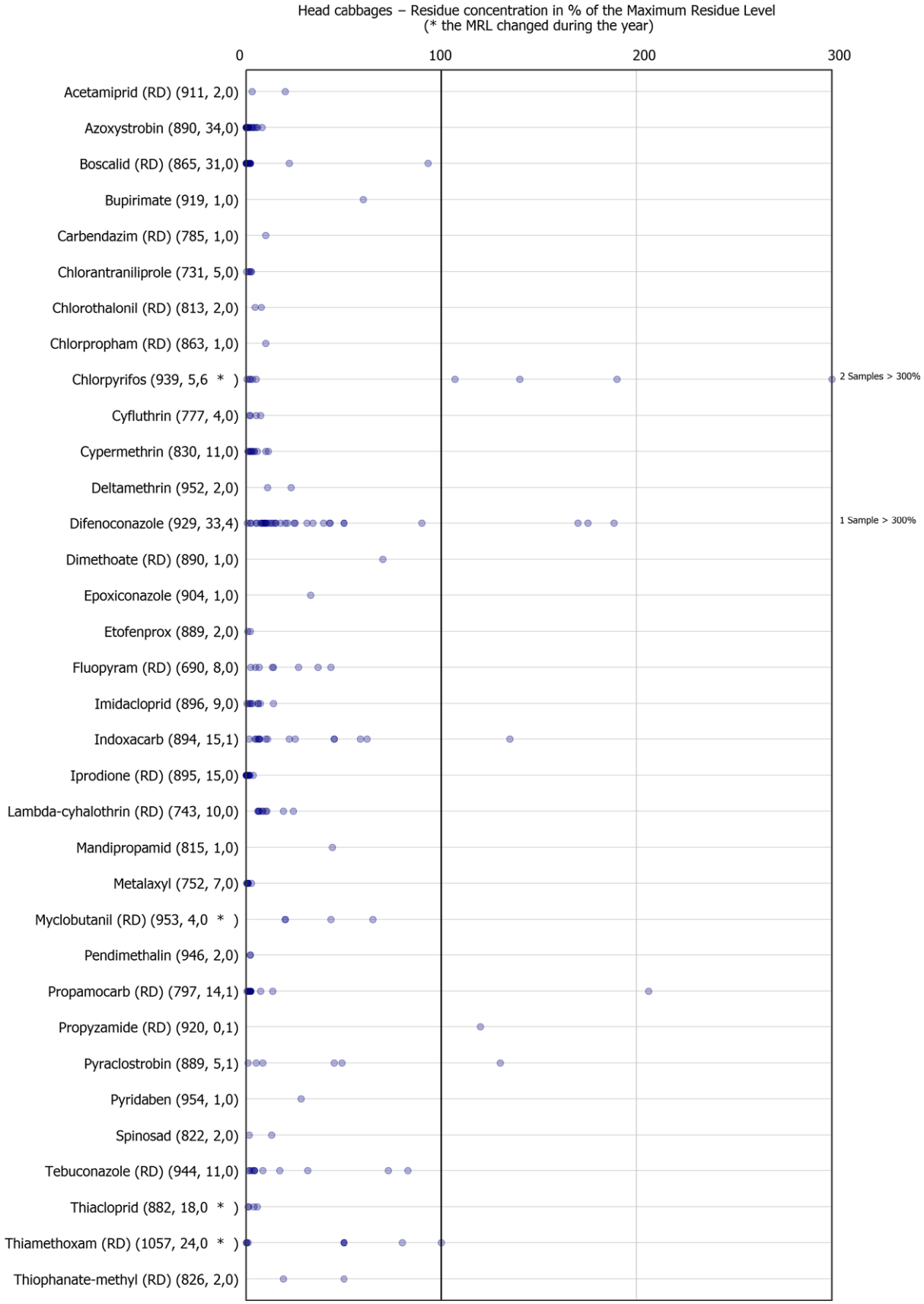


Figure 8: Residue concentrations measured in head cabbage, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

Table 2: Pesticides most frequently quantified in head cabbages in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009)
Difenoconazole	3.8	Approved fungicide
Azoxystrobin	3.7	Approved fungicide
Boscalid (RD)	3.5	Approved fungicide
Thiamethoxam (RD)	2.6	Approved insecticide
Thiacloprid	2.0	Approved insecticide

LOQ: limit of quantification; RD: residue definition.

3.3.3. Leek

In 2016, 909 samples of leek were analysed. In 543 samples (59.7%), no quantifiable pesticide residues were found, while 366 samples (40.3%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 173 samples (19%); up to 9 different pesticides were reported in an individual leek sample (Figure 9). Compared to 2013, in 2016 the overall quantification rate went up (in 2013 33.1% of the samples contained pesticide residues).

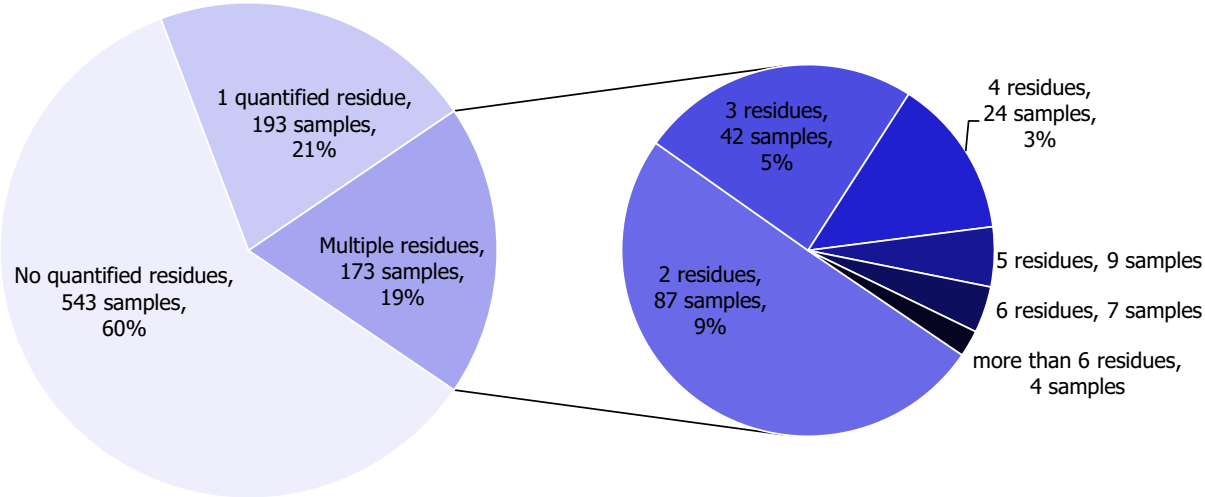


Figure 9: Number of quantified residues in individual leek samples

In 2.3% of the samples (21 samples), the residue concentrations exceeded the MRLs; 1.2% of the samples (11 samples) were reported as non-compliant, taking into account the measurement uncertainty. The origin of the samples was all EU: 5 from Poland, 5 from Spain, 3 from France, 2 from Croatia, 2 from Germany, 2 from Romania, 1 from Belgium and 1 from the Netherlands.

In total, 37 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were dithiocarbamates (analysed as carbon disulfide, CS_2) quantified in 27.2% of the tested samples, tebuconazole (11.1%) and boscalid (10.9%). The MRL was exceeded for 10 different pesticides, most frequently for chlorpyrifos (11 samples) and iprodione (2 samples); all the reported MRL breaches related to food originated from within the EU. It is noted that CS_2 residues are not only related to the use of pesticides belonging to the group of dithiocarbamates but also are generated during analysis from naturally occurring sulfur compounds. This is particularly the case for Alliaceae-like leeks that naturally contain CS_2 precursor compounds.

Figure 10 presents the 2016 and 2013 rates of quantification and MRL exceedances. The overall quantification rates were in the same range than in 2013 for most of the pesticides, except for dithiocarbamates, difenoconazole and fluopyram for which the quantification rate increased significantly in 2016. In 2016, the MRL exceedance's rates increased for eight substances, mainly for chlorpyrifos. The MRL changed during August 2016 from 0.5 to 0.01 mg/kg. The dot plot graph was build taken the MRL in placed as reported by the Member State. Therefore, the lowering of the MRL should not be an excuse for the high exceedance rate. Growers should be informed at an earlier stage in the year of the upcoming change in the MRL so that the plant protection product is used accordingly.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 11. Further information on the most frequently quantified pesticides found in leek in 2016 in at least 5% of the samples is compiled in Table 3.

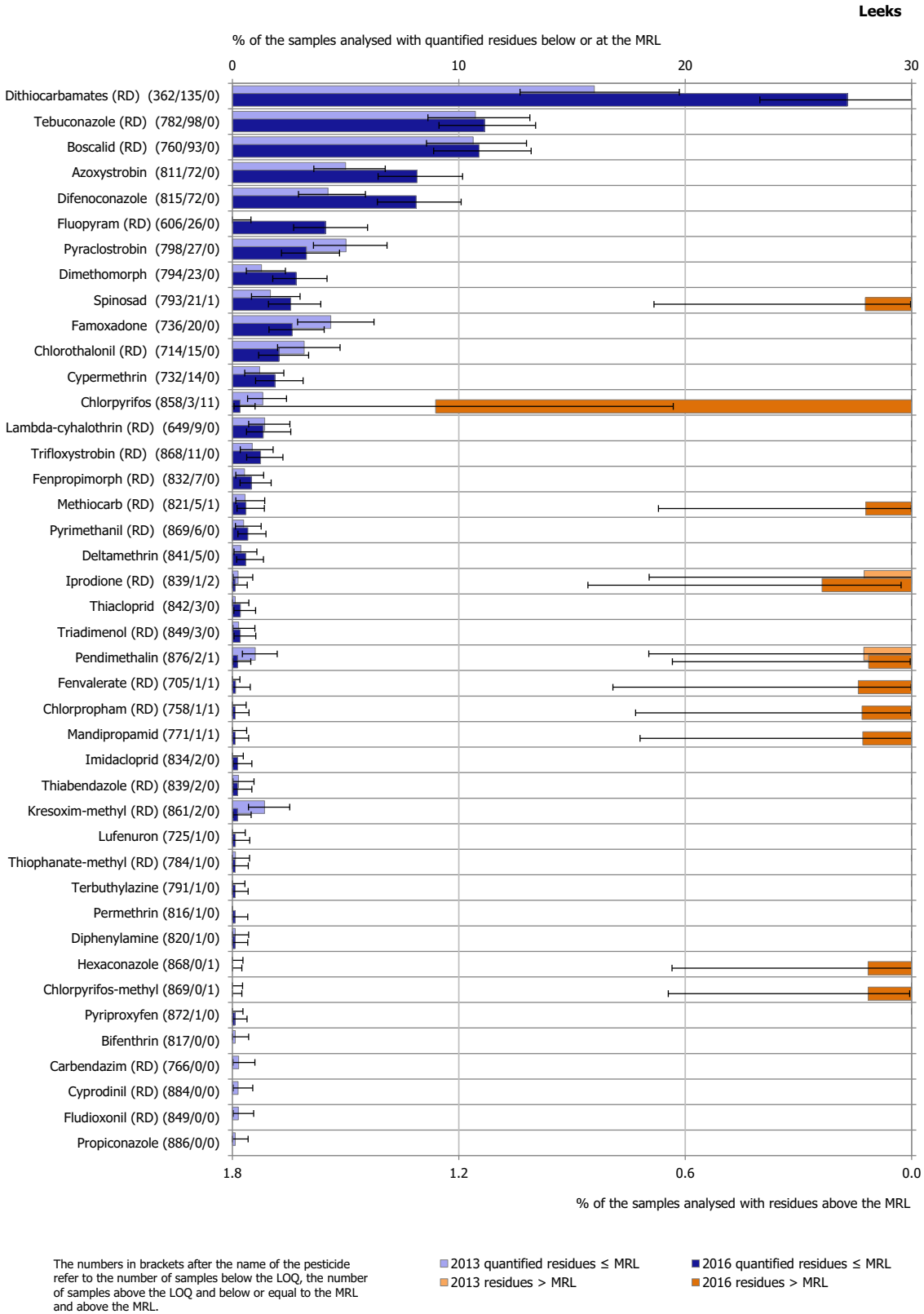


Figure 10: Percentage of leek samples with quantified residues below or equal to the MRL and with residues above the MRL

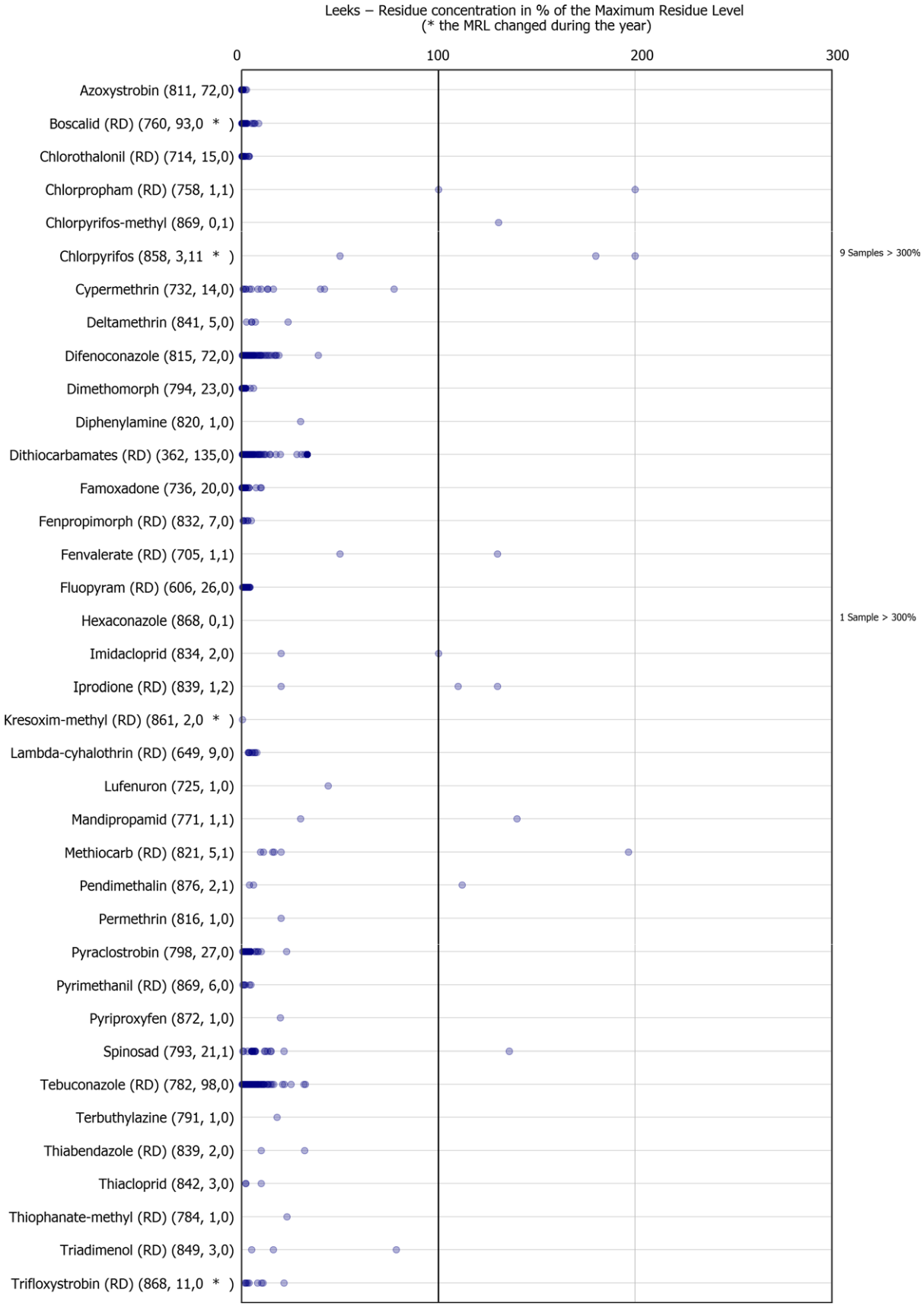


Figure 11: Residue concentrations measured in leek, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

Table 3: Pesticides most frequently quantified in leek in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009) and comments
Dithiocarbamates (RD)	27.2	Dithiocarbamates fungicides approved: maneb, mancozeb, metiram, propineb, thiram and ziram. Possibly, the detection of CS_2 relates to false positive results due to the occurrence of naturally occurring substances in Alliaceae
Tebuconazole (RD)	11.1	Approved fungicide
Boscalid (RD)	10.9	Approved fungicide
Azoxystrobin	8.1	Approved fungicide
Difenoconazole	8.1	Approved fungicide

LOQ: limit of quantification; RD: residue definition.

3.3.4. Lettuce

In 2016, 1,188 samples of lettuce were analysed; in 498 samples (41.9%), no quantifiable pesticide residues were found, while 690 samples (58.1%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 444 samples (37.4%); up to 12 different pesticides were reported in an individual lettuce sample. Compared to 2013, the overall quantification rate is similar (quantification rate in 2013 amounted to 57.9%).

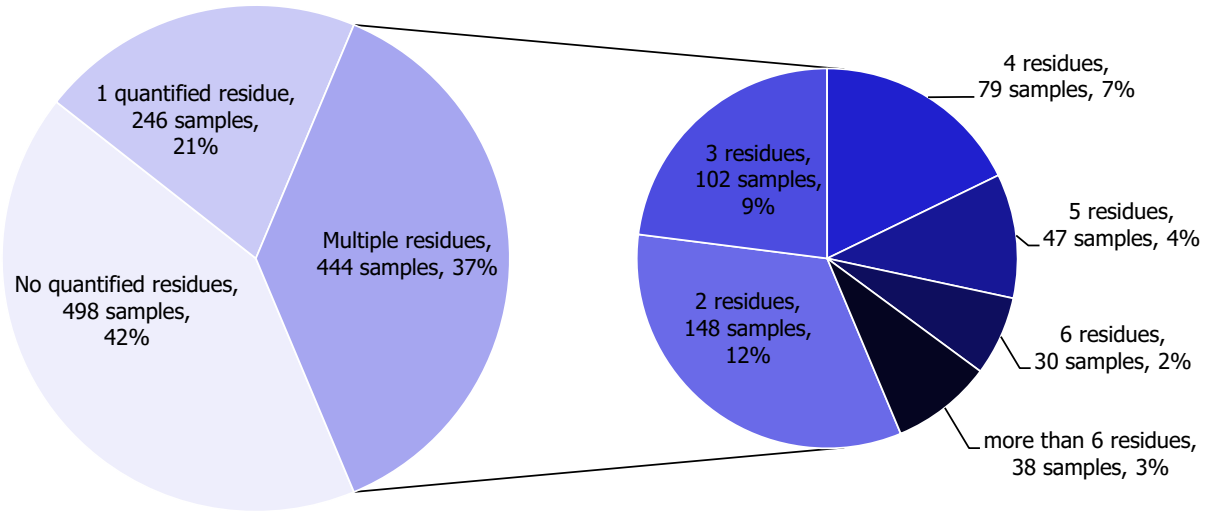


Figure 12: Number of quantified residues in individual lettuce samples

The residue concentrations exceeded the MRL for 28 samples (0.25%), and 12 samples (0.1%) were identified as non-compliant taking into account the measurement uncertainty. In total, 19 pesticides were associated with MRL exceedances. The origin of the samples was: 13 from Romania, 3 from France, 3 from Italy, 2 from Cyprus, 2 from United Kingdom, 1 from Spain, 1 from Croatia, 1 from Poland, 1 from Portugal, and 1 with unknown origin.

In total, 66 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were bromide ion (quantified in 23.7% of the tested samples), boscalid (18.9%), imidacloprid (14.9%) and propamocarb (14.2%).

Figure 13 presents the results for all pesticides with MRL exceedances and the most frequently quantified pesticides. The same pesticides were quantified in these two years with a similar quantification rate; linuron, methiocarb, formetanate, chlorpyrifos-methyl and vinclozolin were only quantified in 2016. The quantification rate of pyraclostrobin, fluopyram and chlorantraniliprole significantly increased in 2016, but it significantly decreased for tolclofos-methyl.

MRL were exceeded for 19 pesticides in 2016 and for 17 pesticides in 2013. Comparing the MRL exceedances in 2013 and 2016, comparable results were found for 8 pesticides: dithiocarbamates, chlorpyrifos, chlorothalonil, carbendazim, acrinathrin, triadimenol, thiophanate-methyl and dimethoate. An increased MRL breach rate for chlorothalonil was observed in 2016 compared to 2013. MRL

exceedances were identified only in 2016 for 11 other pesticides and only for iprodione and pencycuron in 2013.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 14. Further information on the most frequently quantified pesticides found in lettuce in 2016 in at least 10% of the samples is compiled in Table 4.

Table 4: Pesticides most frequently quantified in lettuce in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009)
Bromide ion	23.7	Methyl bromide is a non-approved fungicide/insecticide/nematicide/herbicide which would lead to residues of bromide ion. However, since bromide ion is also a naturally occurring substance, the source of residues of bromide ion findings cannot be identified unambiguously
Boscalid (RD)	18.9	Approved fungicide
Imidacloprid	14.9	Approved insecticide
Propamocarb (RD)	14.2	Approved fungicide
Dithiocarbamates (RD)	12.8	Fungicides approved: maneb, mancozeb, metiram, propineb, thiram and ziram

LOQ: limit of quantification; RD: residue definition.

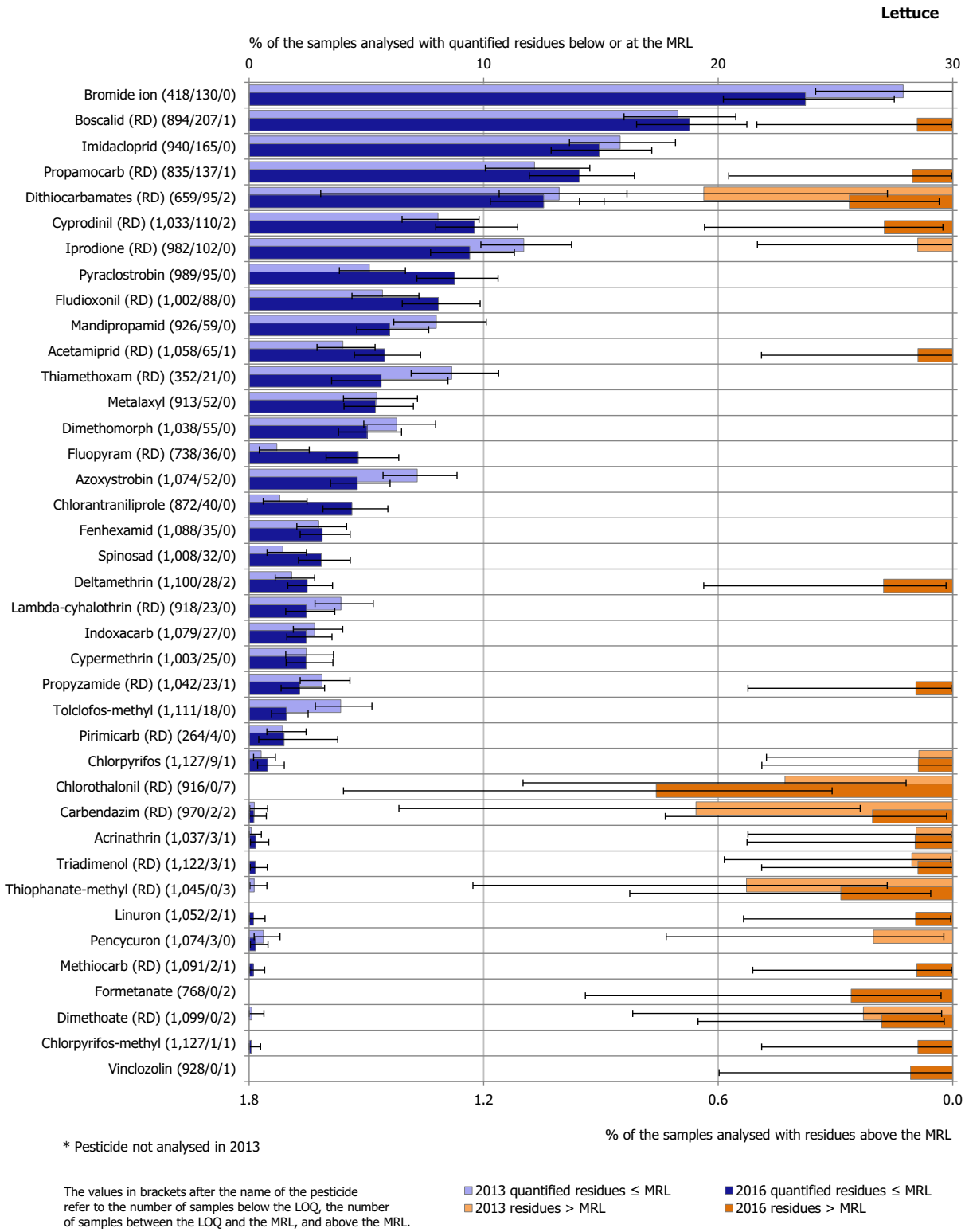


Figure 13: Percentage of lettuce samples with quantified residues below or equal to the MRL and with residues above the MRL

Figure 14: Residue concentrations measured in lettuce, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.5. Peaches

In 2016, 1,178 samples of peaches were analysed. In 262 samples (22.2%), no quantifiable pesticide residues were found, while 916 samples (77.8%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 704 samples (59.8%); up to 13 different pesticides were reported in an individual peaches sample (Figure 15). Compared to 2013, the quantification rate slightly increased (2013 samples: 75.2% contained pesticide residues).

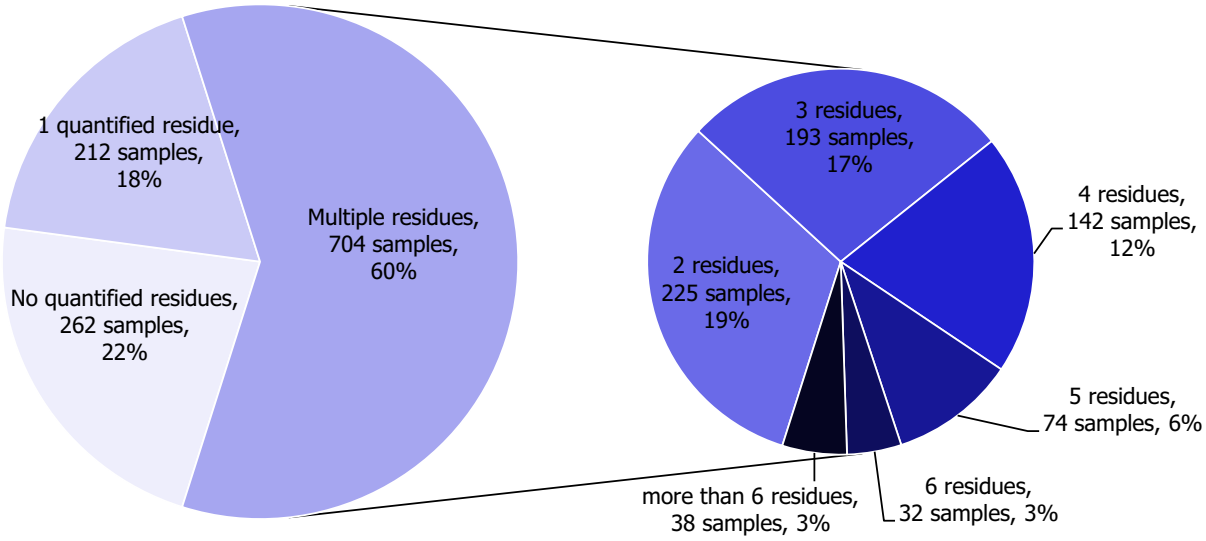


Figure 15: Number of quantified residues in individual peaches samples

MRLs were exceeded for 1.9% of the samples (23 samples) and 1.4% of the samples (16 samples) were reported as non-compliant, taking into account the measurement uncertainty. These MRL exceedances were all related to EU products (10 samples from Malta, 4 samples from Italy, 3 samples from Spain, 2 samples from Cyprus, 2 samples from Greece, 1 from Romania and 1 more sample with unknown origin.

In total, 70 different pesticides were quantified. The most frequently quantified pesticides were tebuconazole (quantified in 26.8% of the samples), fludioxonil (23.4%) and dithiocarbamates (21.5%). The MRL was exceeded for 10 different pesticides: chlorpyrifos in 13 samples (8 samples from Malta, 3 from Spain and 2 from Italy), deltamethrin in 6 samples from Malta, dimethoate in 4 samples (Malta), propargite in 3 samples (Greece and Romania), chlorpropham in 2 samples (Italy), formetanate and dimethomorph together in 1 sample (Cyprus), etofenprox (1 sample from Malta), carbendazim (1 sample from Cyprus) and procymidone (unknown origin). To be highlighted that neither propargite, carbendazim or procymidone are approved substances at the EU level.

Figure 16 presents the results for all pesticides with MRL exceedances and for the most frequently quantified pesticides. Compared to 2013, the quantification rate was lower for iprodione, lambda-cyhalothrin, chlorpyrifos, thiacloprid, carbendazim, whereas fludioxonil, boscalid, etofenprox, fluopyram, pyraclostrobin, deltamethrin and pyrimethanil were more frequently found. In terms of MRL exceedances, a similar rate is found for chlorpyrifos, carbendazim and dimethoate. MRL exceedances were identified only in 2016 for seven pesticides and only in 2013 for four others.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 17. Further information on the most frequently quantified pesticides found in peaches in 2016 in at least 10% of the samples is compiled in Table 5.

Table 5: Pesticides most frequently quantified in peaches in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009)
Tebuconazole (RD)	26.8	Approved fungicides
Fludioxonil (RD)	23.4	
Dithiocarbamates (RD)	21.5	
Boscalid (RD)	17.2	
Etofenprox	15.1	Approved insecticides
Spinosad	13.8	
Fluopyram (RD)	13.7	Approved fungicide

LOQ: limit of quantification; RD: residue definition.

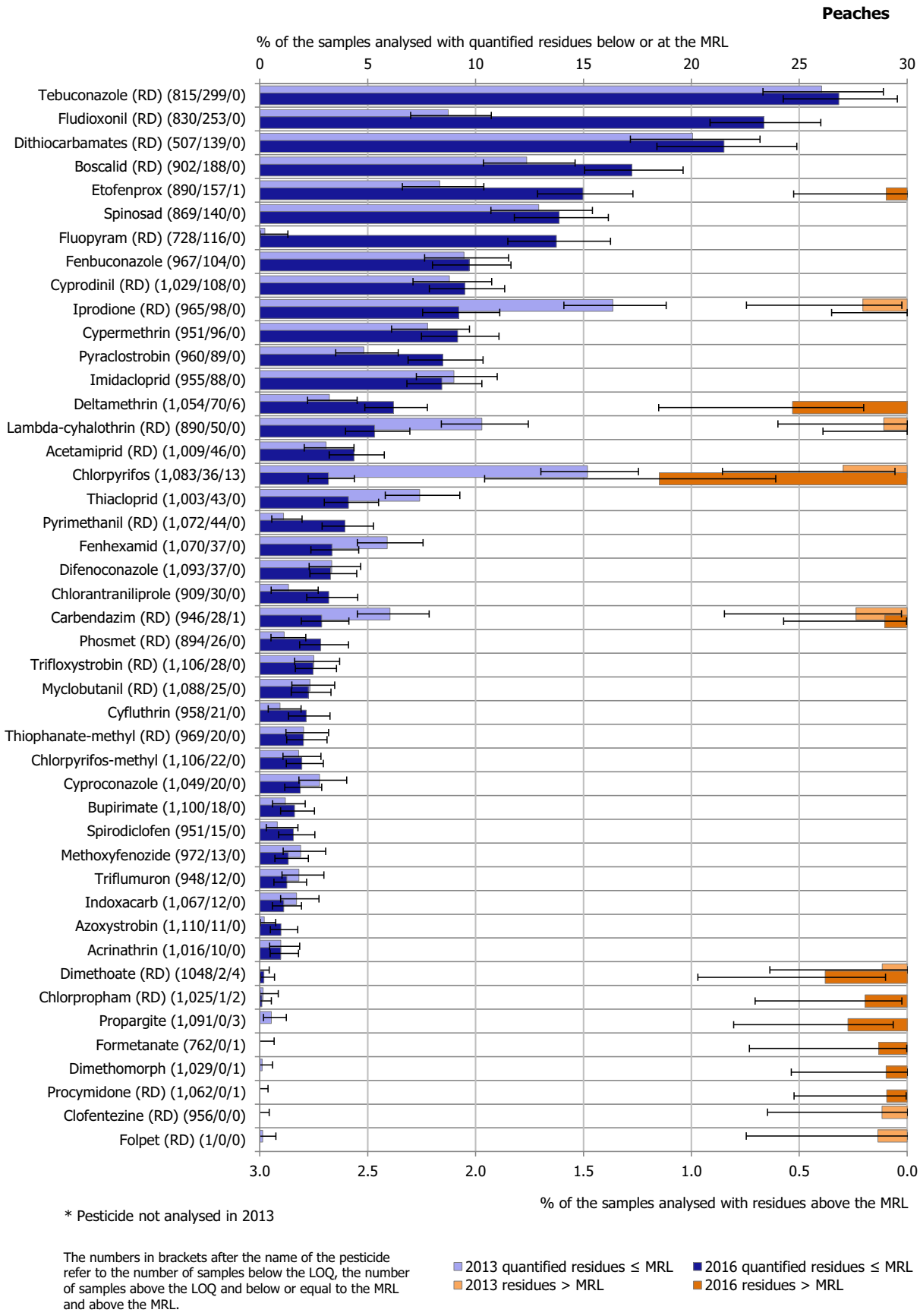


Figure 16: Percentage of peaches samples with quantified residues below or equal to the MRL and with residues above the MRL

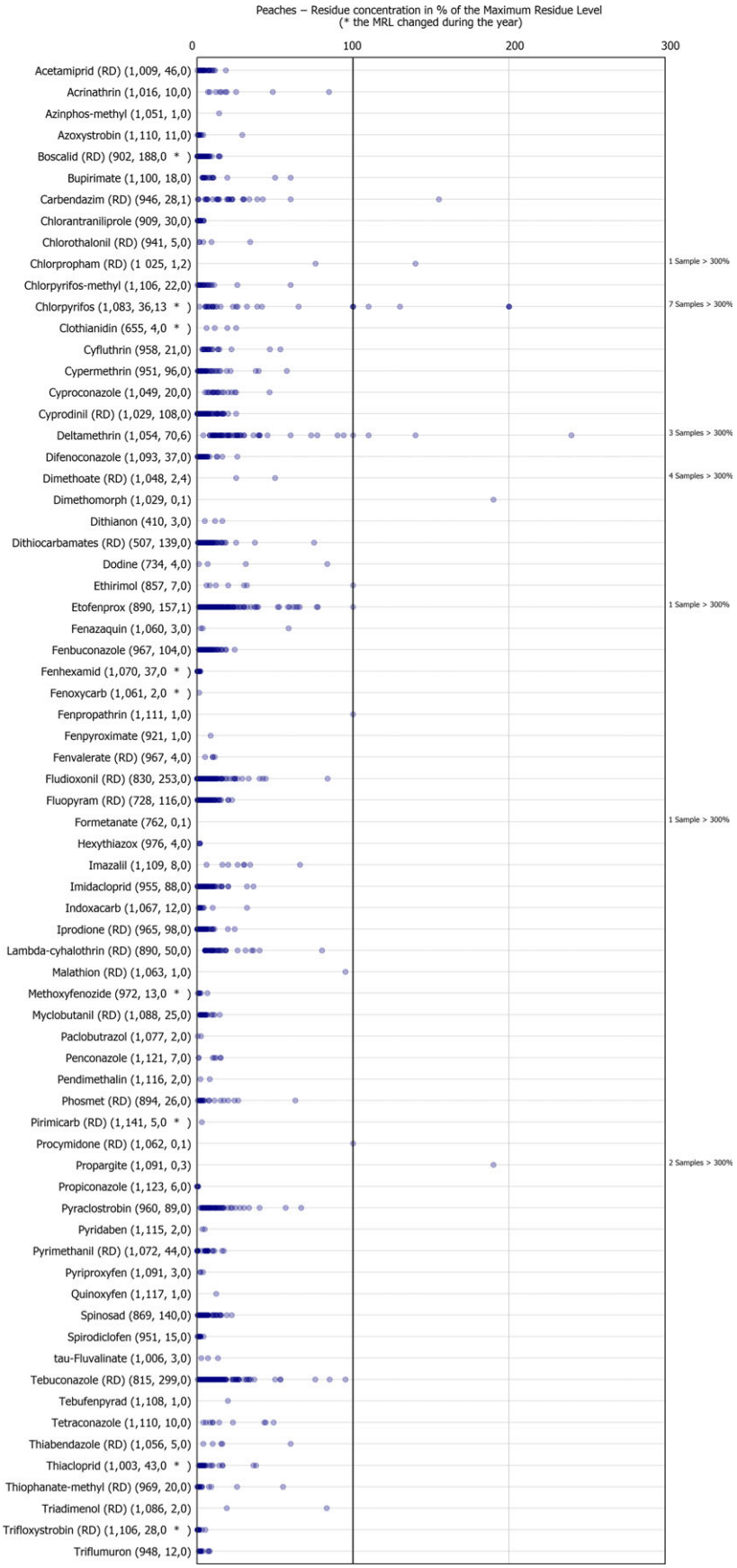


Figure 17: Residue concentrations measured in peaches, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.6. Strawberries

In 2016, 1,206 samples of strawberries were analysed; in 273 samples (22.6%), no quantifiable pesticide residues were found, while 933 samples (77.4%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 771 samples (63.9%); up to 16 different pesticides were reported in an individual sample of strawberries (Figure 18). The overall quantification rate is similar to the one reported in 2013, where 76.3% of the samples contained pesticide residues.

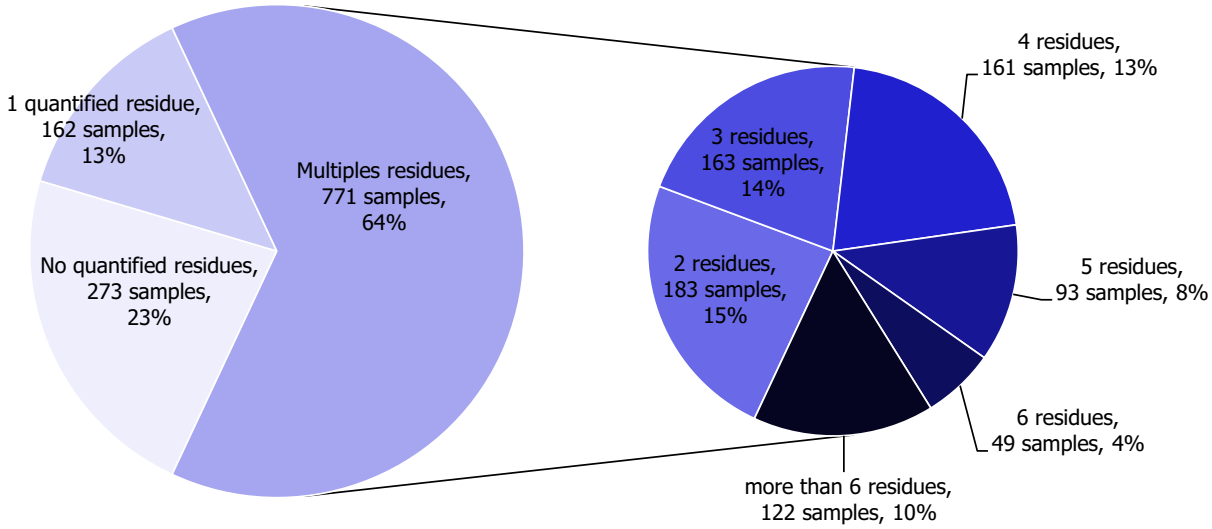


Figure 18: Number of quantified residues in individual strawberries samples

The residue levels exceeded the MRL for 1.8% of the samples (22 samples) and 0.7% of the samples (eight samples) were reported as non-compliant, taking into account the measurement uncertainty. MRL exceedances were mainly related to products grown in the EU (5 from Romania, 5 samples from Italy, 2 samples from Cyprus, 2 from the Netherlands, 1 sample from Spain, 1 sample from Lithuania, 1 from Malta, 1 from Poland and 1 from France – La Réunion). In third countries, 2 samples from Egypt and 1 from China, and 2 with unknown origin had MRL exceedances.

In total, 76 different pesticides were quantified. The most frequently found pesticides were cyprodinil (quantified in 35.6% of the samples), fludioxonil (34.5%) and boscalid (30.3%). The MRL was exceeded for 15 different pesticides, most frequently for spinosad (4 samples from Italy, the Netherlands and Spain) and tebuconazole (4 samples from Romania and Cyprus), dimethoate (China, Egypt and Romania) and carbendazim (Lithuania and Malta).

Figure 19 presents the results for all pesticides with MRL exceedances and for the most frequently quantified pesticides. Compared to 2013, the quantification rate was in the same range for most pesticides. It was lower in 2016 for fenhexamid, pyraclostrobin and mepanipyrim, whereas fluopyram and trifloxystrobin were more frequently found. In terms of MRL exceedances, a similar rate is found for trifloxystrobin, spinosad, carbendazim, tebuconazole, dimethoate, propargite and procymidone.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 19. Further information on the most frequently quantified pesticides found in strawberries in 2016 in at least 5% of the samples is compiled in Table 6.

Table 6: Pesticides most frequently quantified in strawberries in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009) and comments
Cyprodinil (RD)	35.6	Approved fungicide
Fludioxonil (RD)	34.5	
Boscalid (RD)	30.3	
Fluopyram (RD)	24.7	
Fenhexamid	18.0	
Trifloxystrobin (RD)	17.6	
Pyraclostrobin	15.4	
Captan (RD)	12.8	
Azoxystrobin	12.2	
Myclobutanil (RD)	11.3	
Thiacloprid	10.9	Approved insecticide
Spinosad	10.7	

LOQ: limit of quantification; RD: residue definition.

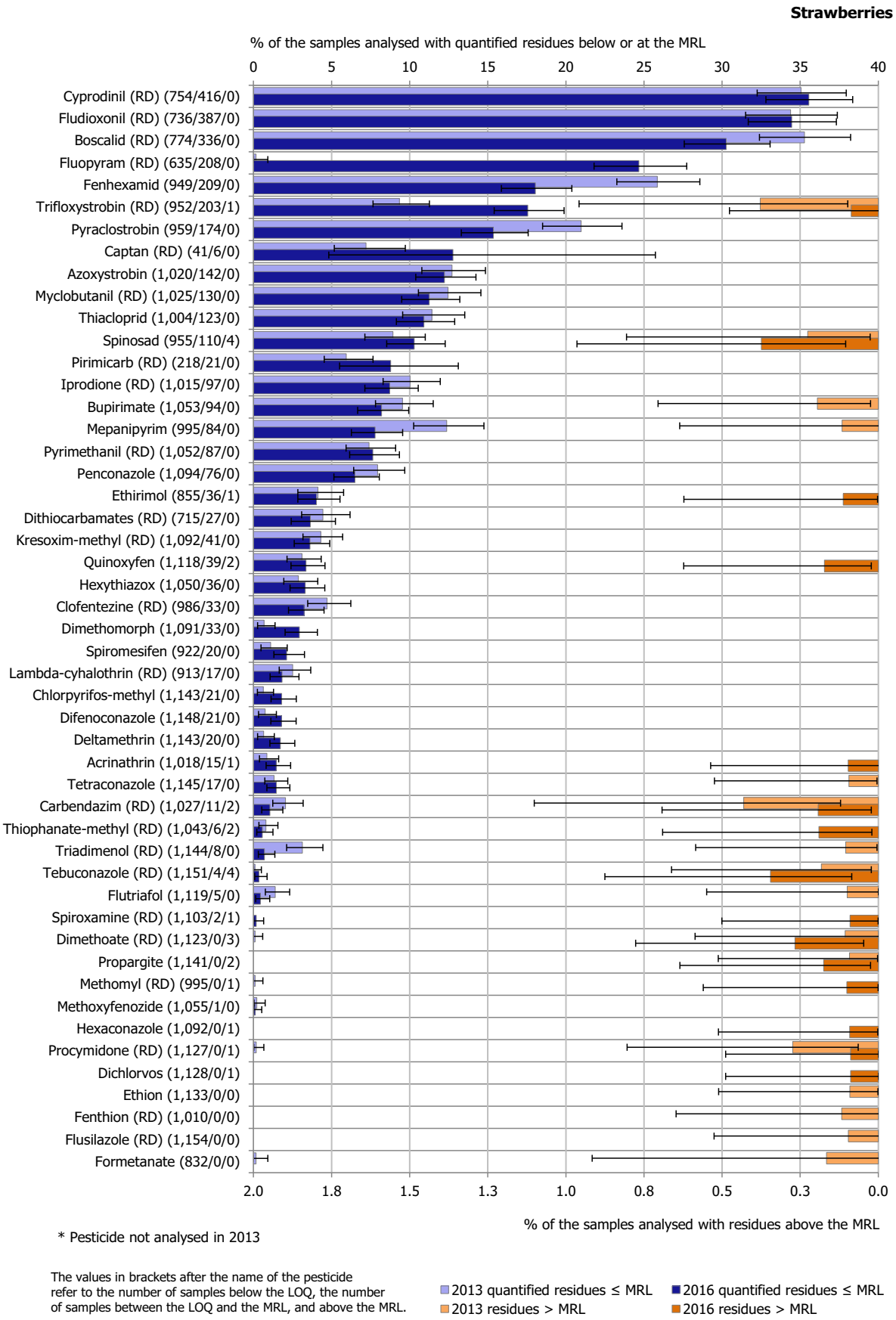


Figure 19: Percentage of strawberries samples with quantified residues below or equal to the MRL and with residues above the MRL

Figure 20: Residue concentrations measured in strawberries, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.7. Tomatoes

In 2016, 1,594 samples of tomatoes[27] were analysed; in 733 samples (46%), no quantifiable pesticide residues were found, while 861 samples (54%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 470 samples (29.5%); up to 12 different pesticides were reported in an individual tomato sample[28] (Figure 21). The overall quantification rate was slightly higher than in 2013 (51% of the samples contained pesticide residues).

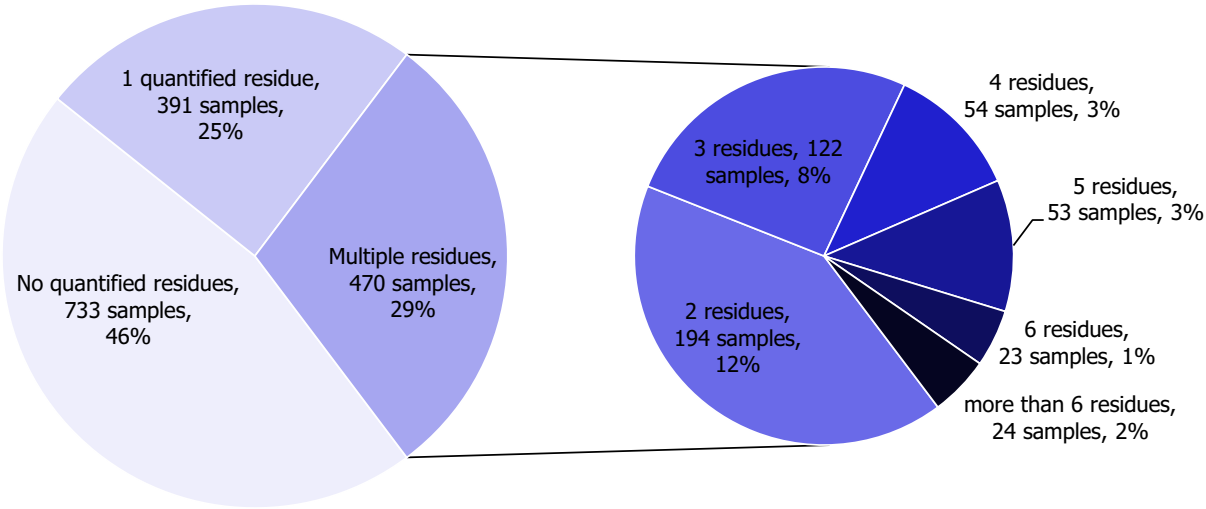


Figure 21: Number of quantified residues in individual tomatoes samples

The residue concentrations exceeded the MRLs in 2.6% of the samples (42 samples) and 1.6% of the samples (25 samples) were reported as non-compliant, taking into account the measurement uncertainty. The MRL exceedances were mainly related to products grown not only in the EU (22 from France of which 20 were from Mayotte, 6 from Italy, 5 from Poland, 2 from Malta, 1 from Spain and 1 from Romania) but also from third countries (1 from Dominican Republic, 1 from Jordan and 1 from Morocco) and 2 samples with unknown origin.

In total, 91 different pesticides were quantified (concentrations at or above the LOQ). The most frequently quantified pesticides are bromide ion (quantified in 31.2% of the tested samples), fluopyram (14.2%) and dithiocarbamates (12.1%) (Table 7). The MRL was exceeded for 21 different pesticides, most frequently for dimethoate with 19 samples: 18 samples from Mayotte (France)[29] and one from Italy.

Figure 22 depicts the results for all pesticides with MRL exceedances and the most frequently quantified pesticides with residues below or at the MRL.

Compared to 2013, the quantification rate was in the same range for most pesticides. It was significantly lower in 2016 for iprodione, while it was higher for fluopyram and thiamethoxam.

In terms of MRL exceedances, a similar rate is found for acetamiprid, ethephon, carbendazim, chlorpyrifos-methyl and procymidone. MRL exceedances were identified only in 2016 for 16 pesticides and only in 2013 for 7 other pesticides. The highest difference in MRL exceedance rate in 2016 and 2013 was for dimethoate.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 23. Further information on the most frequently quantified pesticides found in tomatoes in 2016 in at least 5% of the samples is compiled in Table 7.

[27] Two samples of gojiberries are considered in this analysis (2016 EUCP), as for the 2013 EUCP. Gojiberries/wolfberries (*Lycium barbarumare* and *Lycium chinense*) are classified as tomatoes (ProdCode="0231010") according to Commission Regulation (EU) No 212/2013 of 11 March 2013 replacing Annex I to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards additions and modifications with respect to the products covered by that Annex (Text with EEA relevance), OJ L 68, 12.3.2013, p. 30–52.

[28] And up to 17 different pesticides in one sample of gojiberries from unknown origin reported by The Netherlands under tomato samples (EUCP).

[29] According to the information provided by France, a focussed control was performed in tomatoes produced in French oversea departments.

Table 7: Pesticides most frequently quantified in tomatoes in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009)
Bromide ion	31.2	Dithiocarbamates fungicides approved: maneb, mancozeb, metiram, propineb, thiram and ziram. Possibly, the detection of CS_2 relates to false positive results due to the occurrence of naturally occurring substances in Alliaceae
Fluopyram (RD)	14.2	Approved fungicide
Dithiocarbamates (RD)	12.1	Approved fungicide
Spiromesifen	9.7	Approved acaricide and insecticide
Chlorantraniliprole	8.9	Approved insecticide
Boscalid (RD)	7.4	Approved fungicide
Acetamiprid (RD)	5.2	Approved insecticide

LOQ: limit of quantification; RD: residue definition.

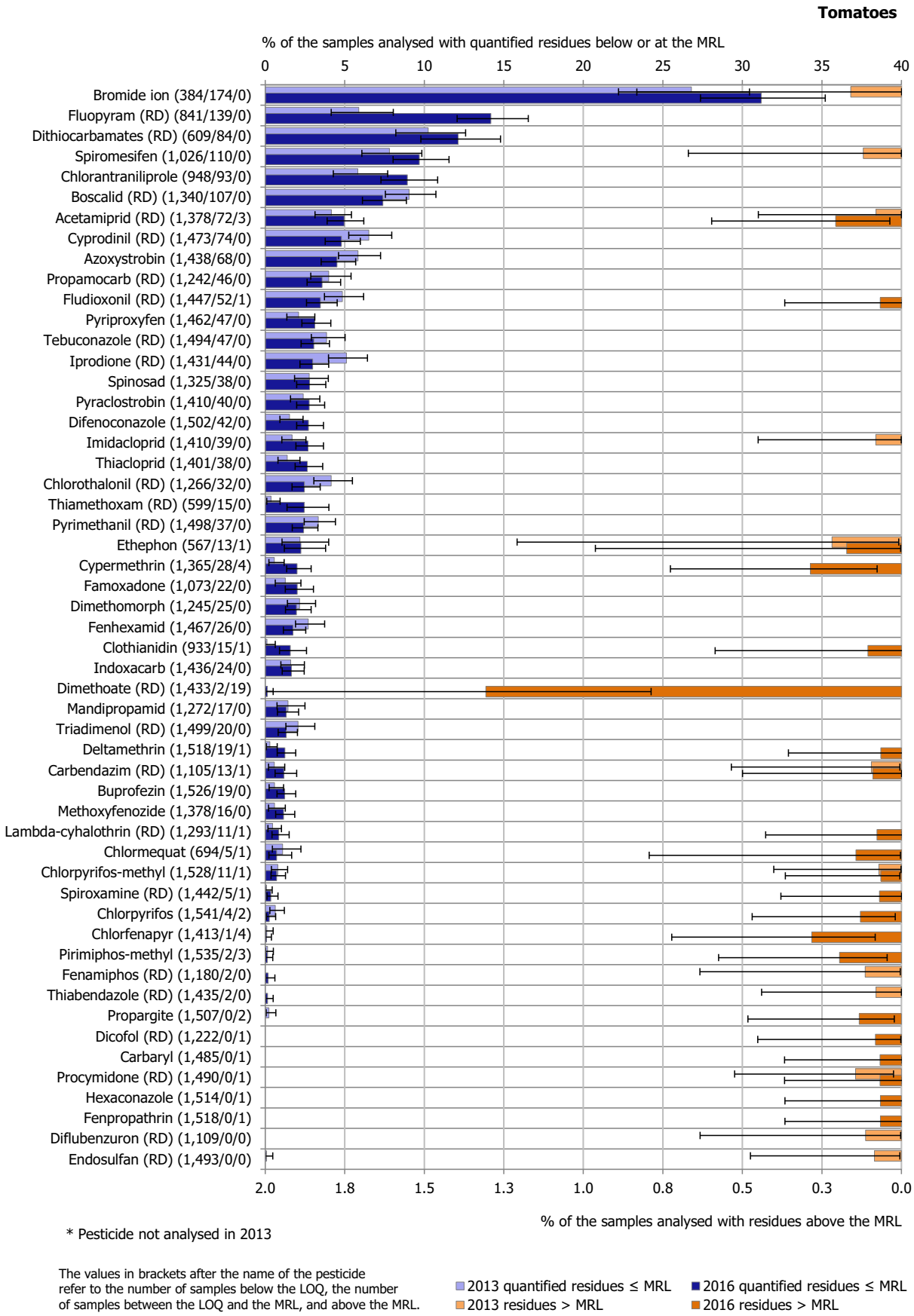


Figure 22: Percentage of tomatoes samples with quantified residues below or equal to the MRL and with residues above the MRL

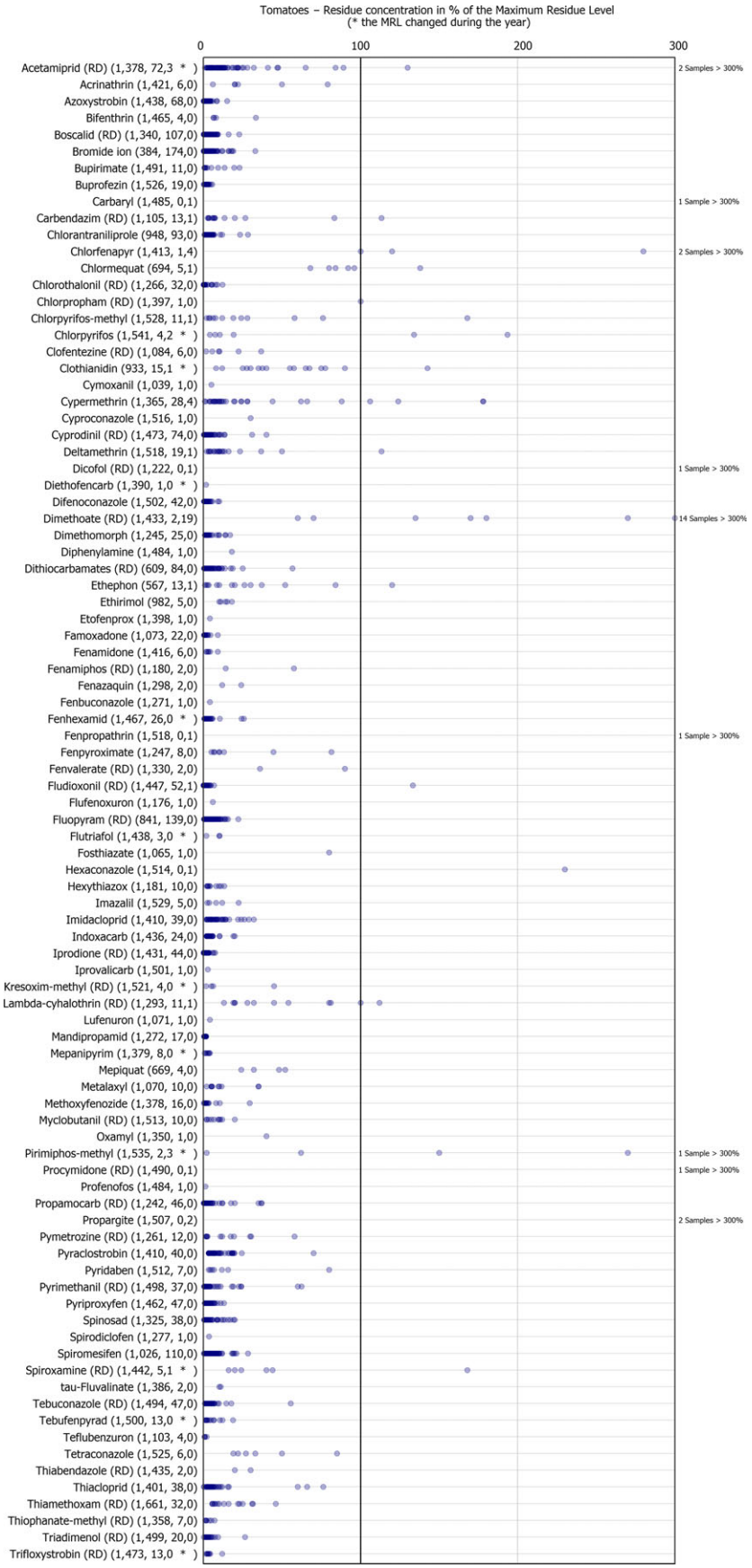


Figure 23: Residue concentrations measured in tomatoes, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.8. Rye

In 2016, 608 samples of rye were analysed; in 396 samples (65.1%), no quantifiable pesticide residues were found, while 212 samples (34.9%) contained one or several pesticides in quantifiable concentrations. Multiple residues were reported in 88 samples (14.5%); up to 4 different pesticides were reported in an individual sample (Figure 24). The overall quantification rate was lower than in 2013 (41% of the samples with at least one residue).

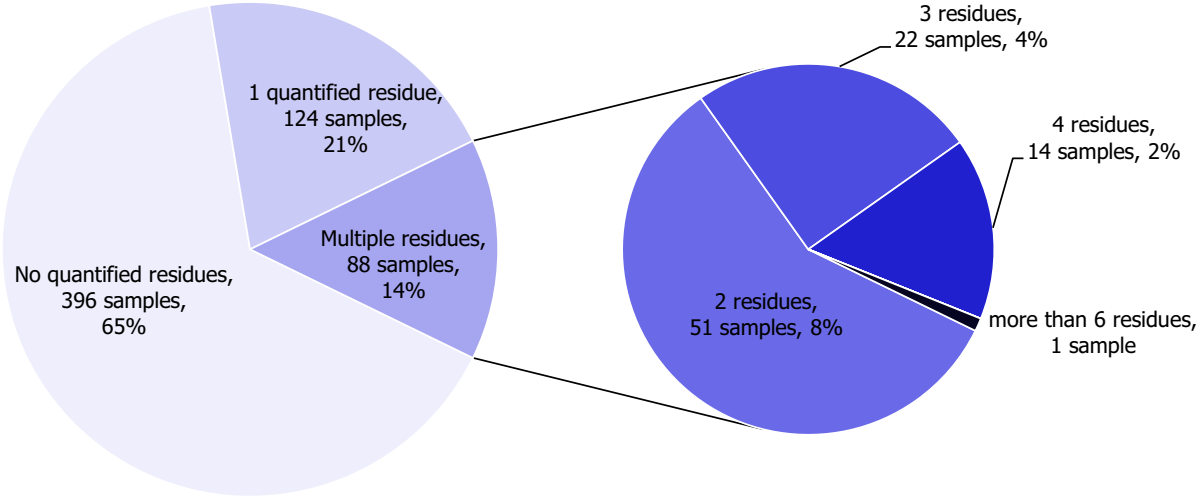


Figure 24: Number of quantified residues in individual samples of rye

The residue concentrations exceeded the MRLs in 0.7% of the samples (4 samples), including 1 sample reported as non-compliant taking into account the measurement uncertainty. These MRL exceedances were related to products grown in the EU (1 sample from Germany, 1 sample from Romania, 1 sample from Italy and 1 unknown origin).

In total, 19 different pesticides were quantified. The most frequently found pesticides were chlormequat (quantified in 34.1% of the tested samples), mepiquat (14.2%) and pirimiphos-methyl (8%). The MRL was exceeded for 4 pesticides: pirimiphos-methyl in 1 sample from Italy, permethrin (1 sample from Germany), hexaconazole (1 sample from Romania) and dichlorvos (unknown origin).

Figure 25 presents the results for pesticides quantified below and above the MRL. Compared to 2013, the quantification rate was in the same range for most pesticides. However, for deltamethrin, this rate significantly increased in 2016. Cypermethrin was only quantified in 2016 and other pesticides were only quantified in 2013: 2-phenylphenol, boscalid, malathion and triadimenol. No MRL exceedances were identified in 2013, whereas four pesticides exceeded MRLs in 2016.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 26. Further information on the most frequently quantified pesticides found in rye in 2016 in at least 5% of the samples is compiled in Table 8.

Table 8: Pesticides most frequently quantified in rye in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009)
Chlormequat	34.1	Approved plant growth regulator
Mepiquat	14.2	Approved plant growth regulator
Pirimiphos-methyl	8.0	Approved insecticide
Glyphosate	5.5	Approved herbicide

LOQ: limit of quantification; RD: residue definition.

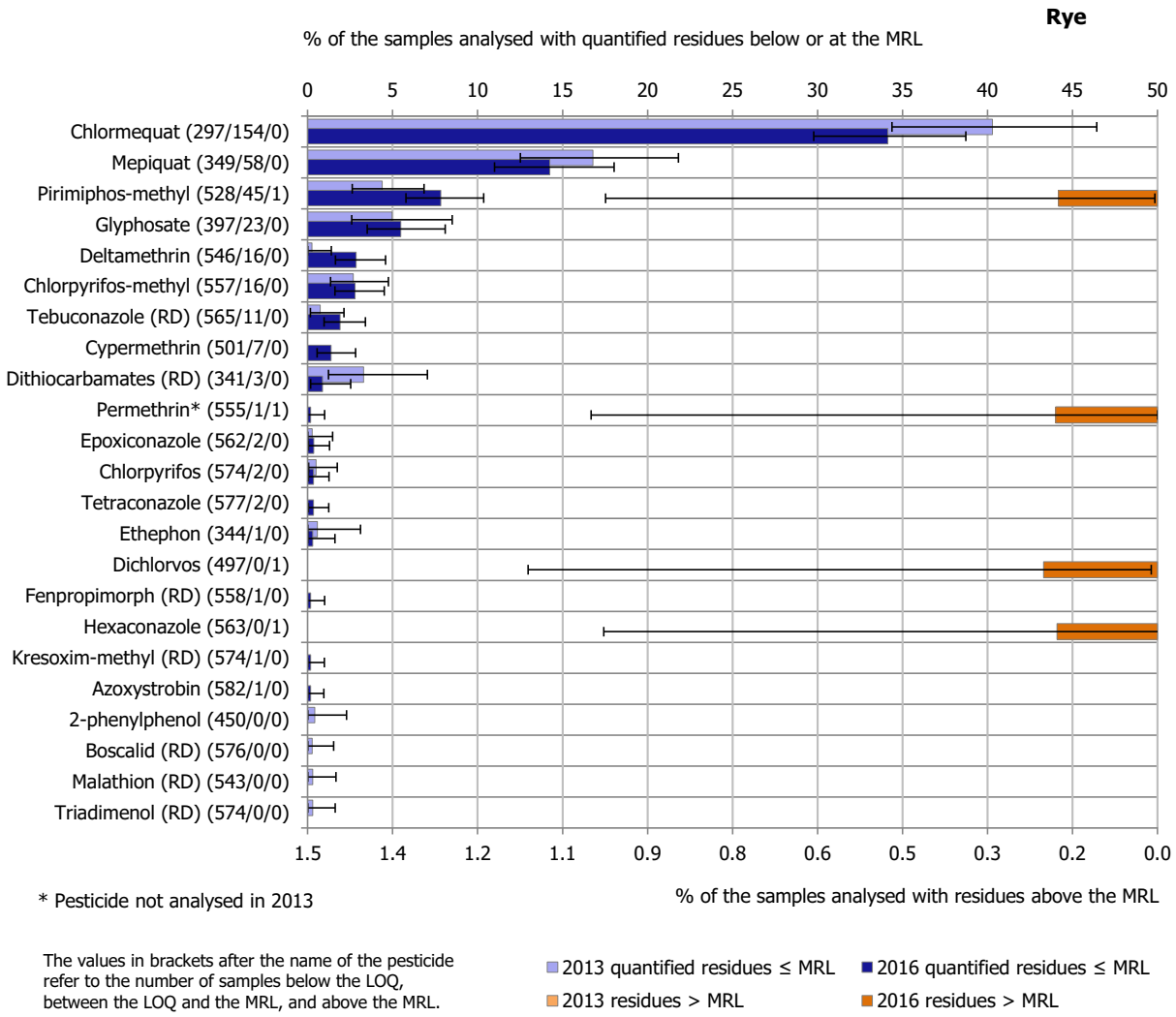


Figure 25: Percentage of samples of rye with quantified residues below or equal to the MRL and with residues above the MRL

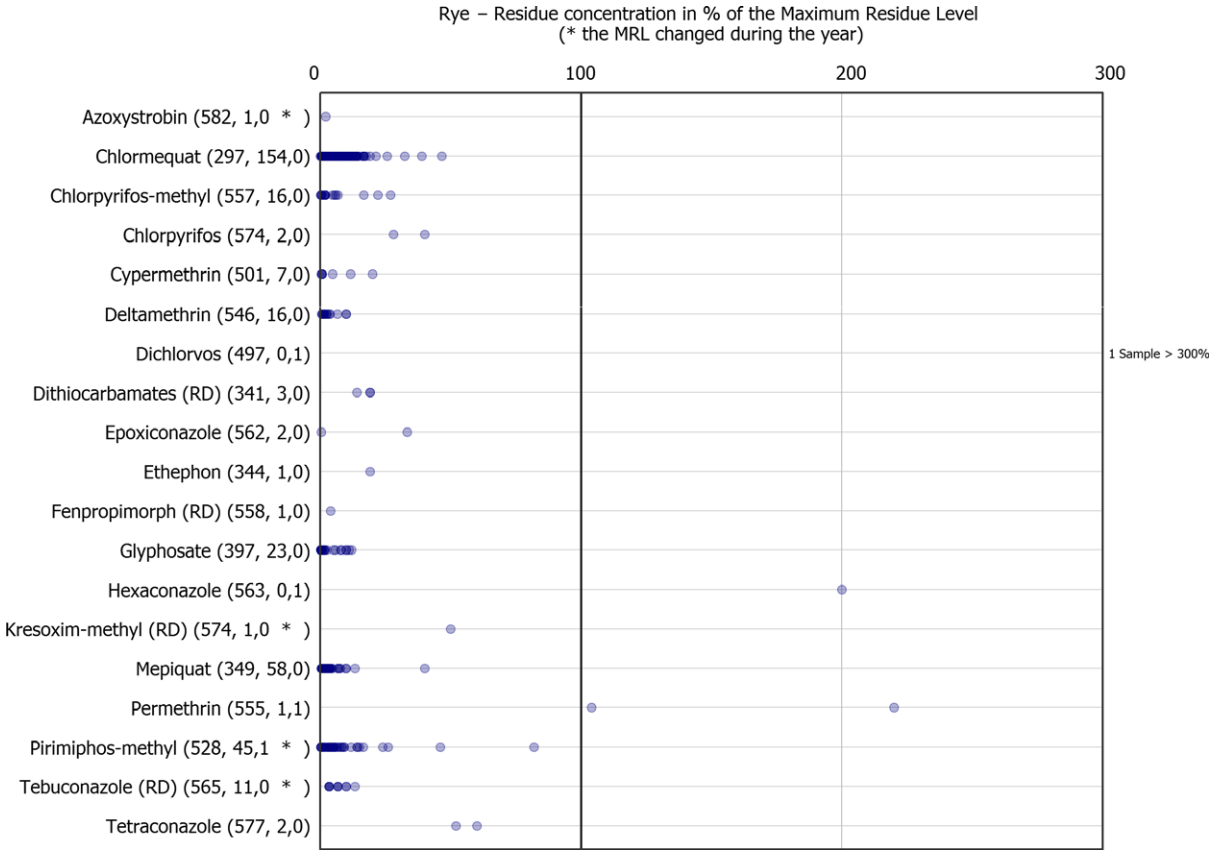


Figure 26: Residue concentrations measured in samples of rye, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.9. Wine

In 2016, 1,317 samples of wine (red or white) made from grapes were analysed. In 768 samples (58.3%), no quantifiable pesticide residues were found, while 549 samples (41.7%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 263 samples (20%); up to 10 different pesticides were reported in an individual wine sample (Figure 27). The overall quantification rate is slightly lower than the 2013 quantification rate (45%).

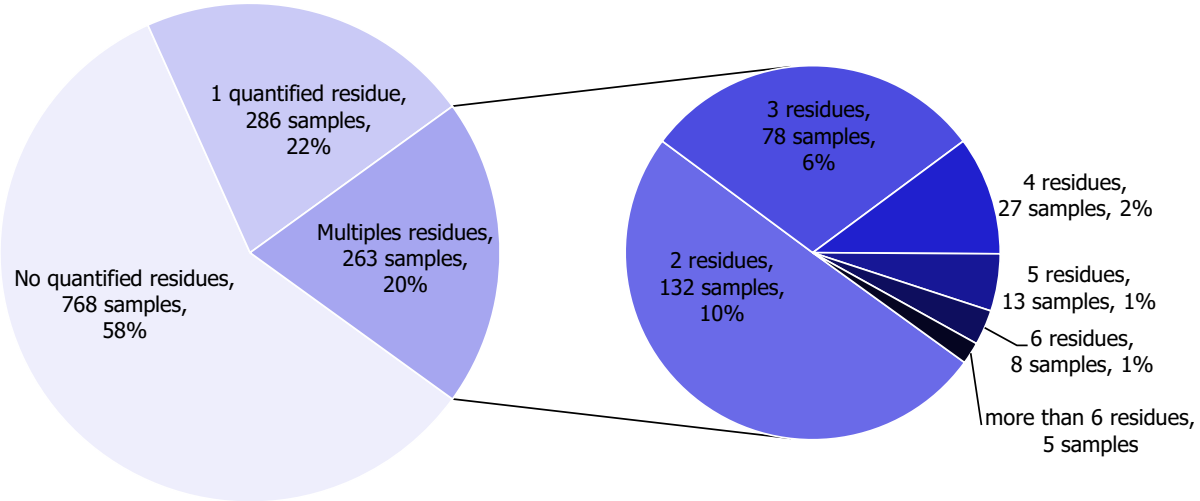


Figure 27: Number of quantified residues in individual wine samples

The residue concentrations exceeded the MRLs in 0.4% of the samples (in total 5 samples, 2 from Chile, 1 from Australia, 1 from Moldova and 1 from Spain); of those, the sample from Australia was reported as non-compliant, after having taken the measurement uncertainty into account.

In total, 37 different pesticides were quantified, most frequently metalaxyl (quantified in 15.5% of the samples), dimethomorph (13.4%) and folpet (13.3%). The MRL were exceeded for metalaxyl in one sample from Spain, and for chlormequat in 2 samples from Chile, 1 sample from Australia and 1 sample from Moldova.

Figure 28 depicts the results for all pesticides with MRL exceedances and all quantified pesticides with residues below or at the MRL. Compared to 2013, the pesticide spectrum was comparable, with a quantification rate significantly higher for metalaxyl (+6.4%) and fluopyram (+3.9%) in 2016, and a lower quantification rate for fenhexamid (−5.7%) and iprodione (−3.1%). Except for carbendazim, in 2016 the reported MRL exceedances related to substances for which no legal limits were exceeded in 2013.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 29. Further information on the most frequently quantified pesticides found in wine in 2016 in at least 5% of the samples is compiled in Table 9.

Table 9: Pesticides most frequently quantified in wine in 2016

Pesticide	% samples above LOQ	Approval status in 2016 (Reg. 1107/2009)
Metalaxyl	15.5	Approved fungicides
Dimethomorph	13.4	
Folpet (RD)	13.3	
Boscalid (RD)	10.8	
Fenhexamid	8.0	
Methoxyfenozide	6.1	Approved insecticide
Iprovalicarb	5.7	Approved fungicides
Pyrimethanil (RD)	5.3	

LOQ: limit of quantification; RD: residue definition.

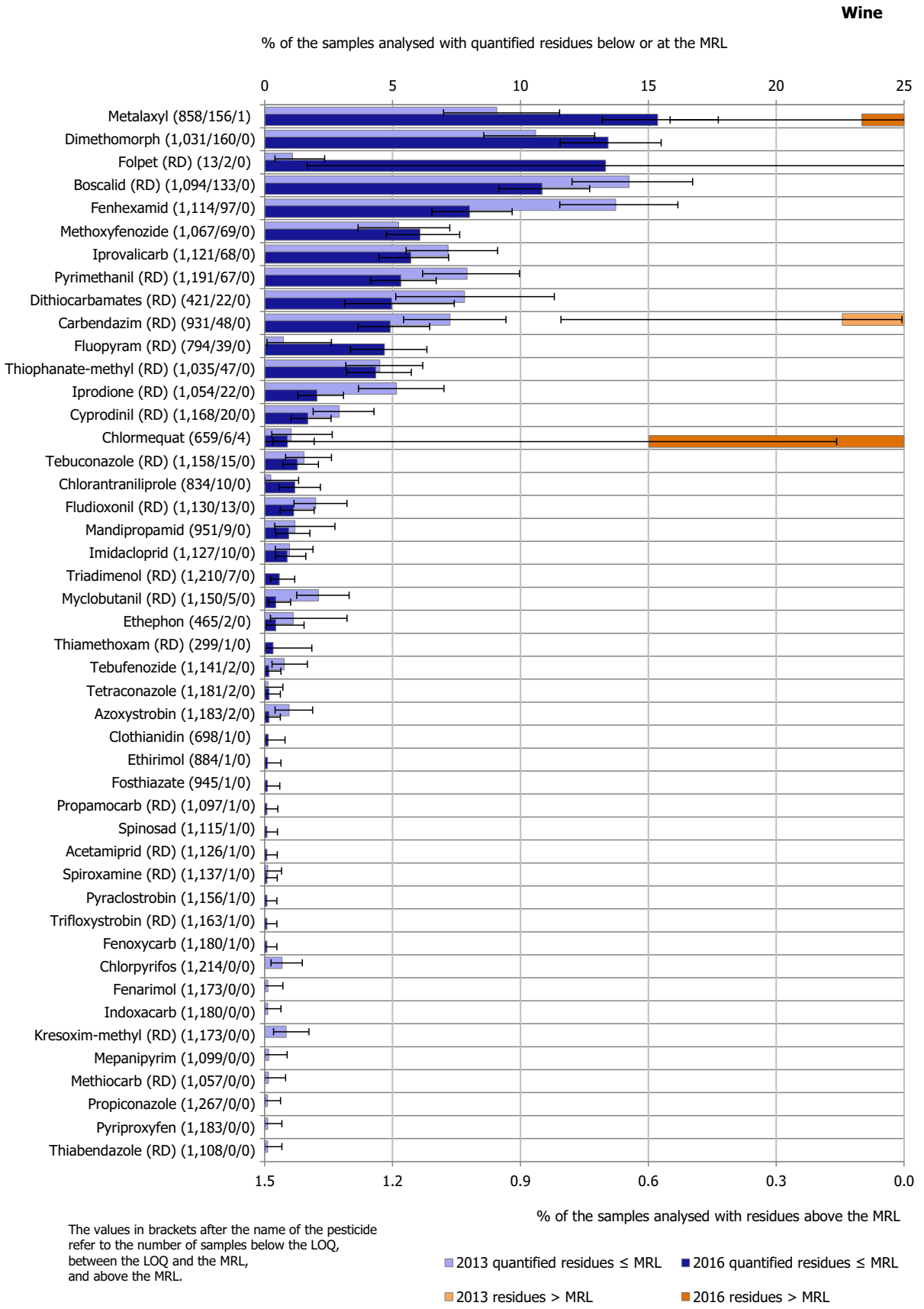


Figure 28: Percentage of wine samples with quantified residues below or equal to the MRL and with residues above the MRL set for wine grapes (default processing factor (PF) of 1 applied according to Regulation (EU) No 2015/595)

Figure 29: Residue concentrations measured in wine, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.10. Cow's milk

In 2016, 582 samples of cow's milk were analysed. In 545 samples (93.6%), no quantifiable pesticide residues were found, while 37 samples (6.4%) contained one or several pesticides in quantifiable concentrations. Multiple residues were reported in 14 samples (2.4%); up to 4 different pesticides were found in an individual milk samples (Figure 30). Compared to 2013, in 2016, the overall quantification rate slightly decreased (in 2013, 8% of the samples contained pesticide residues).

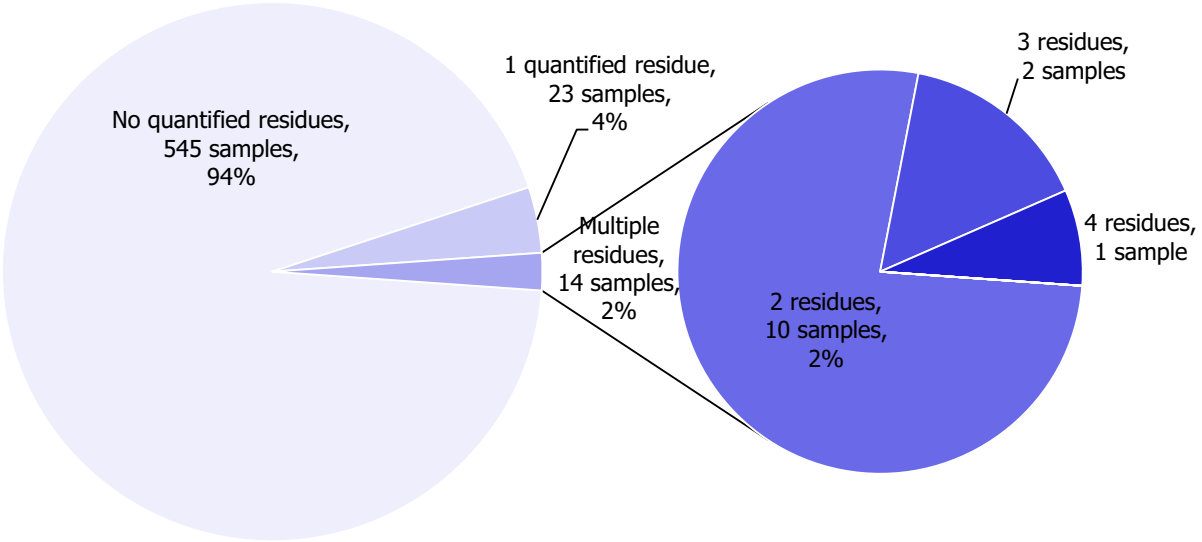


Figure 30: Number of quantified residues in individual cow's milk samples

No MRL exceedance has been identified for these samples.

In total, four different pesticides were quantified at levels at or lower than the MRL. Figure 31 depicts the results for all quantified pesticides. The most frequently quantified pesticides were hexachlorobenzene (quantified in 4.7% of the tested samples) and DDT (4.4%). The quantification rate is similar to the one in 2013. Chlordane and alpha-HCH (hexachlorocyclohexane) were quantified only in 2016. Heptachlor, beta-HCH and lindane (gamma-HCH), found in 2013, were not quantified in 2016.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 32. Further information on the most frequently quantified pesticides found in butter in 2016 is compiled in Table 10.

Table 10: Pesticides most frequently quantified in cow's milk in 2016

Pesticide	% samples above LOQ	Approval status and comments
Hexachlorobenzene	4.7	Persistent organic pollutants, banned at international level (Stockholm Convention, UNEP, 2001) and Regulation (EC) No 850/2004
DDT (RD)	4.4	
Chlordane (RD)	1.9	
Alpha-HCH (hexachlorocyclohexane)	0.6	

LOQ: limit of quantification; RD: residue definition.

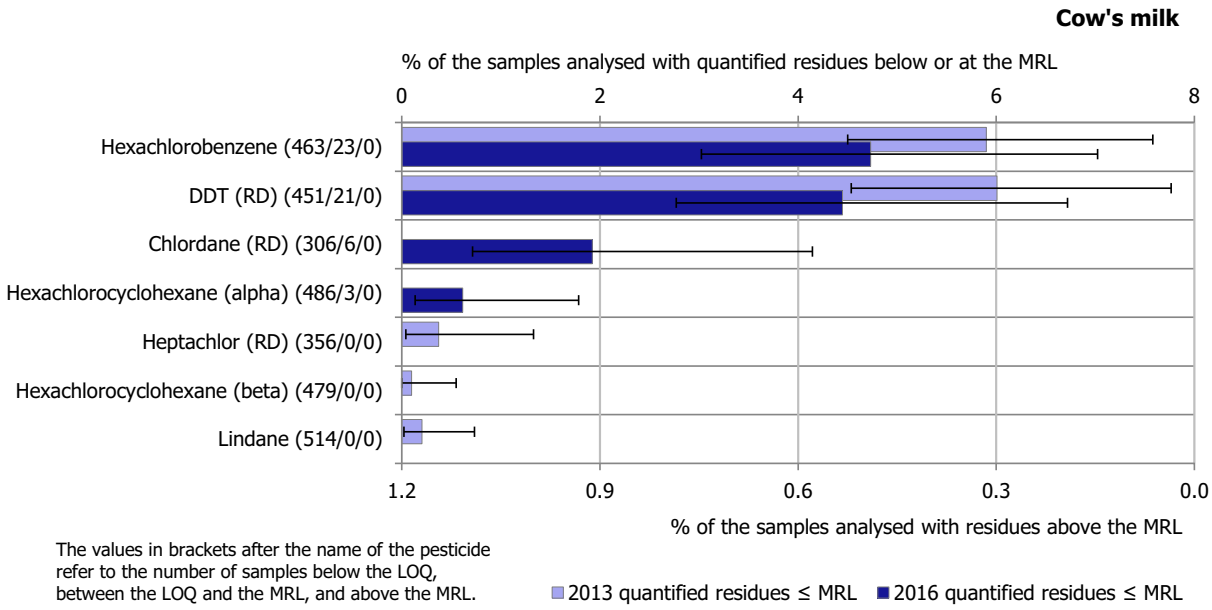


Figure 31: Percentage of milk samples with quantified residues below or equal to the MRL

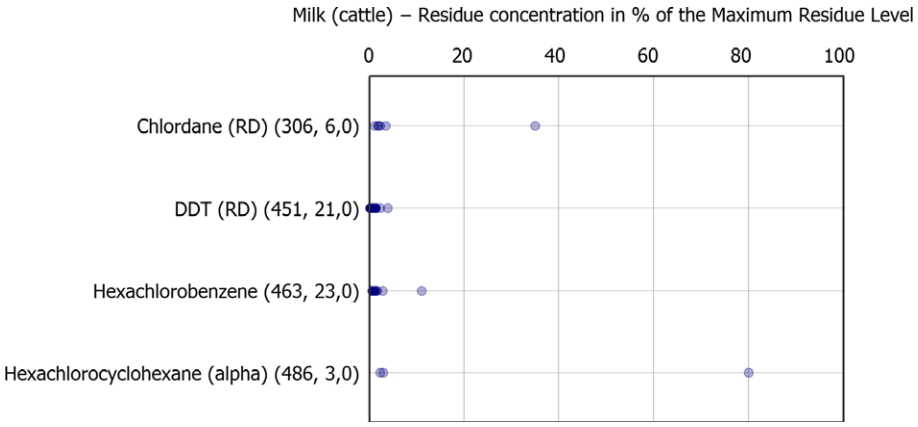


Figure 32: Residue concentrations measured in milk, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.3.11. Swine fat

In 2016, 919 samples of swine fat were analysed. In 893 samples (97.2%), no quantifiable pesticide residues were found, while 26 samples (2.8%) contained one or several pesticides in quantified concentrations. Four samples (0.4%) contained multiple residues; up to 3 different pesticides were reported in an individual swine fat sample (Figure 33). In 2013, swine fat was not analysed.

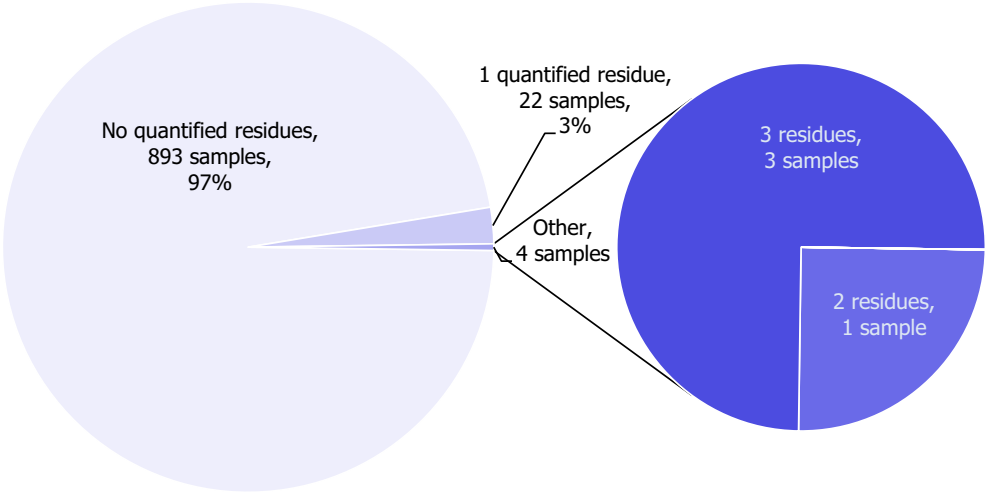


Figure 33: Number of quantified residues in individual swine fat samples

The residue concentrations exceeded the MRLs in one sample of unknown origin and only for one pesticide residue; the concerned residue was permethrin (MRL set at the LOQ of 0.05 mg/kg). This sample was nevertheless compliant with the MRL, when the analytical uncertainty was accounted for.

Figure 34 depicts the results for all pesticides with MRL exceedances and for quantified pesticides with residues below or at the MRL. Compared to 2013 (where only swine meat samples were analysed), the pesticide profile did not change significantly.

In total, 10 different pesticides were quantified in swine fat. The most frequently found pesticides were the POPs, such as DDT (1.8% of the tested samples) and chlordane (0.6%); in addition, cypermethrin (0.6%) and permethrin (0.4%) were found which are used not only as pesticides but also as veterinary medicinal products. POPs are prohibited at the international level under the Stockholm convention (UNEP, 2001), but are still present in the environment due to their persistence. Cypermethrin and permethrin are not only used as pesticides, but are also approved antiparasitic agents used against ectoparasites according to Regulation (EU) No 37/2010.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 35. Further information on the pesticides found in swine fat in 2016 is compiled in Table 11.

Table 11: Pesticides most frequently quantified in swine fat in 2016

Pesticide	% samples above LOQ	Approval status and comments
DDT (RD)	1.8	Persistent organic pollutants, banned at international level (Stockholm Convention (UNEP, 2001); Regulation (EC) No 850/2004). Fat-soluble substances
Chlordane (RD)	0.6	
Cypermethrin	0.6	Approved insecticide according to Regulation (EC) 1107/2009. Fat-soluble substance
Permethrin	0.4	Not approved insecticide according to Regulation (EC) 1107/2009. Fat-soluble substance

LOQ: limit of quantification; RD: residue definition.

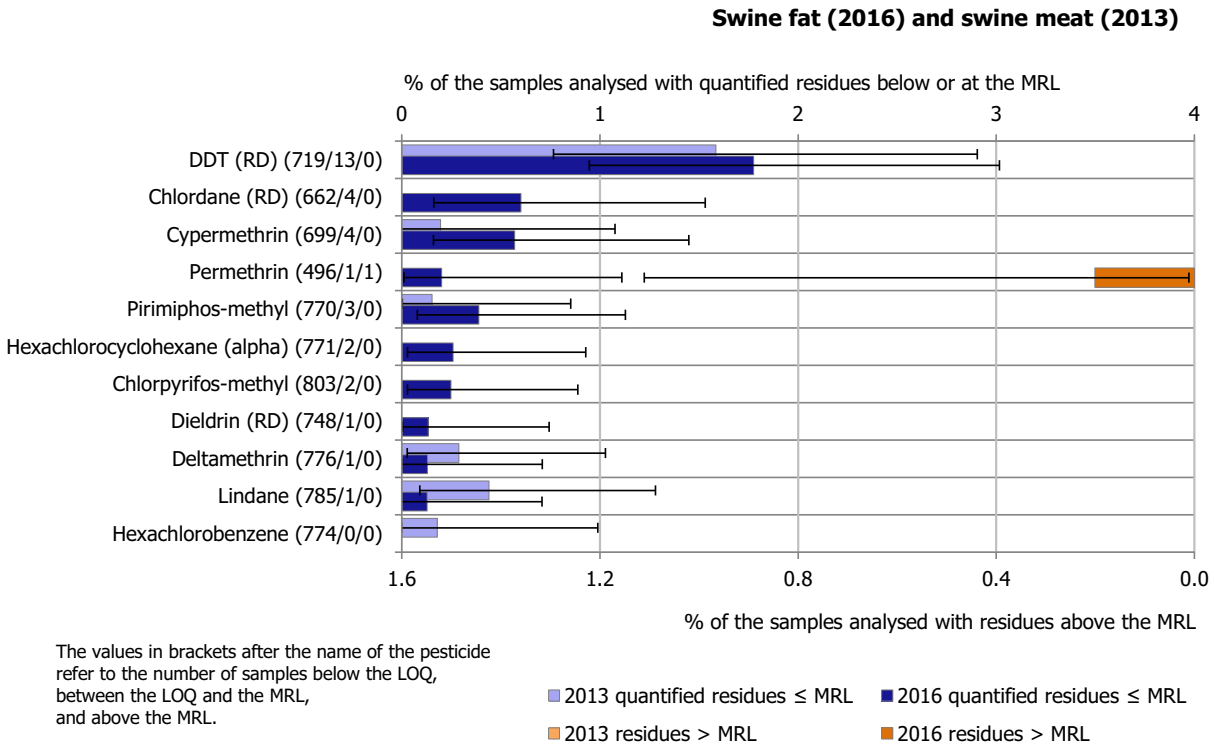


Figure 34: Percentage of swine fat samples with quantified residues below or equal to the MRL and with residues above the MRL

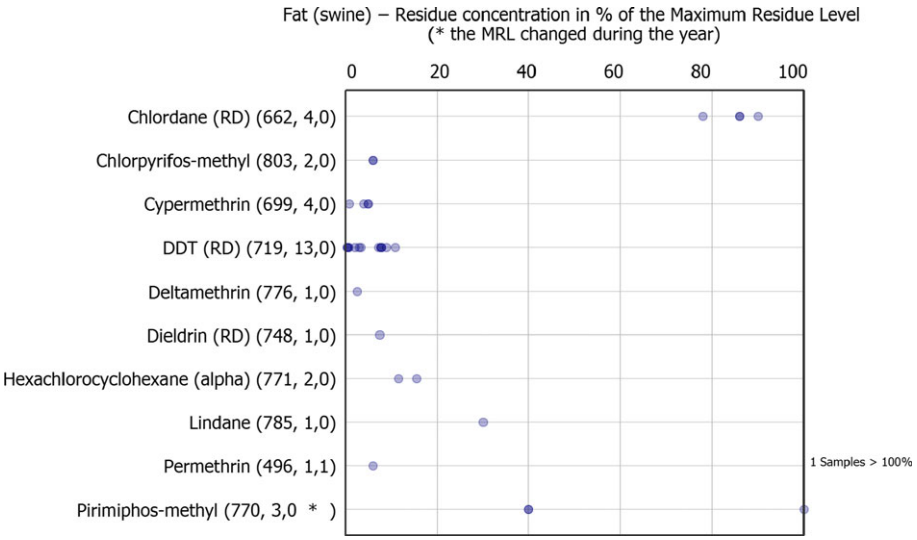


Figure 35: Residue concentrations measured in swine fat, expressed as a percentage of the MRL (only samples with residues ≥ LOQ)[24,25]

3.4. Overall results of EU-coordinated control programme

Overall, 1.7% of the 12,168 samples analysed in 2016 in the framework of EUCP exceeded the MRL (203 samples in total). In total, 0.9% of the samples (107 samples) were considered to be not compliant taking into account the measurement uncertainty. The number of samples with quantified residues, but within the legally permitted level (at or above the LOQ but below or at the MRL) was 5,598 (46.0%) (Figure 36). The number of samples with no quantifiable residues (residues below the LOQ) was 6,367 (52.3%). Compared to 2013 – the reference period where the same commodities as in 2016 were analysed – the MRL exceedance rate recorded in 2013 was significantly lower (0.9%).

Reasons for the MRL exceedances in lettuces, peaches and head cabbage regarding chlorpyrifos residues were due to the lowering of the MRL during 2016, whereas in tomatoes the specific reason for dimethoate exceedances is likely to come from the intensified control France did in Mayotte oversea territory. Further, many non-approved substances were quantified in EUCP samples. The percentage of samples with quantified residues within the legal limits is significantly lower than in 2013 (50.9% in 2013[30] vs 46% in 2016). Considering that in 2013 swine fat samples were not analysed (only swine meat) and that in 2016 oat was not sampled, swine and oat results were not considered to compare the quantification and MRL exceedance rates between 2013 and 2016.

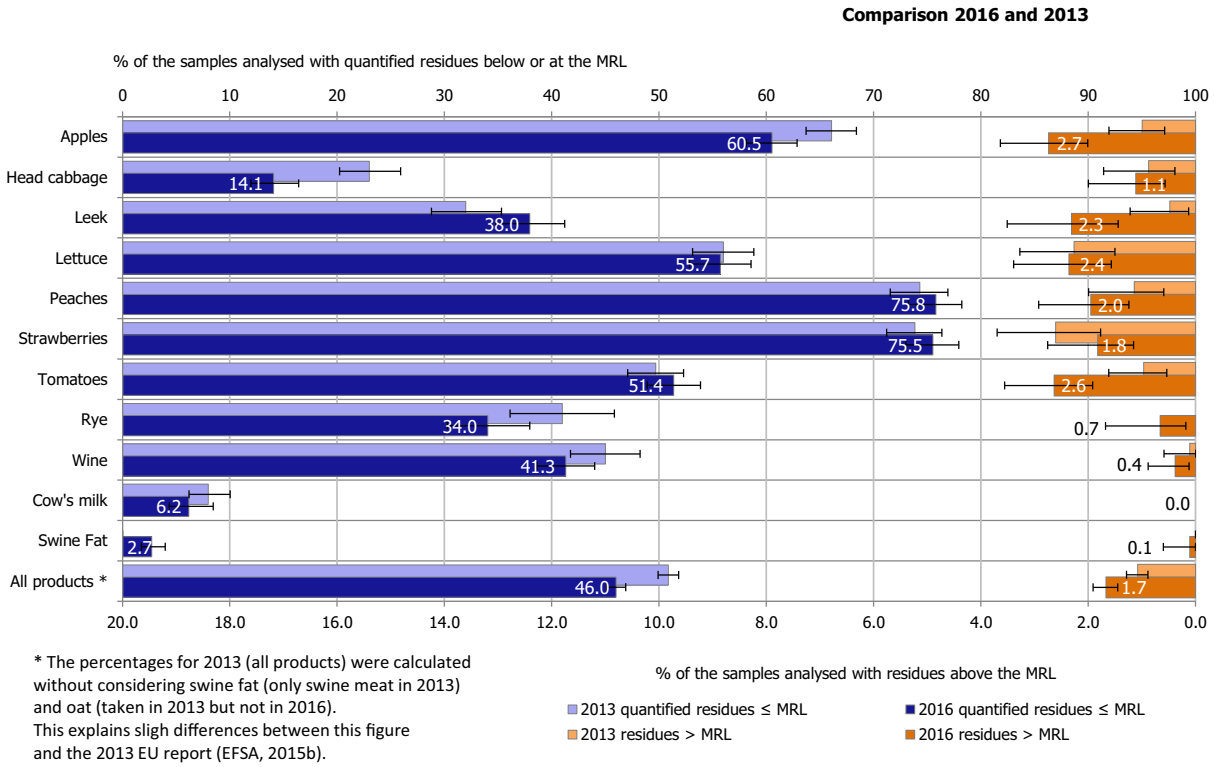


Figure 36: Overall proportion of EUCP samples with residues exceeding the MRL and samples with quantified residues below or at the MRL

Among the unprocessed plant products analysed in the 2016 EUCP, the lowest MRL exceedance rates were identified for rye, followed by head cabbage and strawberries. The ascending ranking of plant products exceeding the MRL is continued with peaches, leek, lettuce, tomatoes and apples. A low MRL exceedance rate was found in wine.

Except for one single quantification of permethrin in one sample of swine fat, no MRL exceedances were reported for samples of animal origin (swine fat and cow's milk); all the quantified residues in animal products were fat soluble and mainly due to obsolete, banned substances, which were used in the past as pesticides.

4. Overall monitoring programmes (EUCP and national programmes)

Compared with the EUCP, the national control programmes are rather risk based, focussing on products likely to contain pesticide residues or for which MRL infringements were identified in previous monitoring programmes. These programmes are not designed to provide statistically representative results for residues expected in food placed on the European market. The reporting countries define the priorities for their national control programmes taking into account the importance of food products in trade or in the national diets, the products with high residue prevalence or non-compliance rates in previous years, the use pattern of pesticides and the laboratory capacities. The number of

[30] The percentage for the category 'all products' was recalculated for 2013, excluding swine fat (as swine meat was requested in 2013) and rye (as oat was requested in 2013). This explains the differences between 50.9% and the 46.3% reported in 2013 EU report (EFSA, 2015b).

samples and/or the number of pesticides analysed by the participating countries is determined by the capacities of national control laboratories and the available budget resources. Considering the specific needs in the reporting countries and the particularities of national control programmes, the results of national control programmes are not directly comparable.

In the framework of the national control programmes, reporting countries also provided results of import controls performed under Regulation (EC) No 669/2009. These specific import controls are defined, *inter alia* based on previously observed high incidences of non-compliant products imported from certain countries from outside the Union and/or notifications under the Rapid Alert System of the European Commission.

The first part of this chapter (Section 4.1) describes the design of the national programmes, highlighting the differences in the approaches chosen by reporting countries. In the second part of the chapter (Section 4.2), the results of the national control activities are analysed in more detail with regard to the main parameters describing the national programmes (food products/pesticides/countries of the food origin). In these analyses, EFSA put specific emphasis on MRL exceedances as these findings may give indications of agricultural practices not in line with the legal provisions or potential consumer risk. However, it should be stressed again that since the national control programmes are targeted sampling strategies, the identified cases of MRL exceedances should not be considered as being statistically representative of the food available to European consumers. The findings, in particular the MRL exceedances, should be used by risk managers for their considerations and/or to take decisions on designing the risk based national monitoring programmes, e.g. which pesticides should be covered by the analytical methods used to analyse food products, or which types of products should be included in the national control programmes in order to make the programmes more efficient. The information would be also a valuable source of information for food business operators to design the control programmes for pesticide residues.

4.1. Description of the overall monitoring programmes

In 2016, in total, 84,657 samples[31] of food products covered by Regulation (EC) No 396/2005 were analysed for pesticide residues in the 30 EU reporting countries. Thus, the total number of samples analysed under the EUCP and the national control programmes increased slightly compared with the previous reporting year (+0.4%), where results for 84,341 samples were reported in 2015.

The majority of samples (80,484 samples, 95.1%) were classified as surveillance samples, meaning that the samples were taken without targeting specific growers/producers/importers or consignments likely to be non-compliant. In 4.9% of the cases, a suspect sampling strategy was applied, enforcing provisions of EU legislation on an increased level of official controls on imported food (Regulation (EC) No 669/2009). This means that samples were taking after concrete indications that certain food may be of higher risk as regards non-compliance or consumer safety (e.g. Rapid Alert notifications or follow-up enforcement samples following MRL violations identified in a first analysis of the product in focus).

The number of samples per reporting country and the sampling frequency per 100,000 inhabitants of the reporting country are presented in Figures 37 and 38.

No major changes were noticed between 2015 and 2016 as regards the ratio of samples from domestic production, other EU/EEA countries and third countries; the information on the sample origin for the 2016 programme is presented in Figure 39. The countries with the highest rates of samples of imported products from third countries were Bulgaria (95.7%), the Netherlands (61.7%) and Sweden (45.9%); Greece, Spain and Portugal focussed their national control programmes mainly on domestic products (more than 85% of the samples analysed).

[31] In addition to these 84,657 samples, the results for 627 samples of feed and fish were reported to EFSA. However, since for these two food groups currently no legal limits are set under Regulation (EC) No 396/2005, these samples are not further taken into account for the detailed analysis of samples analysed within the national control programmes and the 2016 EUCP.

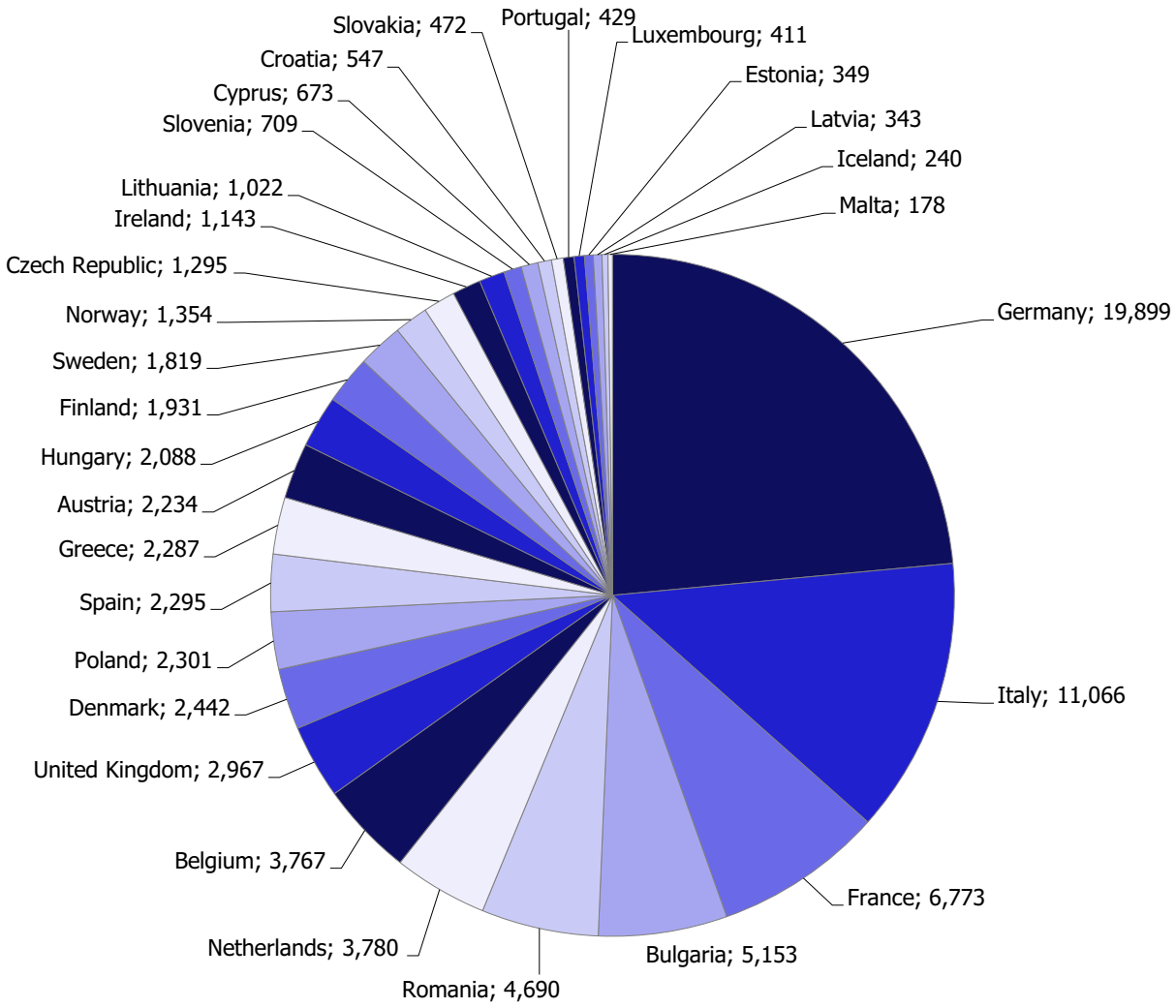
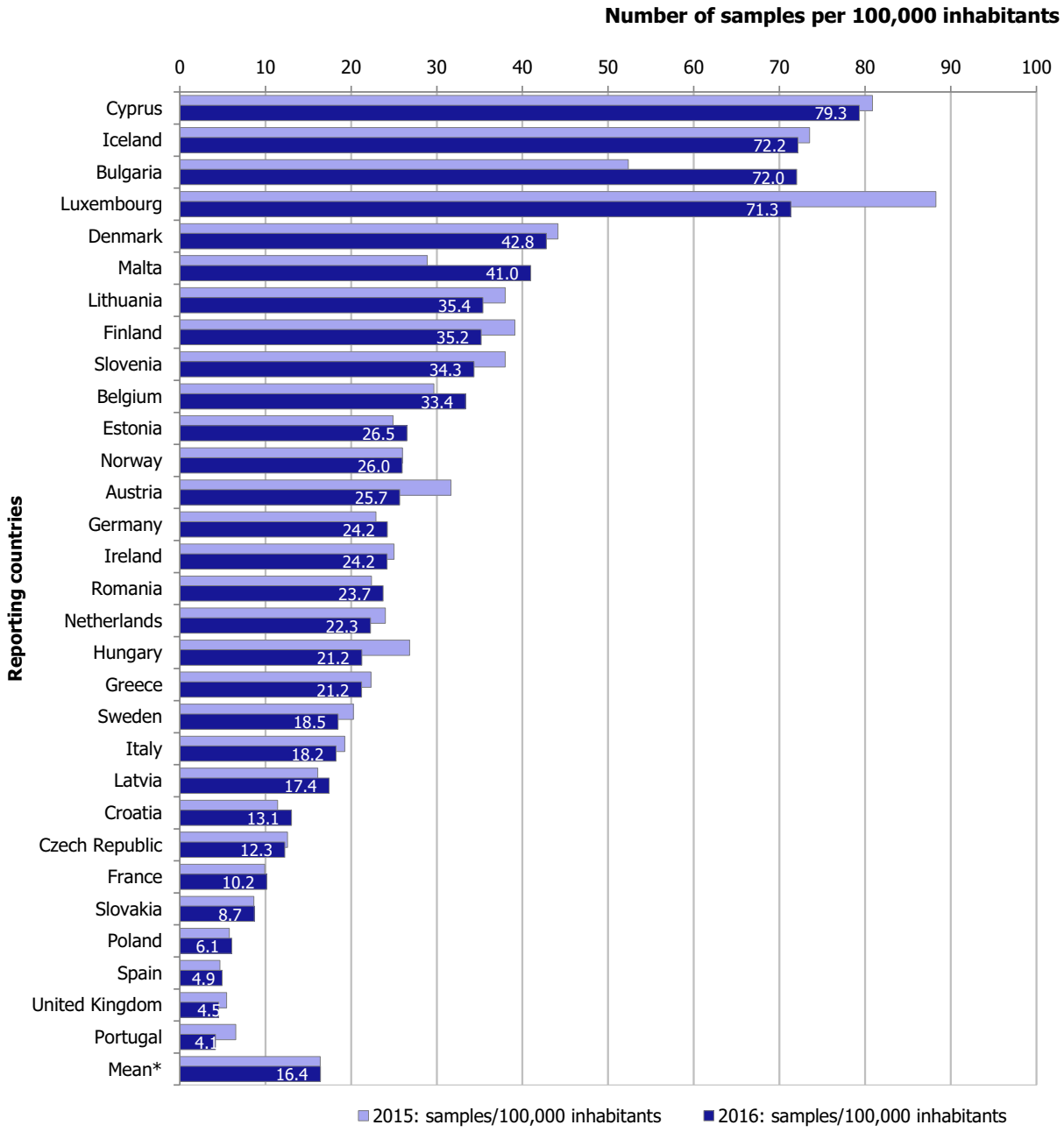


Figure 37: Number of samples analysed by each reporting country



* Overall mean of all reporting countries

Figure 38: Number of samples normalised by number of inhabitants

A more detailed analysis of the origin of the samples is presented in Figure 39.

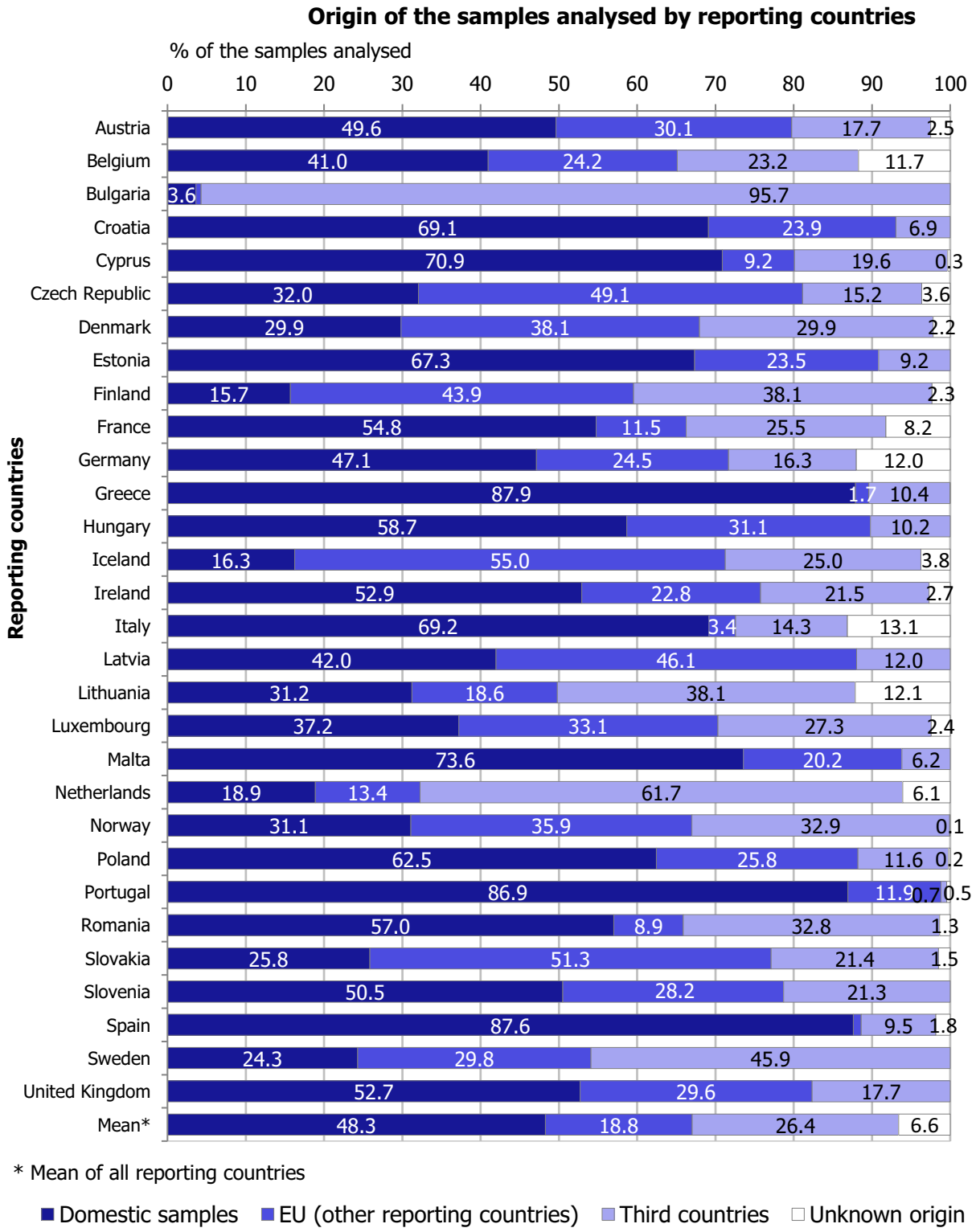


Figure 39: Origin of samples by reporting country

Overall, 56,749 samples (67%) analysed originated from EU reporting countries (EU Member States, Norway and Iceland). In total, 22,345 samples (26.4%) were imported from third countries; for 5,563 samples (6.6%), the origin of the products was not reported (Figure 40).

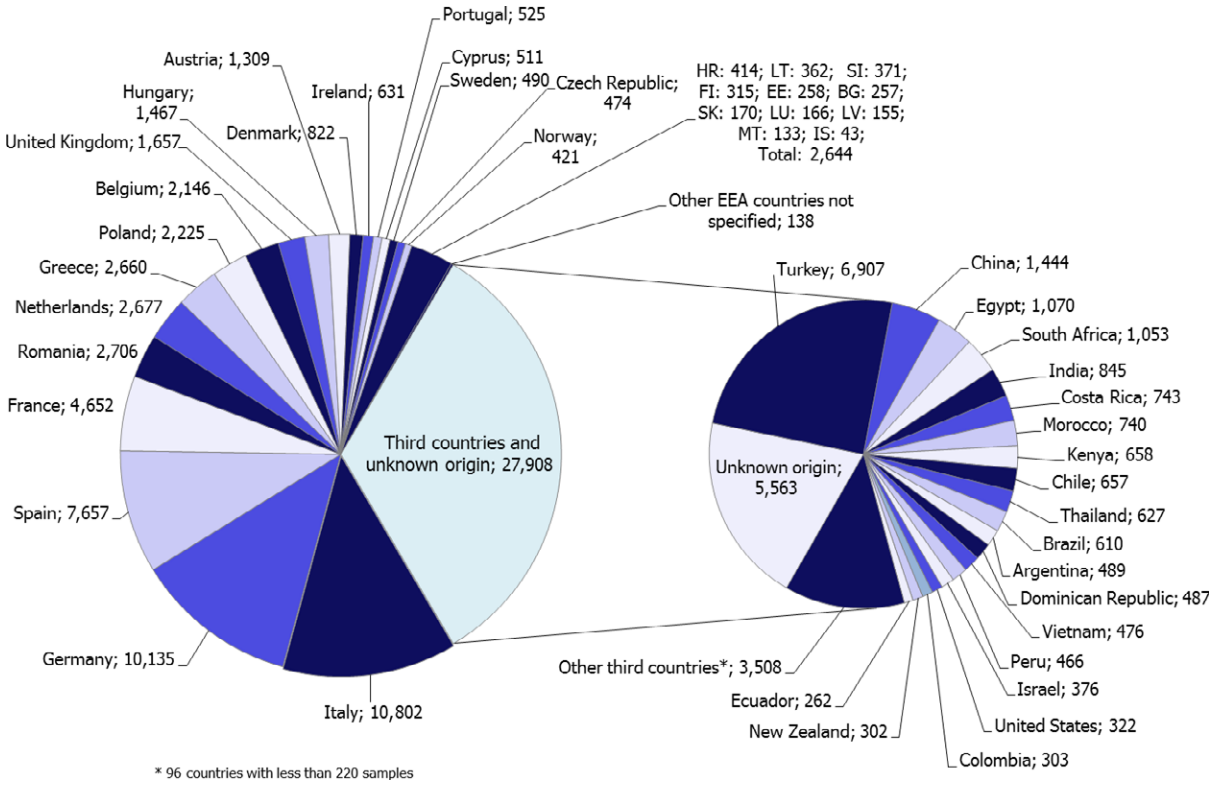


Figure 40: Origin of tested samples (reporting countries and third countries)

Similar to previous years, a wide scope of pesticides and of different food products was analysed. Considering all samples, the reporting countries analysed in total 791 different pesticides. The broadest analytical scopes at the country level was noted for Malta which reported in total 721 pesticides, followed by Germany (683 pesticides), Belgium (606 pesticides), Spain (571 pesticides), France (566 pesticides), Luxembourg (551 pesticides), Austria (519 pesticides), United Kingdom, Croatia, the Netherlands, Hungary, Sweden and Italy, all analysed at least 400 different pesticides. On average, 230 different pesticides were analysed per sample, which represents an increase of 4% compared to the previous year (Figure 41).

All reporting countries together covered a wide variety of unprocessed agricultural food products and processed products (e.g. cereal products such as flour, polished rice, wine, vegetable oils, fruit and vegetable juices, canned fruits and vegetables, milk products, dried fruits such as raisins, dried herbs, different types of baby food, etc.) which allows to get a comprehensive picture of the pesticide residue situation for food placed on the EU market.

A detailed analysis of the national control programmes reveals the different scopes of the national MRL enforcement strategies. Additional elements, such as the proportion of organic and conventional product samples or the types of food products sampled contribute to the overall variability of the national control programmes. The heterogeneity of national control programmes needs to be kept in mind when comparing results of different reporting countries. More information on the national control programmes can be found in the separate EFSA technical report that summarises the national results (EFSA, 2018a).

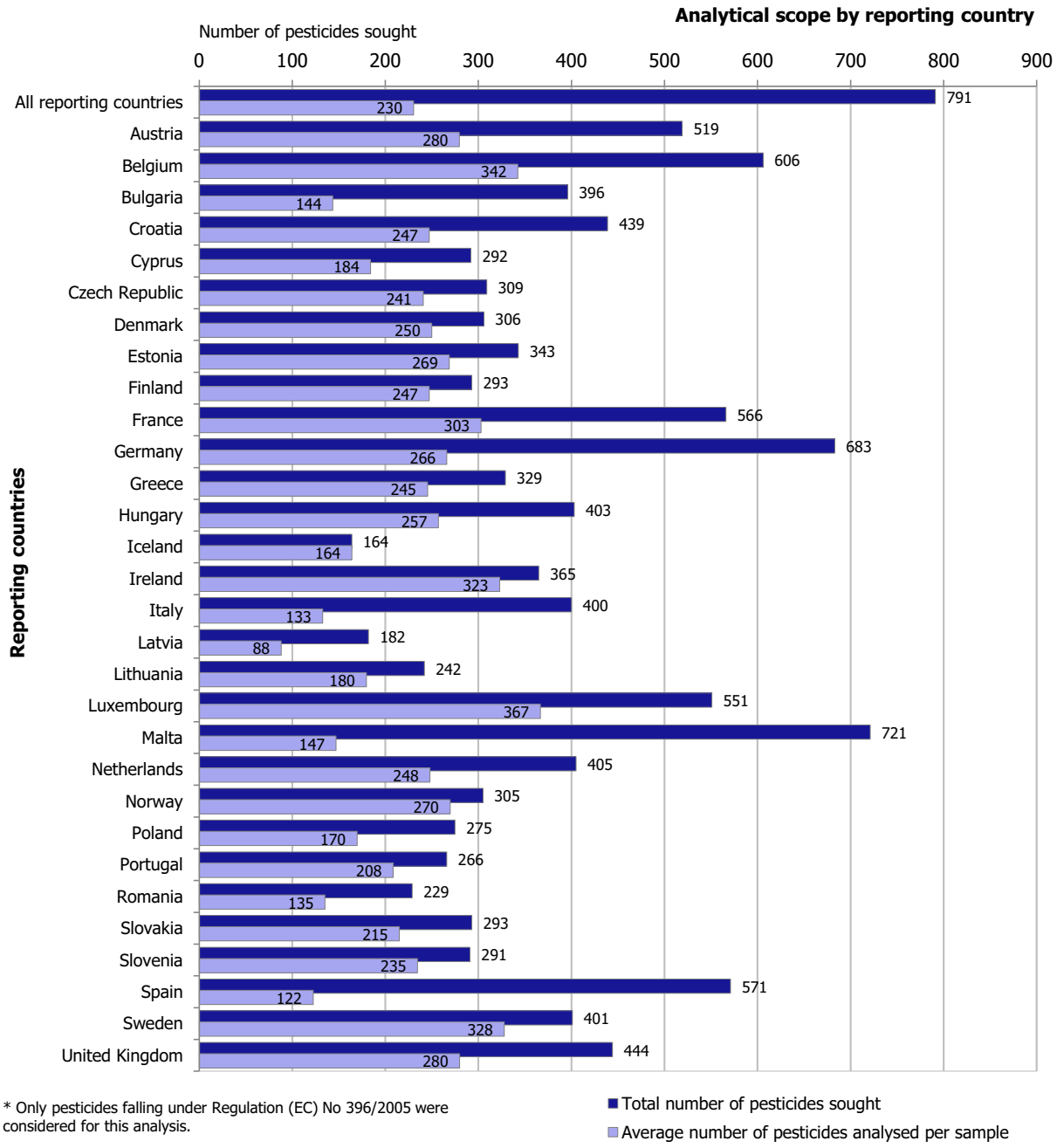


Figure 41: Number of pesticides analysed by reporting country

4.2. Results of the overall monitoring programmes

Overall, 96.2% of the 84,657 samples analysed in 2016 fell within the legal limits (81,482 samples); 42,935 of these samples (50.7% of the total number of samples tested) did not contain quantifiable residues (results below the LOQ for all pesticides analysed) while 45.5% of the samples analysed contained quantified residues not exceeding the legal limits (38,547 samples). MRLs were exceeded in 3.8% of the samples analysed in 2016 (3,175 samples; Figure 42). Taking into account the analytical measurement uncertainty, 2.2% of all samples analysed in 2016 (1,833 samples) clearly exceeded the legal limits, triggering legal sanctions or administrative actions; these samples are considered as non-compliant with the legal limits.

The overall MRL exceedance and non-compliance rates slightly increased in 2016; thus, 3.8% of the samples exceeding the MRL in 2016 (2.8% in 2015) and 2.2% of the samples were considered as non-compliant (1.6% in 2015) (Figure 42). Considering only surveillance samples (samples taken without targeting towards non-compliances), 3.3% of the samples analysed in 2016 contained residues exceeding

the MRL (2.3% in 2015). For enforcement samples (food items sampled targeting towards non-compliances), the MRL exceedance rate was 12.4% in 2016 (11.8% in 2015).

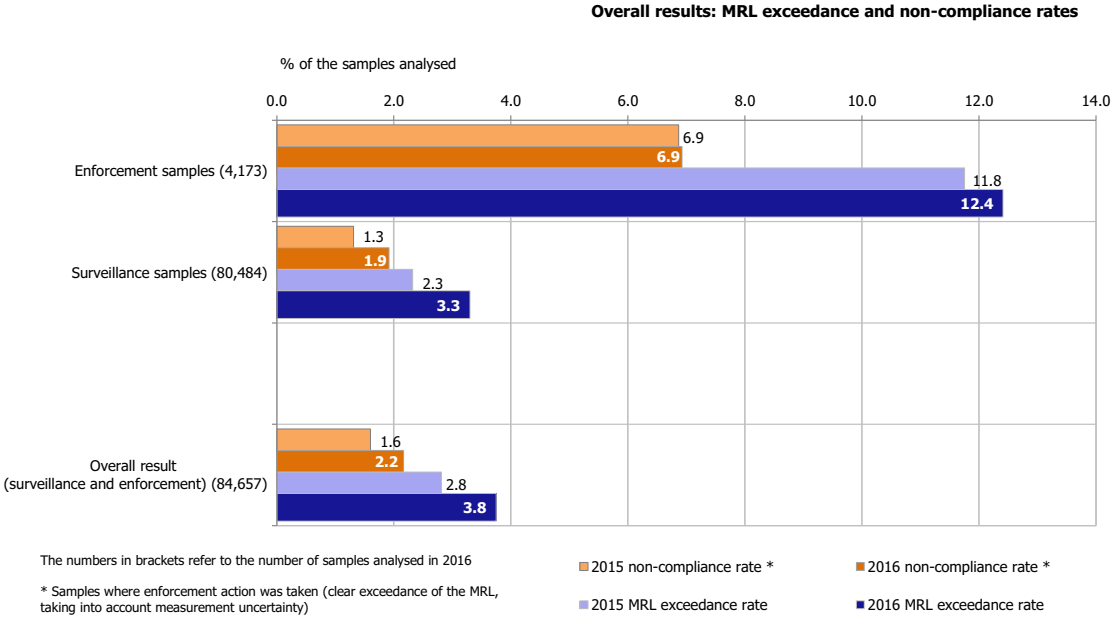


Figure 42: Percentage of samples compliant with the legal limit/exceeding the legal limit (MRL)

The results presented in the following sections refer to the complete data set, comprising results of surveillance and enforcement samples as well as unprocessed and processed food products, unless specifically indicated that the analysis was restricted to a subset of the results.

4.2.1. Results by country of food origin

Overall, 53.8% of the samples originating from EU Member States, Iceland and Norway were free of quantifiable residues; 43.9% of the samples contained residues at or above the LOQ but below the MRL, while 2.4% of the samples exceeded the MRL and 1.2% of the samples were considered non-compliant with the MRL taking the analytical measurement uncertainty into account.

Samples from third countries were found to have a higher MRL exceedance rate (7.2%) and a higher non-compliance rate (4.7%) compared to food produced in the EU (Figure 43). The percentage of samples from third countries free of quantifiable residues (residues below the LOQ) amounted to 40.7% while 52.1% of the samples contained quantifiable residues within the legal limits.

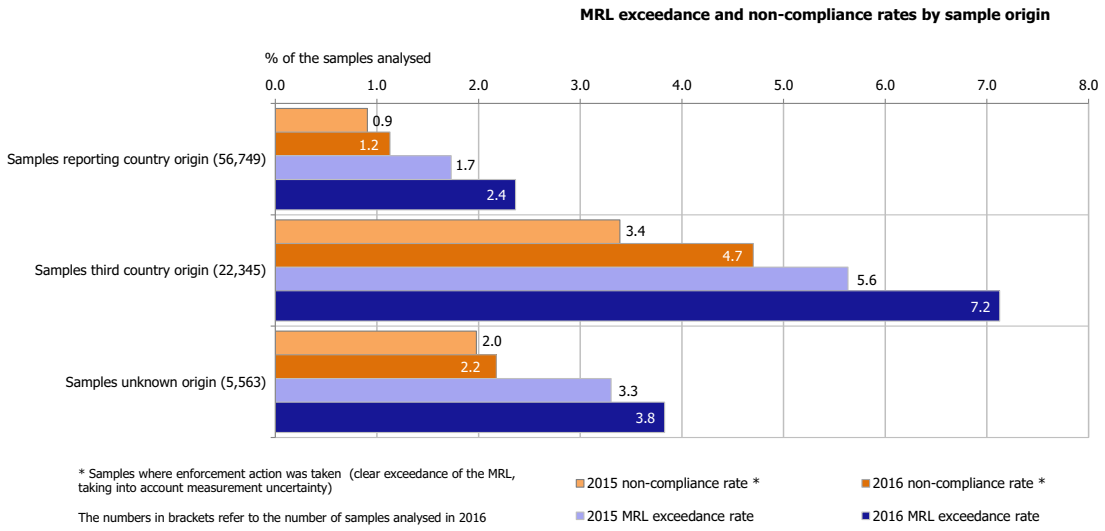


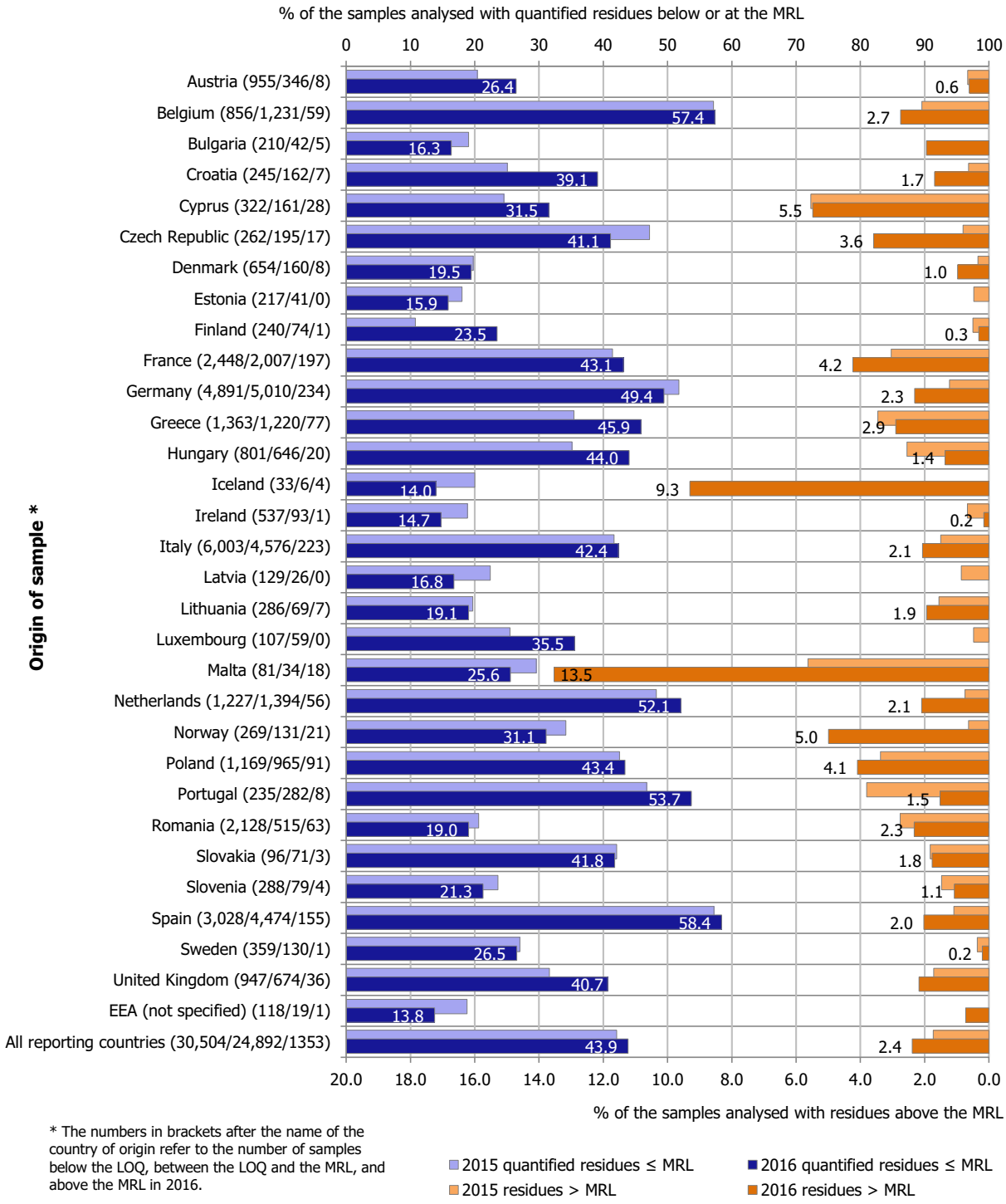
Figure 43: Percentage of samples exceeding the MRL and non-compliant by origin

The detailed MRL exceedance rates and the percentage of samples containing residues within the MRL originating from reporting countries and from third countries are presented in Figures 44 and 45. To allow a tentative comparison with the results generated in the previous reporting year, these two charts contain also the results for 2015.

The highest MRL exceedance rates among the samples originating from the reporting countries (EU produces) were reported for products from Malta, Iceland, Cyprus, Norway, France and Poland (more than 4% of the samples exceeding the MRL). In particular, for Iceland[32] and Malta it is observed an important increase of MRL breaches compared to the previous control year.

For samples produced in a third country (countries for which at least 50 samples were analysed), the highest MRL exceedance rates were noted for Laos, Vietnam, China, Uganda, Sri Lanka, Thailand, Pakistan, Cambodia and Suriname. Other third countries with a substantial number of samples (more than 50 samples taken) and MRL exceedances above the average (7.2% of the samples) were India, Israel, Colombia, Egypt, Dominican Republic, Tunisia, Kenya and Brazil.

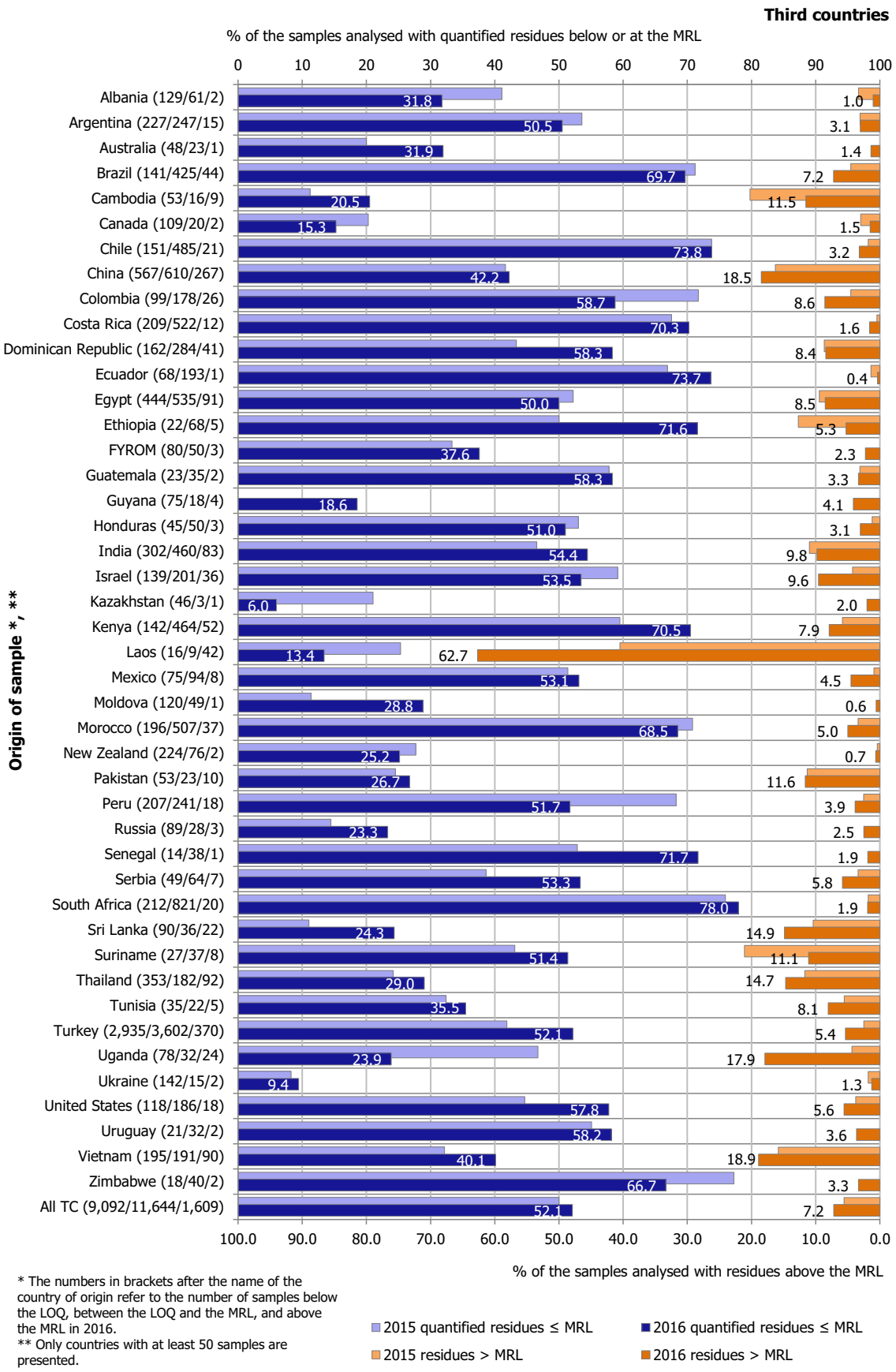
[32] Iceland had 4 samples out of 43 with MRL exceedances. One of those samples with exceedance, triggered follow up action resulting in two more enforcement samples that also exceed the MRL. All samples were grown in the same greenhouse and the production was destroyed.



* The numbers in brackets after the name of the country of origin refer to the number of samples below the LOQ, between the LOQ and the MRL, and above the MRL in 2016.

FYROM: the Former Yugoslav Republic of Macedonia.

Figure 44: MRL exceedance and quantification rates by country of origin (reporting countries)



* The numbers in brackets after the name of the country of origin refer to the number of samples below the LOQ, between the LOQ and the MRL, and above the MRL in 2016.
** Only countries with at least 50 samples are presented.

FYROM: the Former Yugoslav Republic of Macedonia.

Figure 45: MRL exceedance and quantification rates by country of origin (third countries)

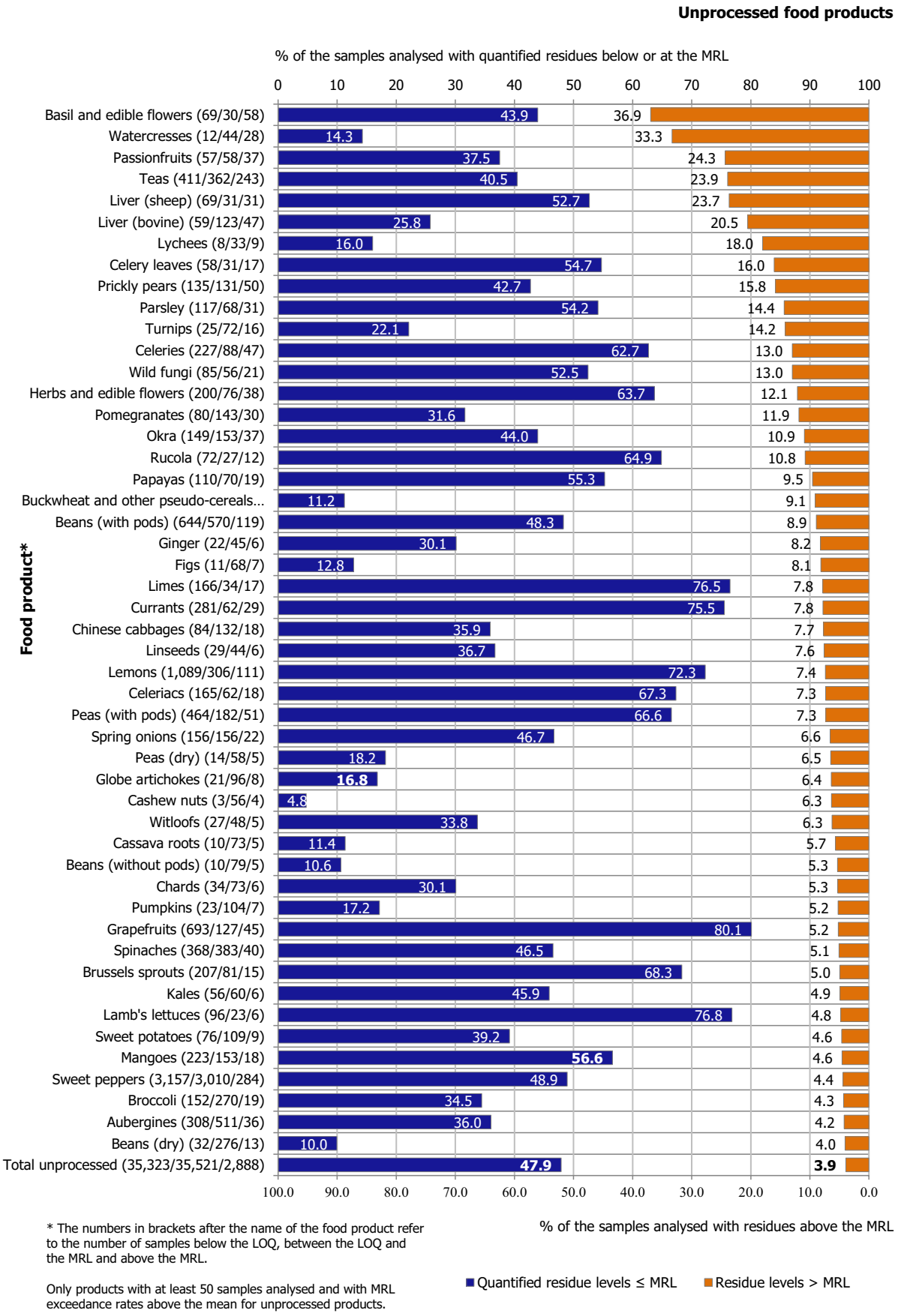
4.2.2. Results by food products

Among unprocessed food products,[33] the MRL exceedance rate amounted to 3.9% of the samples analysed in 2016 (3% in 2015), 47.9% of the samples contained quantified residues within the legal limits (46.9% in 2015) and 48.2% of the samples were free of quantifiable residues (50.1% in 2015) (Figure 46). Among the unprocessed products with at least 60 samples analysed, the highest MRL exceedance rates (greater than 10%) were identified for basil and edible flowers, water cresses, passion fruit, teas, liver (sheep and bovine), celery leaves, prickly pears, parsley, turnips, celeries, wild fungi, fresh herbs and edible flowers, pomegranates, okra and rucola. Some of the food products with MRL exceedance rates above the average are products, which were subject to increased import controls (e.g. tea, okra, basil, parsley, celery leaves) under Regulation (EC) No 669/2009. Thus, the results for these products are biased due to the targeted sampling in the framework of border inspections. More details on results for this specific sampling programme can be found in Section 4.2.4.

No MRL exceedance (products with at least 60 samples analysed) was reported for unprocessed coffee beans, rhubarbs, sweet corn and a number of products of animal origin, such as bovine and poultry (muscle and fat), sheep (fat) and milk.

For processed food products, the overall MRL exceedance rate was lower (2.8%) (Figure 47) than for unprocessed products (3.9%) (Figure 46). Similar to the results reported for 2015, processed grape leaves (and similar species), tomatoes, wild fungi, sweet peppers, rice, table grapes, sweet corn and table olives most frequently exceeded the MRLs. Teas, strawberries, pineapples, milk (goat) and muscle (swine) were also found to exceeded the MRLs frequently in 2016 (more than 2% of the samples). Therefore, it is suggested to continue monitoring the above-listed food items in the national control plans, in particular for those food items not covered by the 3-years EUCP rolling programme (e.g. grape leaves, tomatoes, raisins and wild fungi).

[33] Food products compliant with the description of in Annex I of Regulation (EC) No 396/2005 are considered as unprocessed products. It should be noted that this food classification comprises mainly unprocessed raw agricultural products, but also some processed products such as fermented tea, dried spices, dried herbal infusions etc., which are considered as 'unprocessed' products in the framework of this report.



* The numbers in brackets after the name of the food product refer to the number of samples below the LOQ, between the LOQ and the MRL and above the MRL.

Only products with at least 50 samples analysed and with MRL exceedance rates above the mean for unprocessed products.

Figure 46: MRL exceedance rate and quantification rate for unprocessed food products in 2016, sorted by decreasing MRL exceedance rate

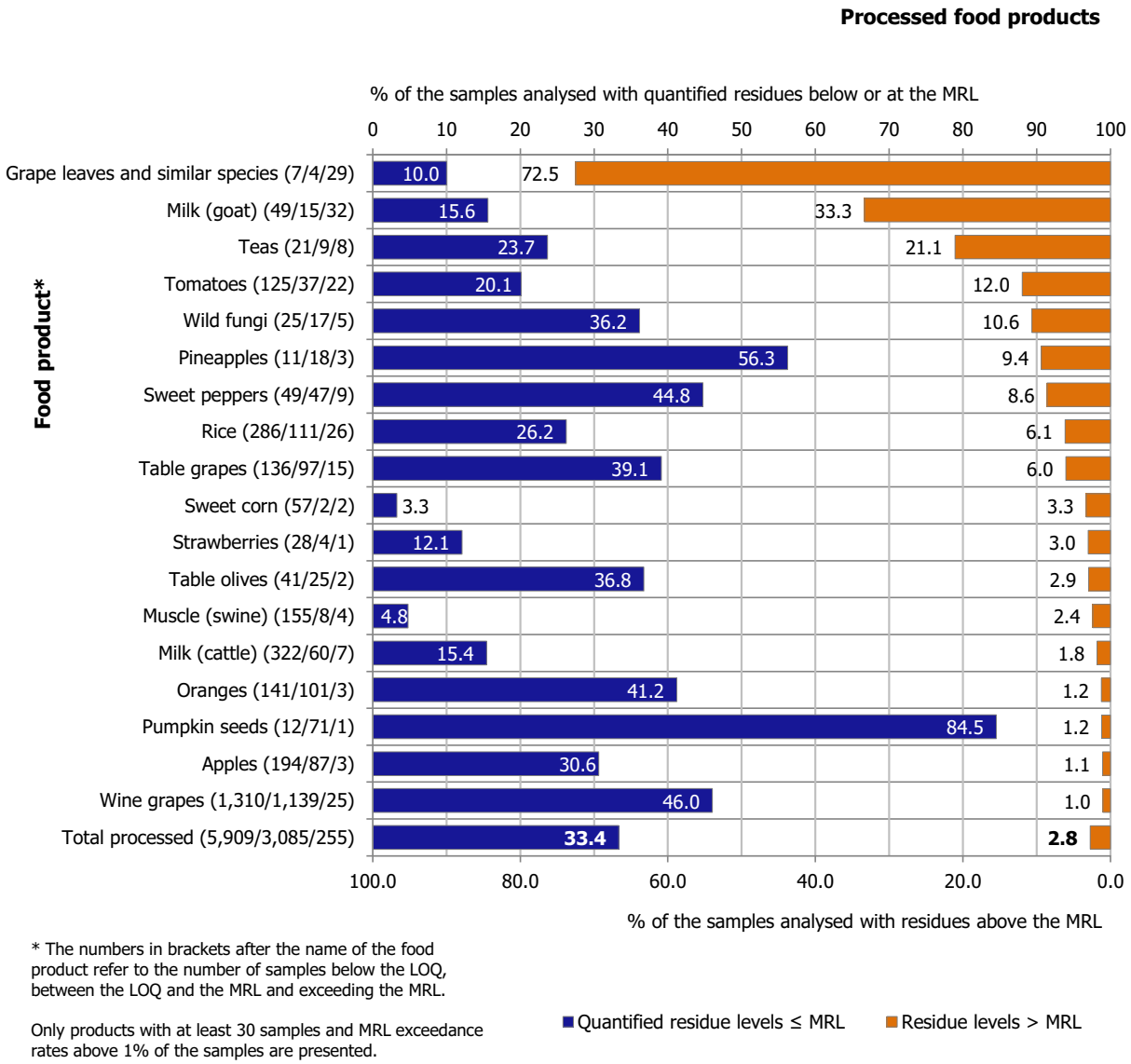


Figure 47: MRL exceedance rate and quantification rate for processed food products (excluding baby foods), sorted by decreasing MRL exceedance rate

4.2.3. Results by pesticides

Overall, in 2016, nearly 20 million analytical determinations (individual results) were submitted to and used by EFSA as basis for the data analysis presented in this report; the number of single determinations for which the residue levels were quantified at or above the LOQ amounted to 109,843 (0.56% of the total determinations; 0.55% in 2015) and related to a total of 41,722 samples (39,423 in 2015) and 350 different pesticides (349 in 2015).

The pesticides mostly quantified (in terms of absolute numbers of positive analysis at or above the LOQ) were boscalid (6,815 determinations), fludioxonil (4,255 determinations), imazalil (4,061 determinations), cyprodinil (3,721 determinations), acetamiprid (3,578 determinations), azoxystrobin (3,526 determinations) and chlorpyrifos (3,371 determinations) (Table C.1). However, the most frequently quantified pesticides (percentage of samples positively analysed for the given pesticide) were hydrogen cyanide (quantified in 95.7% of the samples), copper (quantified in 72.8% of the samples analysed for copper), carbon tetrachloride (56.6%), fosetyl-Al (29.1%), hydrogen phosphide (22.4%), bromide ion (20.6%), chlorate (14.1%), dithiocarbamates (CS_2) (13.9%), mercury (12%) and boscalid (9.5%). Except for carbon tetrachloride and hydrogen phosphide – which were sought in only 272 and 49 samples, respectively – all other pesticides with high quantification rates have been analysed in more than 3,000 samples (the highest number of analysis was reported for boscalid in 71,990 samples).

The table providing the number of analyses/determinations, the number of positive quantifications per pesticide, the quantification rate and the number of food products analysed for the single pesticides can be found in Appendix C, Table C.1.

In total 4,173 analytical determinations[34] were found exceeding the MRL. The pesticides most frequently found above the MRL are presented in Figure 48 (only pesticides with more than 0.05% of MRL exceedances and with at least 2,000 samples analysed). The two pesticides with the highest MRL exceedances' rate were the chlorate (5.6% of the samples exceeding the MRL out of the 5,273 samples analysed) and copper (2.5%, 3,103 samples analysed); these results are not reported in Figure 48 because of their different potential sources or uses, i.e. not necessarily originating from pesticide uses (see also Section 4.3).

[34] The number of samples (3,175 samples) exceeding the legal limit is lower than the total number of determinations exceeding the legal limit, since multiple MRL exceedances were found in a number of samples (525 samples).

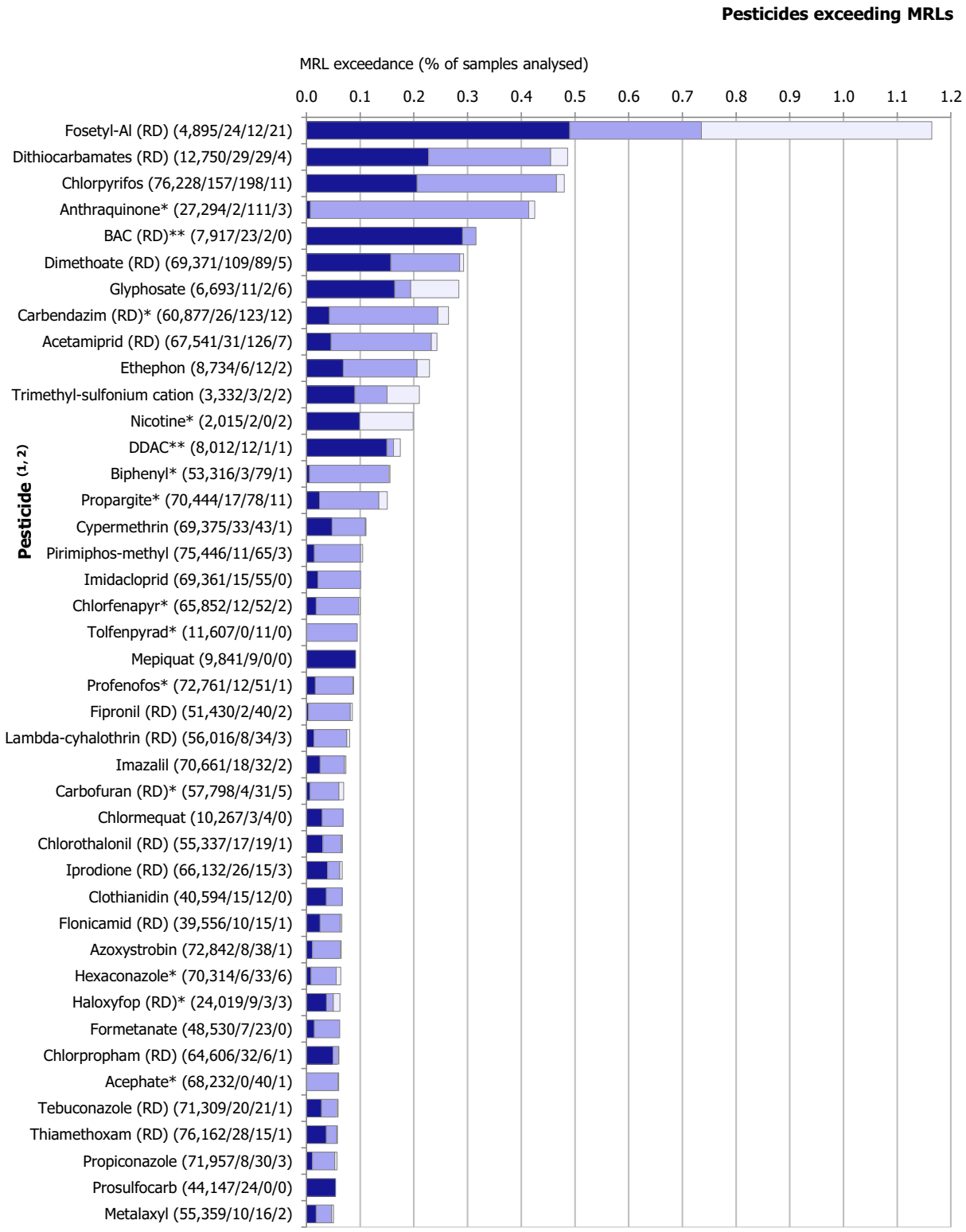


Figure 48: Frequency of MRL exceedances per pesticide and sample origin

4.2.4. Results on glyphosate residues in food

Glyphosate, an herbicide attracting a high level of public interest, was analysed in 2016 by 26 reporting countries. Overall, 6,761 samples of different food products (including processed products) were analysed for glyphosate residues; of these, 124 were baby food samples[35] and 76 were food samples of animal origin.

Considering the individual food products analysed, glyphosate residues were mainly analysed in wheat and rye (813 and 542 samples, respectively), apples, tomatoes, wine grapes, honey and other apicultural products, strawberries, table grapes, sweet peppers, lettuces, asparagus, plums, leeks, potatoes, kiwi fruits, carrots, cherries and pineapples. For other food products, results for less than 100 samples were reported.

Compared with 2015, in 2016, the overall number of samples analysed for glyphosate increased by 27% (5,329 samples were analysed in 2015). In total, 77.3% of the samples tested originated from the EU, 12.7% from third countries and for 10% the sample origin was not identified (unknown origin).

The majority of the samples was analysed by Germany (60%), followed by the United Kingdom (7.5%) and Croatia (5.3%).

Overall, 3.6% of the samples analysed for glyphosate contained quantified residues of this active substance.

Considering the individual food products analysed, the highest quantification rate was observed for dry lentils (38% of the samples containing quantified levels of glyphosate, i.e. 16 samples of the 42 samples analysed), followed by linseeds (20% of the samples: 3 out of 15 samples), soya beans (16% of the samples: 6 out of 38 samples), dry peas (12% of the samples: 2 out of 17 samples) and tea (10% of the samples: 3 out of 29 samples). In cereals, glyphosate was mainly found in buckwheat and other pseudo-cereals (24% of the samples: 15 out of 62 samples), followed by barley (19% of the samples: 6 out of 31 samples), millet (18% of the samples: 2 of the 11 tested samples), wheat (13% of the samples: 105 of the 813 samples) and rye (4% of the samples: 23 of the 542 samples). No detection of glyphosate residues was reported for rice samples.

Among the 6,761 samples analysed, 19 samples (0.28%) exceeded the MRL for glyphosate:

- Five samples of honey and other apicultural products from Germany (MRL = 0.05* mg/kg);
- Seven samples of buckwheat and other pseudo-cereals, of which 5 were from Lithuania, one from China and one from Ukraine (MRL = 0.1* mg/kg);
- One sample of poppy seeds from Slovakia (MRL = 0.1* mg/kg);
- Six other samples (four of buckwheat and other pseudo-cereals, one of millet and one of honey and other apicultural products) were reported with unknown origin.

Glyphosate residues were not quantified in baby food samples.[36]

The use of plant protection products containing glyphosate trimesium, a variant of glyphosate, may lead not only to residues of glyphosate, but also to residues of trimethyl-sulfonium cation, a compound for which specific MRLs have been established. The following results for trimethyl-sulfonium cation residues have been reported:

- Four countries (Germany, Italy, the Netherlands and Cyprus) reported analysis in 3,332 samples of 108 different food products, mainly wine grapes, tomatoes, table grapes, strawberries, lettuce, apples, potatoes; other food products, were tested for trimethyl-sulfonium cation, but for less than 100 samples. Trimethyl-sulfonium cation was quantified in 1.8% of these samples, mostly in cultivated fungi (48% of the samples: 26 out of 54 samples analysed), citrus fruits (24% of the mandarins analysed (5 of the 21 samples), 9% of oranges (2 of the 22 samples), 6% of grapefruits (2 of the 34 samples), 4% of limes (1 of the 26 samples) and 4% of lemons (3 of the 83 samples), 14% of the papaya samples (1 of the 7 seven samples), and table grapes (5% of the samples: 8 of the 166 samples). In addition, some positive results were reported for teas, pumpkin seeds, pomegranates, celeriacs, lentils (dry), melons, sweet peppers, apricots, asparagus and plums. Trimethyl-sulfonium cation was exceeded in seven samples (0.2% of the total samples tested): three samples on cultivated fungi (two originated from Germany and one from Poland), one sample of table grapes from Chile and three samples of tea (one sample originated from China and the other two were from unknown origin).

[35] Baby food samples are referring to: 'baby foods other than processed cereal-based foods, processed cereal-based foods for infants and young children and infant formulae'.

4.2.5. Results on import controls under Regulation (EC) No 669/2009

According to the provisions of Regulation (EC) No 669/2009[36] on import controls, in 2016, certain food products from Cambodia, China, the Dominican Republic, Egypt, Kenya, Thailand, Turkey and Vietnam were subject to an increased level of official controls for certain pesticides at the point of entrance into the EU territory. A description of the required controls (type of products, countries of origin and the type of hazard) relevant for the calendar year 2016 can be found in Appendix C, Table C.2.

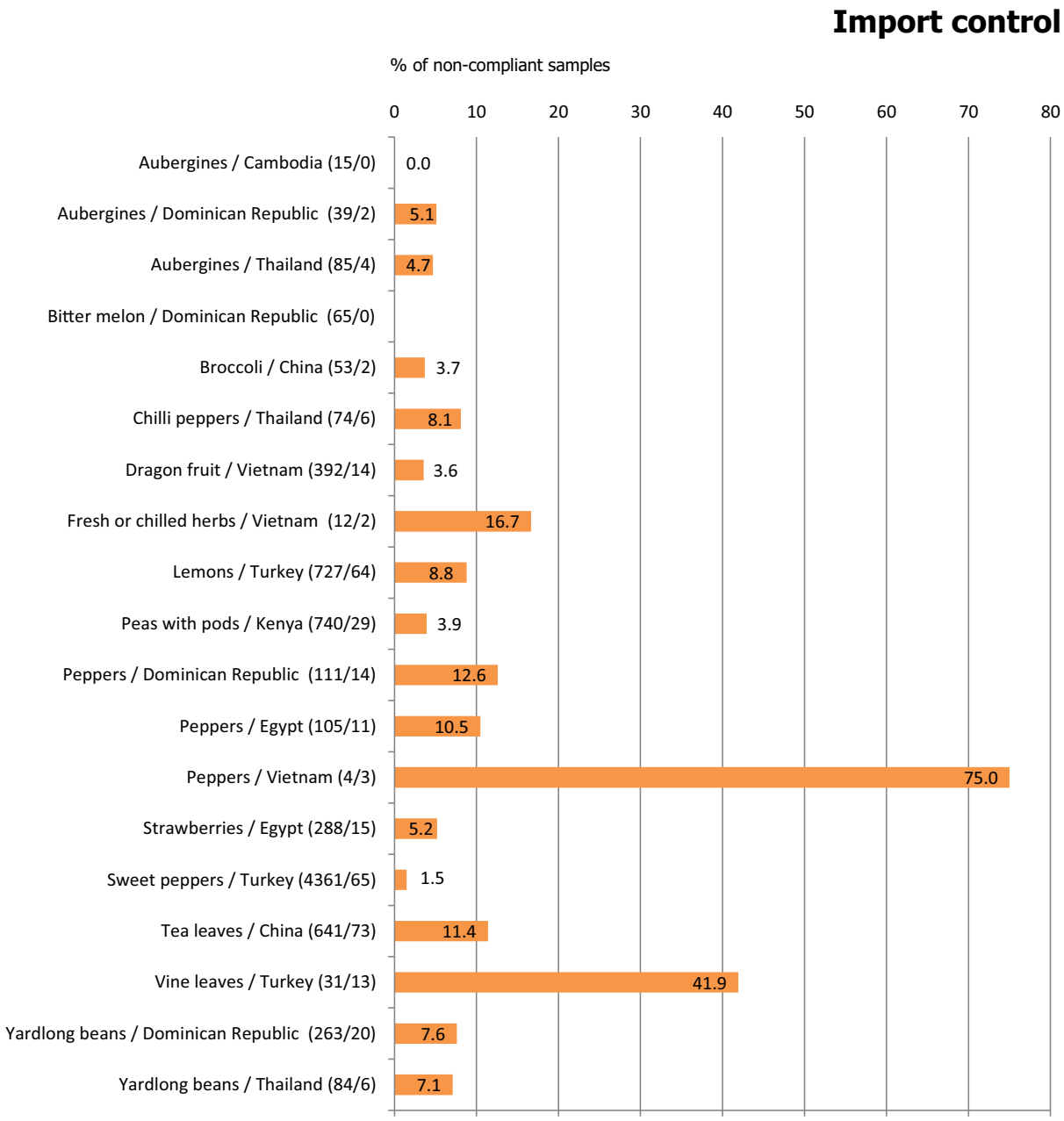
As for the last EU report on pesticide residues (2015 control year), the results presented in this paragraph are based on the 2016 results provided by the European Commission, i.e. summary statistics on the exceedance rate with no detailed information on the pesticides analysed and quantified.

In 2016, 65,010 consignments of products covered by the Regulation (EC) No 669/2009 on an increased level of official import controls on the imports of certain feed and food of non-animal origin at the EU borders were imported to the EU. In total, 8,092 of these consignments were selected for laboratory analyses. A total of 343 consignments (4.3% of the total number of consignments submitted to analysis) were considered as non-compliant with EU legislation on pesticide residues, taking into account the analytical measurement uncertainty.

Among food commodities for which at least 30 samples were analysed in 2016, the highest non-compliance rates were reported for the following items: vine leaves from Turkey (41.9%), sweet peppers from Dominican Republic (12.6%) and from Egypt (10.5%), tea leaves from China (11.4%), lemons from Turkey (8.8%), chilli peppers from Thailand (8.1%), yardlong beans from Thailand (7.1%) and from Dominican Republic (7.6%), strawberries from Egypt (5.2%) and aubergines from the Dominican Republic (5.1%).

Figure 49 reports the percentages of non-compliant food products analysed according to the provisions of Regulation (EC) No 669/2009 by sample origin and food item.

[36] Commission Regulation (EC) No 669/2009 of 24 July 2009 implementing Regulation (EC) No 882/2004 of the European Parliament and of the Council as regards the increased level of official controls on imports of certain feed and food of non-animal origin and amending Decision 2006/504/EC, OJ L 194, 25.7.2009, p. 11–21.



*: The number in brackets after the name of the country of origin/food product refer to the number of samples analysed for pesticide residues under Reg. 669/2009 and the number of non-compliant samples.

Figure 49: Frequency of non-compliant samples analysed in the framework of the reinforced import controls under Regulation (EC) No 669/2009

4.2.6. Results on baby food

Reporting countries analysed 1,676 samples of baby foods (i.e. foods covered by Directives 2006/125/EC and 2006/141/EC), including 153 samples of infant formulae and 77 follow-on formulae, 357 processed cereal-based baby foods and 1,089 other baby foods including 423 samples taken in the framework of the EUCP.

Quantified residues (at or above the LOQ) were found in 171 samples (10.2%), while the majority of samples were free of quantifiable residues (89.8%). In 13 samples, more than one residue was

quantified in the same sample (Figure 50). For 1.9% of the samples (32 samples), the residue concentrations were considered by the reporting countries exceeding the MRL[37] (for more details, see below); 1.4% of the samples (24 samples) were considered non-compliant with the legal limits, taking into account the analytical measurement uncertainty. Compared with the overall results for 2016, the quantification rate (percentage of samples with quantified residues) is significantly lower in baby food samples (10.2%) compared to the quantification rate recorded considering all food groups (49.3%). In 2015, the pesticide quantification rate in baby foods was slightly higher (11%).

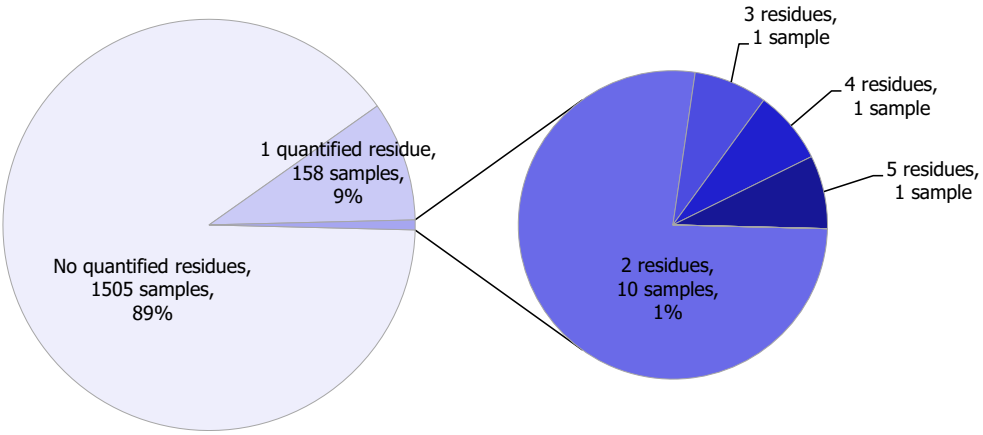


Figure 50: Number of quantified residues per individual baby food samples

Considering the samples of all baby food categories, 21 different pesticides were quantified in concentrations at or above the LOQ. Similar to the previous reporting years, the most frequently quantified compound in baby food was copper (quantified in 91 samples, mainly baby foods classified as 'other than processed cereal-based foods'), followed by chlorate (29 samples, all type of baby foods), fosetyl-Al (23 samples, not quantified in infant and follow-on formulae), BAC (8 samples, all type of baby food), hexachlorobenzene (8 samples), DDT (6 samples), pendimethalin (6 samples), didecyldimethylammonium chloride (DDAC) (3 samples), dieldrin (2 samples), dodine (2 samples) and tricyclazole (2 samples). Other pesticides that occurred in quantifiable concentrations in only one single sample were: acetamiprid, boscalid, chlordane, deltamethrin, difenoconazole, dithiocarbamates, imazalil, mercury, pymetrozine and pyrethrins. The frequent occurrences of copper are explained by the legal context: copper is a nutrient that is added to infant formula and follow-on formula and can also be added to processed-cereal-based food and baby food. Copper compounds in baby food may also result from other sources (natural occurrence of copper in plant or animal products or the use of copper as feed additives). BAC and DDAC belong to the group of quaternary ammonium compounds that are widely used in biocides (disinfectants), but since they have been used as pesticides in the past, they fall under the remit of the pesticide MRL regulation. Chlorate is a substance that is formed as a by-product from the use of chlorine disinfectants (chlorine, chlorine dioxide and chlorite), is used as processing aids to allow good hygiene practices in food processing and as a biocidal in the process of disinfecting drinking water. These uses are necessary to ensure a good hygiene of food products but also lead to detectable residues of chlorate in food in the food chain not necessarily linked to a use as a pesticide. Finally, some of the other quantified substances (i.e. hexachlorobenzene, DDT and dieldrin) can be considered as persistent environmental contaminants.

Overall, EFSA noted 34 analytical determinations in 32 samples (1.9% of the baby food samples) in which the residue concentrations exceeded the default MRL of 0.01 mg/kg,[38] most frequently for fosetyl-Al (20 samples vs 56 in 2015) and chlorate (6 samples). The overall MRL exceedance rate is lower in 2016 than in 2015 (4.8% of the samples), mainly because of lower MRL exceedances reported for fosetyl-Al.

[37] In general, a default MRL of 0.01 mg/kg is applicable for food covered by Directive 2006/125/EC and 2006/141/EC unless lower legal limits for the residue levels are defined in the Directives. Thus, the provisions are more restrictive than for other food falling under the provisions of Regulation (EC) No 396/2005.

[38] The results related to copper (89 determinations) were not taken into account in the calculation of the MRL exceedance rate, because of the specific provisions on copper in Directive 2006/125/EC and 2006/141/EC.

4.2.7. Results on organic food

In total, 5,495 samples of organic food (excluding baby foods)[39] were taken (6.5% of the total number of samples tested in 2016 compared to 6.4% in 2015); the 767 samples of organic products taken in the framework of the EUCP are also included in this total number of samples.

Overall, 4,568 samples did not contain quantifiable residues (83.1% of the analysed samples in 2016 compared to 85.8% in 2015). In total, 927 samples contained quantified residues (16.9% in 2016 vs 14.2% in 2015); of those, 856 samples contained residues, whose measured levels were below or at the MRL (15.6% of the samples compared to 13.5% in 2015) and 71 samples with residue levels above the MRL (1.3% vs 0.7% in 2015). Of the 71 samples exceeding the MRLs, 41 samples were considered non-compliant by the reporting country considering the uncertainty of the analytical measurement. Multiple MRL exceedances were found for three samples: one sample of tomatoes from China, one sample of lettuce from Bulgaria and one sample of fresh herbs from India.

Compared to conventionally produced food (non-organic), the MRL exceedance and quantification rates were significantly lower in organic food. In 2016, the estimated MRL exceedance rate was 1.3% in organic food, while 4% for conventional food; the same rates' pattern was observed for the quantification rates, which were 15.6%[40] in organic food and 48.5% in conventional food. In Figure 51, the results for individual organic food groups are analysed separately, showing the major difference in the findings, in particular for fruits and nuts, vegetables and cereals.

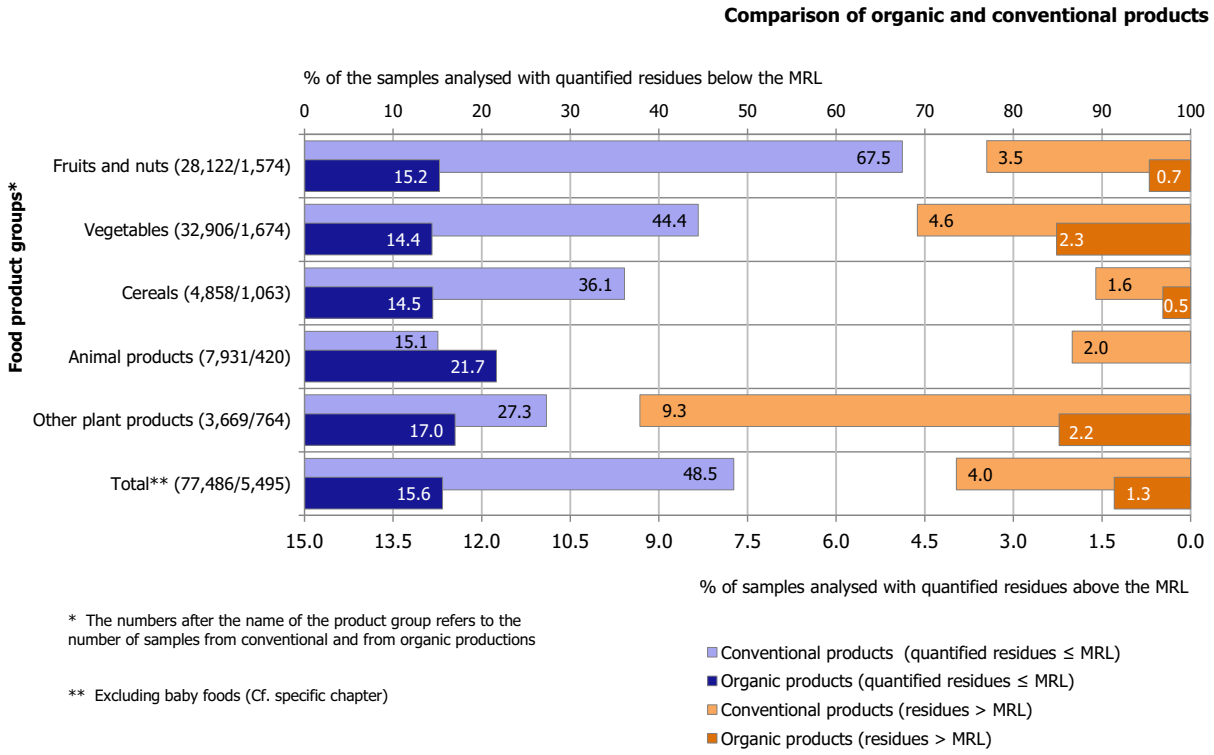


Figure 51: Comparison of organic and conventional foods: quantification and MRL exceedance rates for main food product groups (including all pesticides)

In total, 151 different pesticides were quantified in 2016 (compared to 140 in 2015) in concentrations at or above the LOQ. The pesticides measured most frequently (quantified in at least five samples) are presented in Figure 52. There, the pesticides permitted in organic farming, naturally occurring compounds and substances resulting from environmental contamination (persistent pesticides no longer used in the EU), are specifically labelled with an asterisk.

[39] The baby food samples were not included in this analysis since the results for this food group are presented in detail in the previous chapter.

[40] For this comparison, all pesticides were considered; the naturally occurring substances covered by the MRL legislation were not excluded since they are also present in conventional food and are therefore also covered in the calculation of the quantification rate for conventional food.

Similar to the previous reporting years, the most frequently quantified residue in organic food was copper in 218 samples in 28 different food items, mostly in wine grapes, rice, rye and soya beans, followed by bromide ion in 107 samples (in 28 different food items, mostly in tomatoes), fosetyl-Al in 82 samples (27 commodities, mostly in wine grapes), spinosad in 74 samples (23 commodities, mainly in tomatoes), hexachlorobenzene in 64 samples (eggs, milk and pumpkin seeds), chlorate in 49 samples (26 food items, mostly in carrots, lettuce and cucumbers), carbon tetrachloride in 44 samples (13 food commodities, mainly in oil plants), DDT in 39 samples (five food items, mostly eggs and milk), chlorpyrifos in 31 samples (18 commodities), boscalid in 18 samples (12 commodities), dithiocarbamates in 18 samples (10 commodities), thiacloprid in 18 samples (mainly in honey and other apicultural products), imidacloprid in 17 samples (11 different commodities). Other pesticides were found in less than 16 samples (Figure 52).

Copper, spinosad, azadirachtin and pyrethrins are allowed to be used in organic farming so far as the corresponding use is authorised in the general agricultural in the Member State concerned; thus, the presence of residues of these compounds is linked to agricultural practices permitted in organic farming in the Union; as a result, the positive measurements of these substances in organic food are not unexpected. Residues of hexachlorobenzene, DDT and dieldrin are resulting from environmental contaminations (mainly from the soil), due to the use of these persistent compounds as pesticides in the past. Quantifications of copper, bromide ion, chlorate, carbon tetrachloride and dithiocarbamates in certain commodities may result from other sources than pesticide uses, e.g. CS_2 measured for dithiocarbamates (see Section 3.3.2. Head cabbage) are naturally found in some plants, particularly in Brassicaceae and Alliaceae.

Among the top three most frequently quantified residues in organic food, it is noted the occurrence of fosetyl-Al residues. The current legal residue definition is 'sum of fosetyl-Al and phosphonic acid and their salts expressed as fosetyl'. Phosphonic acid is naturally present in the environment or can come from use of certain fertilisers, therefore these findings do not necessary indicate that there was a use of fosetyl-aluminium. Food business operators have been made aware of this explicitly in 2014 by a Note on the DG SANTE webpage and through the relevant trade associations. The occurrence of other pesticides not authorised in organic farming can – as for conventional products – be the result of spray drift, environmental contaminations or contaminations during handling, packaging, storage or processing of organic products. This occurrence could also be linked to wrong labelling of conventionally produced food as organic food.

MRL exceedances[41] in organic products were reported mainly for chlorate (22 samples) and additional 53 determinations for 29 other pesticides. The details on samples of organic products exceeding a legal limit can be also found from the Excel file published as a supplement to this report.

The overall results above are not directly comparable with the findings presented in the recently published EFSA technical report on pesticide residue measured in organic versus conventional food products (EFSA, 2018a–d). There, the data analysis and systematic comparison focussed on samples taken and analysed in the framework of the EUCP in the reference period 2013, 2014 and 2015 (for a total of 28,912 conventional and 1,940 organic food samples). Thus, the data analysis was limited to the food items mostly consumed by EU citizens, and did not addressed some 'minor' food, for which the likelihood of the detection of pesticide residues is higher. Furthermore, the analytical scope as limited to the EUCP requirements. In the above technical report, 44% of the conventional produced food samples contained one or more quantifiable residues, while in organic food the frequency of samples with measurable pesticide residues was lower (6.5% of the organic samples); instead, the MRL exceedance rate for conventional and organic food amounted to 1.2% and 0.2% of the samples tested, respectively, without considering the occurrence of the residue related to naturally occurring substances.

Therefore, if all the organic food items are considered and a larger analytical scope is accounted for without discriminations among national and EUCP control plans (which have different sampling strategies), the MRL exceedance rate estimated in 2016 (0.7%, in case the quantified residues related to residues that do not necessarily originate from the use of pesticides) is higher than the corresponding rate gathered from the EUCP results alone (0.2%). To conclude, EFSA recommends continuing monitoring pesticide residues in organically food items tested in the frame of both the national and EUCP programmes.

[41] For conventional and organic products, the MRLs established in Regulation (EC) No 396/2005 are applicable.

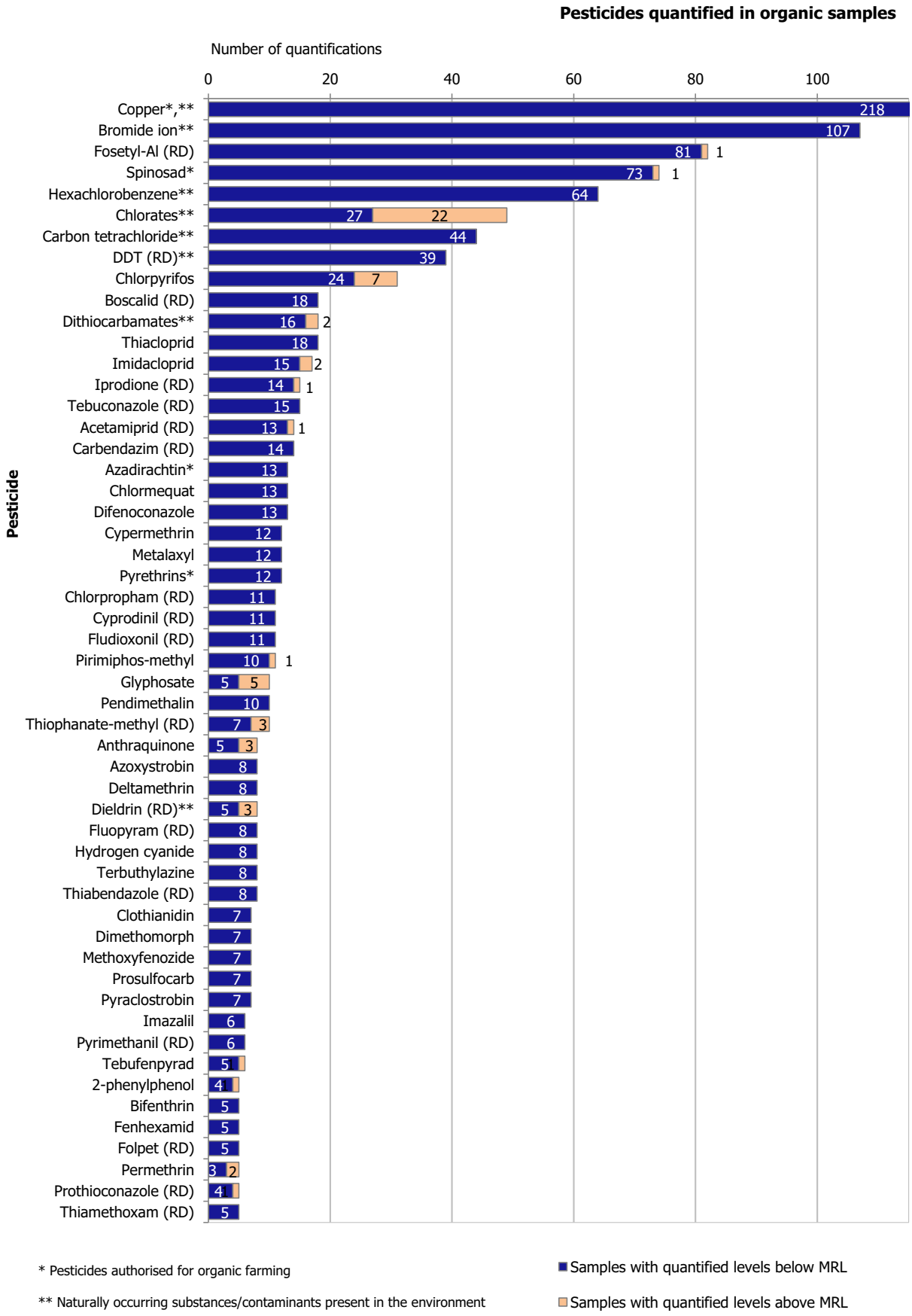


Figure 52: Pesticides most frequently quantified in organic samples (at least five positive quantifications reported)

4.2.8. Results on animal products

In total, 8,351 samples of products of animal origin covered by Regulation (EC) No 396/2005 were analysed. In Figure 53, the total number of samples taken is broken-down by food product/product group.

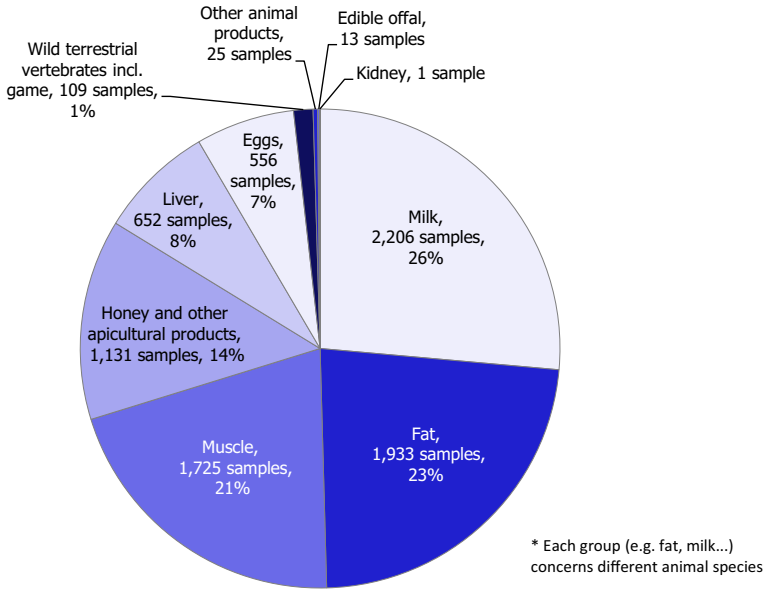


Figure 53: Number of samples of animal products tested, broken-down by food group

The majority of these samples (83%, 6,906 samples) was free of quantifiable residues; in 317 samples (4%), more than one pesticide was reported (Figure 54). Compared with the overall results for other food products, the quantification rate was significantly lower for animal products (49.3% for all food groups compared to 17% for animal products).

For 159 samples (1.9%), an MRL exceedance was identified, particularly for honey (19 samples), liver (84 samples) and milk (50 samples). In 2015, 0.4% of the samples (33 samples) exceeded MRLs. Compared to the results on the 2015 control activities; in 2016 and increase of the MRL exceedance rate was observed (1.9% in 2016 compared to 0.4% in 2015) mainly due to the findings reported on chlorate in milk (out of 159 samples, 31 samples were of milk and 1 on honey, containing residues of chlorate above the MRL.

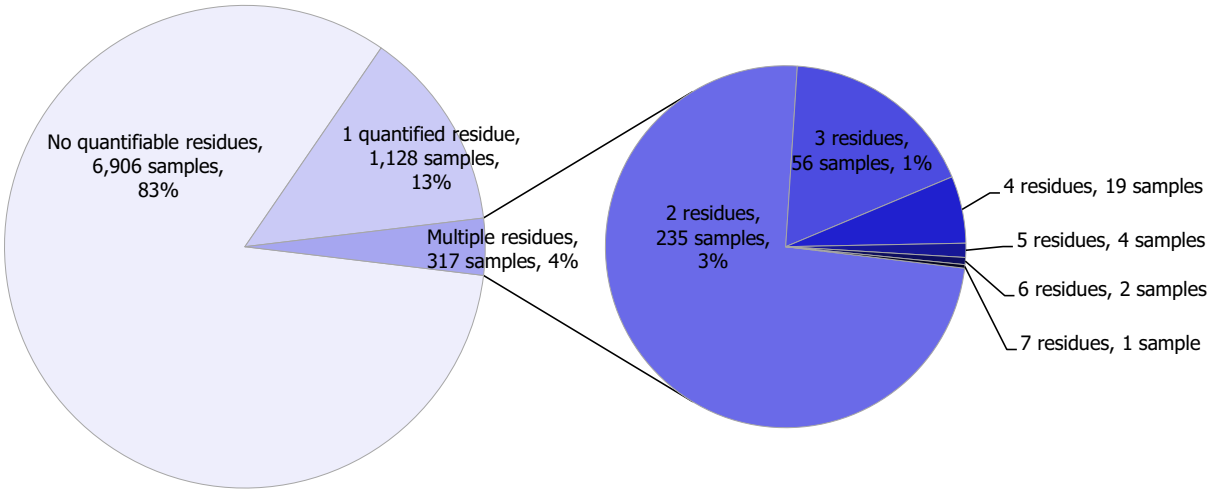


Figure 54: Number of quantified residues per individual sample of animal origin

Among the 629 pesticides analysed in food of animal origin, 49 different pesticides were quantified (residue levels at or above the LOQ). The most frequently quantified substances were: copper, DDT,

hexachlorobenzene, thiacloprid, chlordane, HCH-beta, chlorate, BAC, DDAC, HCH-alpha and dieldrin (Figure 55). Most of these compounds are banned or no longer used as pesticides in Europe, but they are still found in the food chain due to their persistence in the environment. It is noted that copper residues in animal products are not necessarily linked to the use of copper as a pesticide, but may result from the use of feed supplements, which contain copper compounds.

Out of 1,131 samples of honey and other apicultural products analysed, 236 samples (20.1%) contained at least one pesticide residue; 19 samples numerically exceeded the MRL (1.7%) and nine samples were reported as MRL non-compliant by the reporting countries (0.8%). The MRL was exceeded for the following substances: glyphosate, amitraz, fluvalinate and coumaphos.

Among the 619 different pesticides sought in honey and related products, 30 were quantified, mostly copper (quantified in 100% of the samples, i.e. in the 42 samples analysed), thiacloprid (quantified in 17% of the samples, 100 of the 588 samples tested), glyphosate (8.2%, 18 of the 220 samples analysed), chlordane (7.8%, 28 of the 358 samples analysed), dimoxystrobin (5%, 16 of the total of 319 samples analysed) and chlorate (5%, 1 of the 20 samples analysed). Other pesticides were also quantified in honey (in decreasing order of quantifications rate): flonicamid, acetamiprid, fluvalinate, amitraz, azoxystrobin, fosetyl-Al, carbendazim, DDT, boscalid, isopyrazam, tebuconazole, heptachlor, tau-fluvalinate, picoxystrobin, coumaphos, HCH-beta, endosulfan, imidacloprid, propargite, dimethoate, endrin, HCH-alpha, methoxychlor, chlorpyrifos. Some of these substances are environmental contaminants resulting from past uses as pesticides (e.g. chlordane, DDT, methoxychlor, heptachlor, HCH alpha and beta, lindane and dieldrin). Others, such as thiacloprid are due to the use of pesticides in crops that are foraged by bees. Thiacloprid was also frequently quantified in 2014 and 2015 (EFSA, 2016a–c, 2017a–d). Coumaphos (two quantifications) and amitraz (13 quantifications) residues in honey originate more likely from treatments of beehives with antiparasitic products authorised under Regulation (EU) No 37/2010 on veterinary medicinal products, rather than from pesticides uses; it is noted that both compounds are no longer approved as pesticides in Europe.

In the Excel file published as supplement to this report, further details on the pesticide/food combinations are reported, which were found to exceed the legal limits.

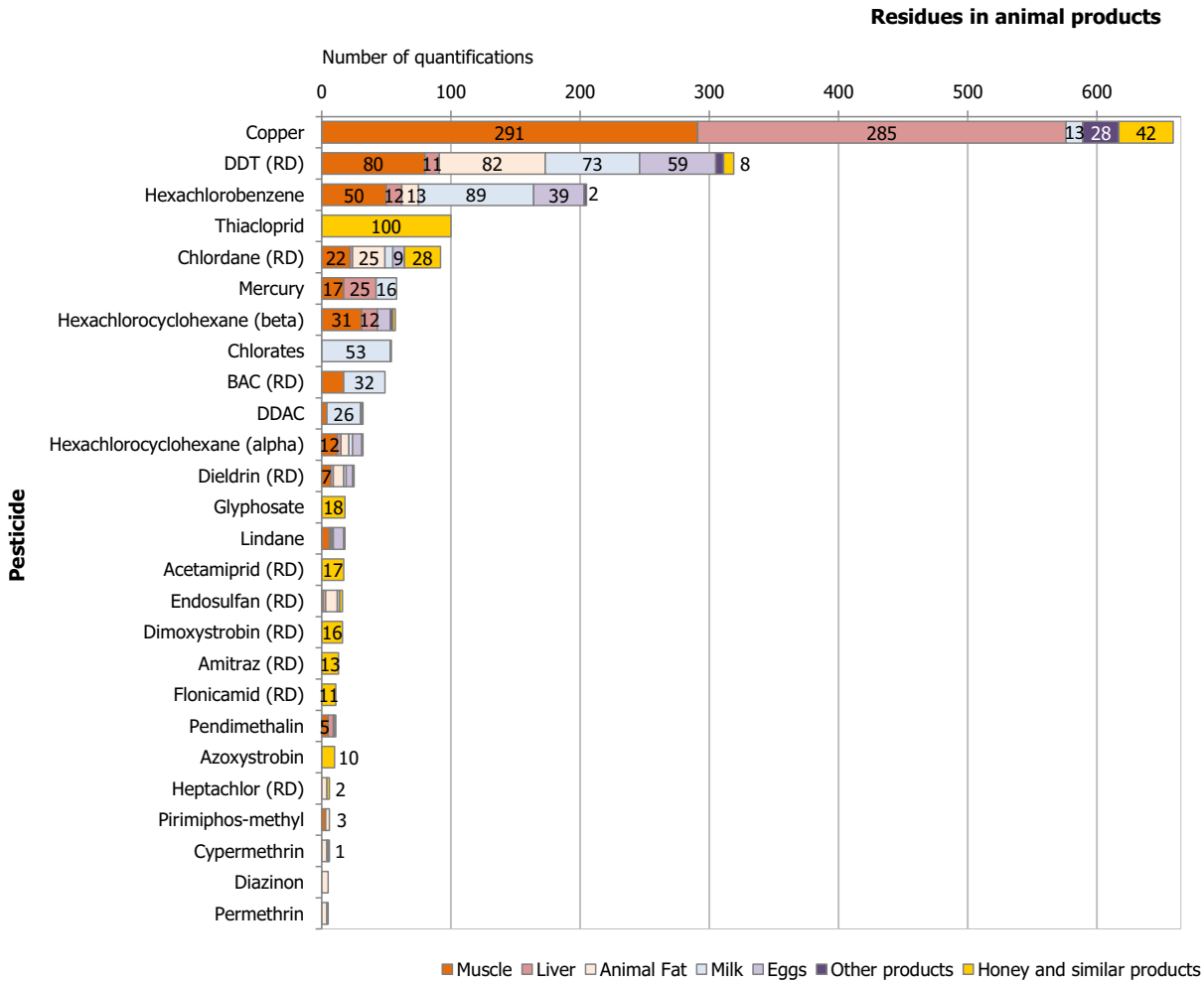


Figure 55: Pesticides most frequently quantified in animal products (in absolute numbers of detections at or above the LOQ)

4.2.9. Multiple residues in the same sample

Multiple residues in one single sample may result from the application of different types of pesticides (e.g. application of herbicides, fungicides or insecticides against different pests or diseases) or use of different active substances avoiding the development of resistant pests or diseases. Besides these agricultural practices, multiple residues may also occur due to mixing or blending of lots with different treatment histories, contaminations during food processing, uptake of persistent residues via soil, or spray drift to fields adjacent to treated fields. According to the current EU legislation, the presence of multiple residues in a sample is not considered as non-compliance, as long as each individual residue level does not exceed the corresponding MRL.

Different pesticides (multiple residues) were quantified in 30.1% of the 84,657 samples analysed (28% in 2015) (Figure 56). In unprocessed products, the frequency of multiple residues was slightly higher (32.5%) compared with processed products (13.4% of the samples analysed contained more than one pesticide in concentrations higher or equal to the LOQ). Notably, 589 samples contained 10 or more pesticides (71 samples of processed and 518 samples of unprocessed products, such as table grapes (81 samples), strawberries (58 samples), tea (56 samples), apples (32 samples), sweet peppers (32 samples), lettuces (26 samples) and pears (20 samples). Compared with the 2015 results on multiple residues in the same sample, in 2016, the number of samples with multiple residues increased; for example, the number of unprocessed wine grapes and strawberry samples with 10 or more residues increased from 42 in 2015 to 81 in 2016 and from 25 to 58, respectively, while the total number of samples tested remained almost unchanged. A potential, partial explanation for this fact is that in 2016 some EU countries faced a wet growing season for e.g. wine grape production.

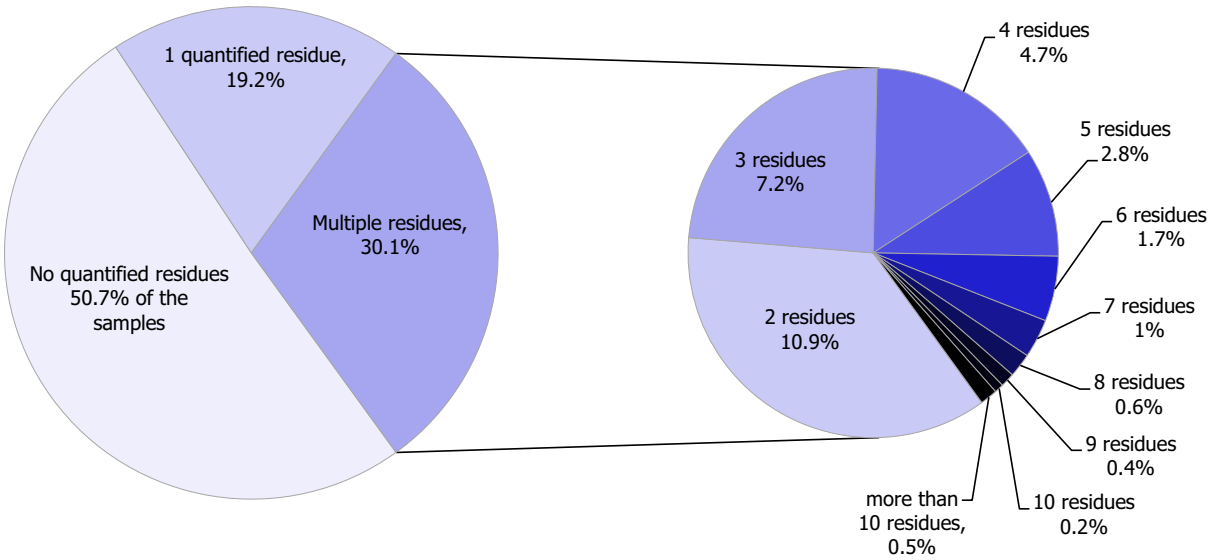


Figure 56: Percentage of samples with single and multiple quantified residues

Focussing on unprocessed food products with a substantial number of samples taken per food item (more than 30 samples analysed), the highest frequency of multiple residues was found in gooseberries (85.7% of the total samples analysed), hops (81.8%), grapefruits (73.1%), currants (72%), blackberries (68.4%), table grapes (68.1%), raspberries (66.9%) and strawberries (65.4%). These commodities were also identified in the 2015 monitoring programmes as unprocessed products with the highest frequency of multiple residues. In addition, lettuces, lemons, basil and edible flowers, limes, fresh herbs and edible flowers, cherries, rucola, peaches, bananas, oranges, mandarins, wine grapes, apricots, celeries, pears, celeriac, poppy seeds, chives, Brussels sprouts and peas (with pods) were found to contain multiple residues in more than 50% of the samples analysed. In Figure 57, the results for the top ranked food products with multiple residues are presented, broken down by the number of residues found in quantified concentrations; only food products with at least 30 samples analysed were included in the analysis.

A similar analysis was performed for processed food products (Figure 58). Among these products, the highest frequency of multiple residues was found for processed grape leaves and similar species, apricots, pineapples, pumpkin seeds, table grapes, teas, sweet peppers, oranges, wine grapes, tomatoes and wild fungi.

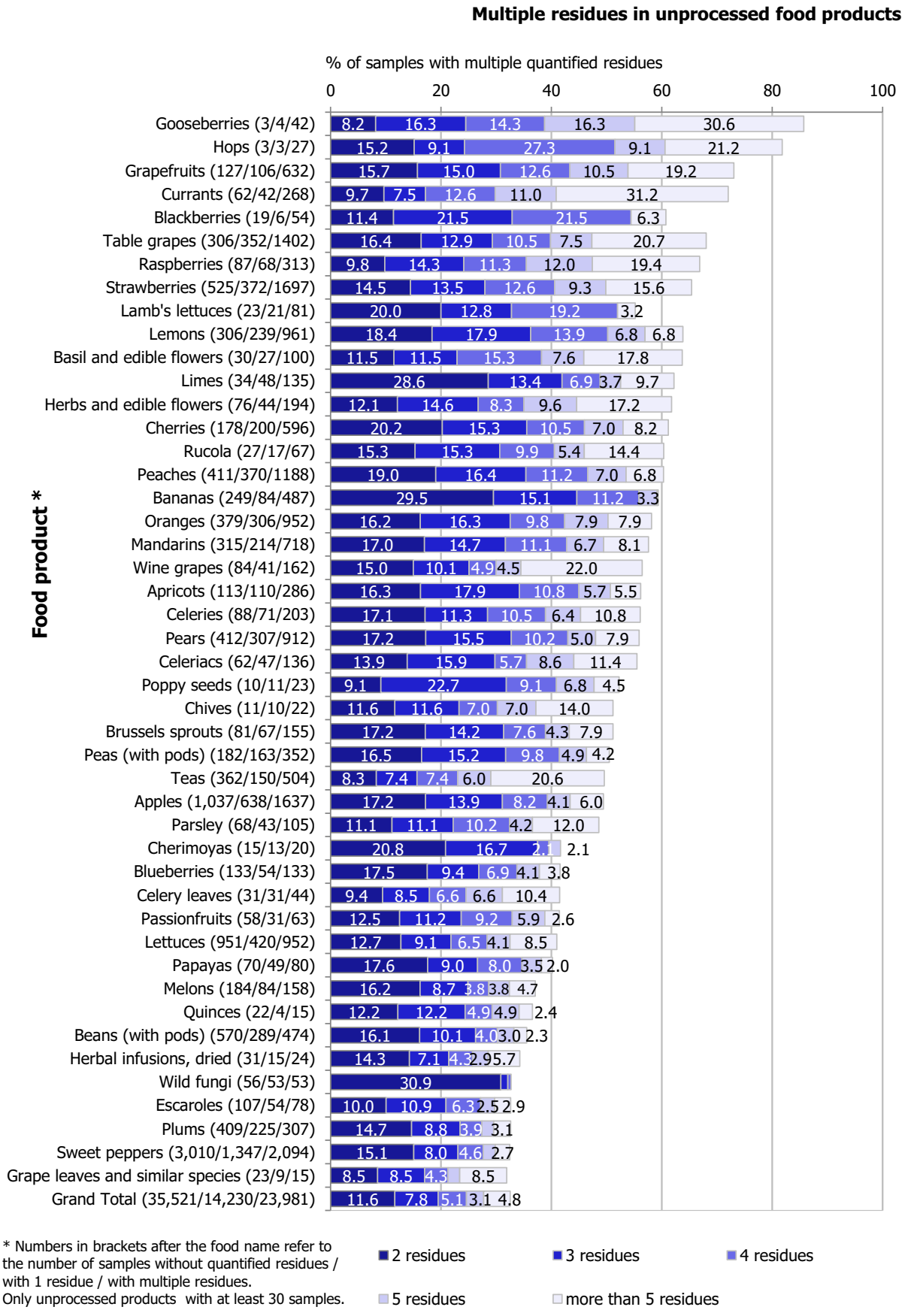


Figure 57: Unprocessed food products most frequently containing multiple quantified residues

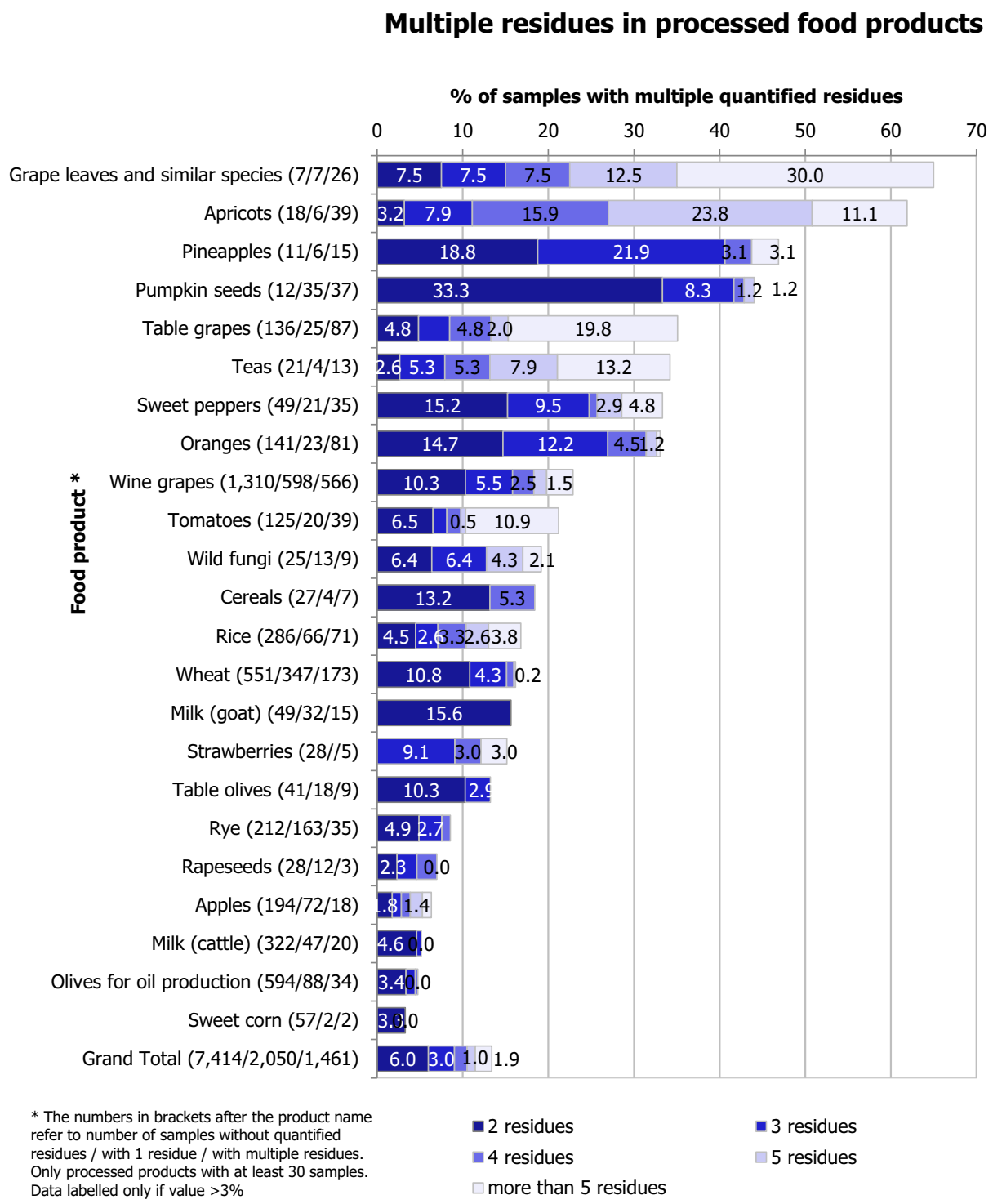


Figure 58: Processed food products most frequently containing multiple quantified residues

4.3. Reasons for MRL exceedances

The legal limits (MRLs) are established on the basis of the results of supervised residue trials that reflect the residue levels expected under field conditions. The MRL value is estimated using statistical methods and is usually established to cover at least the upper confidence interval of the 95th percentile of the expected residue distribution. Thus, a percentage of approximately 1% MRL exceedances are expected even if the approved Good Agricultural Practices (GAP) are fully respected. However, in such a case, the residue levels would be expected to exceed the MRLs only marginally.

In total, in 2016, 3,175 samples exceeded the MRL (3.8% of samples analysed). Multiple MRL exceedances per sample were reported for 525 samples (112 from EU/EEA origin, 387 from third countries, and 26 for samples of unknown origin). Overall, 4,173 individual determinations were reported to violate the EU legal limits in 2016. In comparison, 2.8% of the samples analysed and 3,170 determinations exceeded MRLs in 2015.

The possible reasons for MRL exceedances are below summarised:

- For samples coming from third countries:
  - Use of pesticides that are not or no longer approved in the EU on crops for which no import tolerances have been requested by the importers, as foreseen in Article 6 of Regulation (EC) No 396/2005;
  - Use of pesticides that are approved in the EU, but on crops for which no import tolerances have been requested by the importers;
  - Contaminants with unclear origin in concentrations exceeding the legal limit (e.g. nicotine in cultivated and wild fungi and in tea, anthraquinone in tea, cardamom and wild fungi).
- For samples originating from the reporting countries:
  - MRL exceedance due to natural background levels (e.g. dithiocarbamates in brassica vegetables, leeks and onions);
  - Presence of biocides that also fall under the pesticide legislation (Regulation (EU) No 528/2013[42]) (e.g. BAC and DDAC in plant and animal products, including processed foods such as baby foods, as well as chlorate reported for the first time under the pesticide data collection – 202 MRL exceedances);
  - Changes in the toxicological reference values that lower the MRLs were the impact was not anticipated with time enough and the product was placed in the food chain. Further, if the lowering of the MRL were risk based with no transitional measures were granted and food pre-treated could still be on the market (e.g. chlorpyrifos in different food items);
  - Use of approved pesticides but not in accordance with the Good Agricultural Practices, in particular, the use of plant protection products on crops for which no authorisation was granted or not respecting the application rate, the preharvest interval, the number of applications, or the method of application, e.g. dimethoate in various fruits and vegetables;
  - GAP not being respected (e.g. chlorpropham) or drift contamination;
  - Use of non approved pesticides (propargite – 17 exceedances);
  - Dual uses should be followed up in the case of fertiliser containing phosphonic acid so they are distinguished from the use of phosphonate/phosphite salts approved as a pesticide in the EU-wide;
  - Environmental contamination: POPs included in the Stockholm Convention of prohibited substances (UNEP, 2001). These substances are no longer used as a pesticide but are very persistent in the environment and found in the food chain (e.g. dieldrin – 16 samples; heptachlor – 1 sample; DDT – 4 samples; chlordecone in roots and tuber vegetables from some French Antilles, due to soil contamination related to historical uses (chlordecone was banned in 1993 in the French Caribbean territories; mercury – 13 samples).

Out of 5,563 samples analysed in 2016 without any origin mentioned, the residue levels were exceeded for 213 samples (26 samples with multiple MRL exceedances).

More details on pesticide/crop combinations exceeding the legal limits are compiled in an Excel file published as supplement to this report (see 'Supporting Information').

5. Dietary exposure and dietary risk assessment

In the acute or short-term exposure assessment, the uptake of pesticide residues via food consumed within a short period, usually within one meal or one day, is estimated. The chronic or long-term exposure assessment aims to quantify the pesticide intake by consumers over a long period of time, predicting the lifetime exposure. A comparison of the estimated chronic and acute dietary exposure with the relevant toxicological reference values for long-term and short-term exposure (i.e. the acceptable daily intake (ADI) and the acute reference dose (ARfD)), gives an indication of whether

[42] Regulation (EU) No 528/2012 of the European Parliament and of the council of 22 May 2012 concerning the making available on the market and use of biocidal products, OJ L 167, 27.6.2012, p. 1–123.

consumers are exposed to pesticide residues that may pose a health risk. As long as the dietary exposure is lower than or equal to the toxicological reference values, based on current scientific knowledge, a consumer health risk can be excluded with a high probability. However, possible negative health outcomes cannot be fully excluded if the exposure exceeds the toxicological reference values.

EFSA calculated the short-term exposure estimating the consumer health risks resulting from pesticide residues in and on food using a similar approach as in previous years (EFSA, 2013a, 2014b, 2016c). For the long-term dietary exposure, a more comprehensive approach was made, taking all food items for which consumption data was provided under PRIMo ver. 2 (see Section 5.2.1). For estimating the actual acute and chronic exposure to pesticide residues present in food that was analysed in monitoring programmes, EFSA used a deterministic risk assessment methodology. This method was originally developed for the risk assessment in the context of pesticide authorisations (EFSA PRIMo) (EFSA, 2007b). The model implements the principles of the WHO methodologies for short-term and long-term risk assessment (FAO, 2009), based on the food consumption of the European population. The calculations should be understood as a conservative risk assessment screening, meaning that the results are likely to overestimate the actual exposure.

The calculation tool (adapted version of EFSA PRIMo revision 2) used for the risk assessment screening is made available as a supplement to this report.

Results of cumulative risk assessments cannot yet be presented in the current report, as the scientific preparatory work is not yet completed (e.g. grouping of pesticides sharing a common target organ to derive cumulative assessment groups) (EFSA, 2013, 2016d). EFSA aims to finalise by the end of this year the description of the probabilistic exposure assessment methodology including practical implementation on two cumulative assessment groups (CAGs) at the EU level: on the thyroid (chronic methodology) and on the nervous system (acute methodology).[43]

5.1. Short-term (acute) risk assessment – individual pesticides

5.1.1. Method

The methodology used to calculate the short-term dietary exposure is described in detail in the 2010 European Union report on pesticide residues (EFSA, 2013a). The calculations were performed with assumptions which are likely to overestimate the actual exposure of European consumers (i.e. consumption of the concerned food products in high amounts without any industrial/household food processing that would reduce the residues level (e.g. cooking). Furthermore, it was assumed that the residue concentration in the consumed products was five to seven times higher than the residues measured in the samples analysed.[44]

The short-term exposure assessments were performed for the food items addressed by the 2016 EU-coordinated programme[45] covering the 165 pesticides and the 11 food products: apples, head cabbage, leek, lettuce, peaches, strawberries, tomatoes, rye, wine, cow's milk and swine fat. The exposure was calculated considering 21,770 samples taken in the framework of the EUCP and national control programmes for the above-mentioned food items. The food samples results accounted for both surveillance and more targeted sampling strategies. The highest residue level measured at or above the LOQ was identified for each single pesticide/crop combination and used in the acute exposure estimation.

For 33 pesticides of the 165 pesticides covered by the EUCP, the acute risk assessment was not relevant due to the toxicological properties of the active substance (i.e. pesticides for which a decision was taken that the setting of an ARfD was considered not necessary).

The short-term (acute) consumer exposure was calculated using the following approach:

[43] Further explanations on the cumulative dietary exposure ongoing can be found in EFSA web site: https://www.efsa.europa.eu/en/press/news/180419

[44] The approach using the so-called unit variability factor of 5 or 7 is applied in the currently used risk assessment methodology for short-term dietary exposure, postulating an inhomogeneous distribution among the individual units. The variability factors are applied for mid-sized products like apples, peaches, tomatoes, head cabbage, lettuce and leek; for processed products, for products that are normally mixed or bulked before consumption and for products with a small unit weight, no variability factor is applied (e.g. for wine, strawberries, rye). The latter also applies to cow's milk and swine fat.

[45] For 33 substances included in the EU-coordinated control programme the setting of an ARfD was not necessary because of the low acute toxicity of the substances. These pesticides are therefore not relevant for acute exposure assessment.

- The short-term exposure was calculated for all pesticide/crop combinations covered by the 2016 EU-coordinated programme.[46]
- For pesticide/crop combinations, where all reported results were below the LOQ, no acute exposure assessment was performed, assuming a no residue/no exposure situation.
- The exposure calculation for the unprocessed plant products (apples, peaches, strawberries, tomatoes, head cabbage, lettuce, leek and rye) was based on the large portion food consumption implemented in the EFSA PRIMo (EFSA, 2007b).
- For wine, the wine large portion of an adult consumption (instead of the children diet) was calculated from wine grapes to wine consumption by considering a wine yield factor of 0.7 (Robinson, 2006).[47] In the case of wine, monitoring results from both red and white productions were combined. No clear trend on the residue levels measured in the two types of wine was observed.
- In the 2016 EU-coordinated programme, default PFs for rye flour and wine were specified to convert the measured residues back to rye grains and wine grapes, respectively. As the proposed PF for both food products was 1, no refinement using other processing factors was performed. The other 2016 EUCP crops were considered as been eaten raw and therefore no further refinement of the exposure was done.
- The acute exposure was calculated using the highest concentration (HR) value reported to EFSA for each pesticide/crop combination. To retrieve the HR for rye, results from raw rye grains and rye flour[48] were pooled. The HR was always identified for rye grains (unprocessed).
- To pool all cows' milk results, the residue levels reported on fat basis (mg/kg of milk fat) were recalculated to the whole milk basis (mg/kg of milk) assuming a 4% of fat content in the milk sample. The exposure was then calculated accounting for the large portion related to consumption of milk (cattle).
- In the 2016 EUCP, the requested food product of animal origin to be monitored was swine fat. However, PRIMo rev. 2 has more robust consumption data on swine meat. Therefore, the monitoring concentration values reported on swine fat were recalculated to swine meat assuming a 20% of fat content on the meat. Then, the exposure was calculated accounting for the large portion related to consumption of swine meat.
- The residue values reported according to the residue definition for enforcement (in accordance with the EU MRL legislation) were not recalculated to the residue definition for risk assessment, lacking a comprehensive list of conversion factors.

The estimated short-term exposure for the pesticide/crop combination was compared with the toxicological reference value, usually the ARfD value. The recently established and modified ARfD/ADI values and ARfD values for active substances that were not covered by the previous EU-coordinated programme are reported in Appendix D, Table D.1. The toxicological reference values for the remaining pesticides are unchanged and can be retrieved from Appendix D, Table D.1 of the 2013 EU report on pesticide residues (EFSA, 2015b), Appendix D, Table 20 of the 2014 EU report on pesticide residues (EFSA, 2016c) and Appendix D, Table D.1 of the 2015 EU report on pesticide residues (EFSA, 2017a).

For six pesticides, the short-term risk assessment has been performed using the ADI instead of the ARfD because these pesticides have not been evaluated with regard to the setting of the ARfD and/or the setting of the ARfD was not finalised. In four of these six active substances, quantified residues were reported at or above the LOQ (i.e. bromopropylate, chlordane, heptachlor and hexaconazole). The use of the ADI instead of the ARfD is an additional conservative element in the risk assessment.

It should be highlighted that some of the ARfD values were recently set, lowered or withdrawn and were not in place when the monitoring results were generated in 2016 (e.g. the ARfD for propargite,[49] iprodione, mepanipyrim, methoxyfenozide, propiconazole and trifloxystrobin). Finally, in the case of further six pesticides, neither ARfD nor ADI has been derived and therefore no exposure assessment

[46] The exposure calculations were carried out separately for each pesticide/crop combination as it is considered unlikely that a consumer would eat two or more different food products in large portions within a short period of time and that all of these food products would contain residues of the same pesticide at the highest level observed during the reporting year.

[47] EFSA under a grant agreement is developing a Compendium of Representative Processing Techniques investigated in regulatory studies in pesticides. It will be published as an EFSA supporting publication in 2018, where the most common processing techniques are described. A compilation of available PF will also be published.

[48] According to the 2016 EUCP control programme, samples of rye flour could have been taken in case rye grains' samples were not available for monitoring purposes.

[49] In the framework of the Pesticides Peer Review Experts' Meeting 153 (EFSA, 2018d), new valid genotoxicity studies were provided for propargite having been a data gap during the peer review of 2011 where toxicological reference values were derived.

could be conducted (EPN, fenamidone,[50] hexachlorobenzene, hexachlorocyclohexane (alpha), hexachlorocyclohexane (beta) and isocarbophos).

The legal residue definitions for fenvalerate, methomyl and triadimenol contained compounds with different toxicological profiles. To perform the acute risk assessment, it was assumed that the residue found consisted solely of the authorised active substance (i.e. esfenvalerate, methomyl and triadimenol).

The residue definition for dimethoate contains compounds with significantly different toxicological potencies (i.e. dimethoate and omethoate) (EFSA, 2006, 2010). In order to estimate the actual risk for consumers, the results that followed the legal residue definition (sum of dimethoate and omethoate, expressed as dimethoate) reported to EFSA were used to calculate two scenarios[51]:

- Scenario 1 ('optimistic dimethoate scenario') where it is assumed that the determined residues are related only to the less toxic compound dimethoate; and
- Scenario 2 ('pessimistic omethoate scenario'), where the total residue concentration reported is assumed to refer only to the more toxic compound omethoate

Residues resulting from the use of dithiocarbamates are measured as CS_2 by using a common moiety method for all the pesticides belonging to this group of chemicals. Some crops contain naturally occurring sulfur that mimic the presence of dithiocarbamates in the analytical method. Thus, the analytical methods used do not distinguish which active substances were originally applied on the crop or whether the residue is resulting from natural sources. Hence, an unambiguous risk assessment is not possible since pesticides falling in the class of dithiocarbamates have different toxicological properties. For dithiocarbamates, five scenarios were considered, assuming that the measured CS_2 concentration refers exclusively to maneb, mancozeb, propineb, thiram or ziram.[52]

5.1.2. Results

In Figure 59, the results of the short-term (acute) risk assessment are summarised. There:

- Grey cells refer to pesticide/crop combinations not covered by the 2016 EUCP or to pesticides not relevant for acute risk assessment (setting of an ARfD was not necessary).
- Empty, white cells in the grid refer to pesticide/crop combinations for which none of the samples analysed for the given food item contained quantified residues.
- The cells marked with an asterisk refer to pesticide/crop combinations with quantified residues for which a risk assessment could not be performed lacking toxicological reference values.
- For pesticide where an ARfD (or alternatively an ADI) was available and where at least one sample with quantified residues was reported, the exposure was calculated. The result reported in the graph refers to the sample containing the highest residue among all the samples analysed for the given pesticide/food combination. The calculated exposure is expressed as percentage of the ARfD (or ADI).
- Pesticide/crop combinations where the calculated dietary exposure exceeded the ARfD are highlighted in red; more specifically, if the exposure was estimated at or between 100% and 1,000%, the cells are coloured in light red; if the exposure was estimated at or above 1,000%, the cells are filled with dark red; whereas for pesticide/crop combinations where the exposure was calculated to be below the toxicological reference values these are indicated in yellow.

Overall, 122 pesticides were assessed for acute exposure.

For 18 of the pesticides relevant for acute exposure assessments not a single quantified result at or above the LOQ was reported for any of the food products tested. Thus, for these pesticides the short-term dietary exposure was considered to be of no concern for the food products covered by the EUCP: aldicarb, biphenyl, diazinon, dicloran, diniconazole, EPN, ethion, fenarimol, fenbutatin oxide, fenpropidin, fenthion,

[50] In the framework of the Pesticides Peer Review Experts' Meeting 134 on fenamidone (EFSA, 2016a,b,c, 2017a,b,c,de), no toxicological reference values were set because of the lack of conclusive data on the potential genotoxicity. During the renewal procedure, the majority of experts considered that the setting of reference values of fenamidone cannot be supported because of no conclusion on the genotoxic potential of fenamidone could be drawn leading to a critical area of concern. That is why the reference values set in 2003 were not used in the exposure assessment.

[51] During the renewal process, it has been agreed on a separation of the two active substances from the same residue definition of the sum of dimethoate and omethoate expressed as dimethoate. Therefore, no further scenarios were considered necessary taking into account the individual concentration reported of each of the two active substances according to their toxicological potency. Upon request, this analysis could be done.

[52] For metiram, no ARfD was considered necessary. Thus, no metiram scenario was calculated.

hexachlorocyclohexane (beta), methoxychlor, monocrotophos, oxydemeton-methyl, parathion-methyl, tefluthrin, triazophos.

For 89 pesticides, residues were quantified in one or several of the food products analysed, but the exposure was estimated to be below the toxicological reference values: abamectin, acephate, azinphos-methyl, bitertanol, bromopropylate, buprofezin, captan, carbaryl, chlordane, chlormequat, chlorothalonil, chlorpropham, chlorpyrifos-methyl, clothianidin, cyfluthrin, cymoxanil, cypermethrin, cyproconazole, dichlorvos, dicofol, dieldrin, difenoconazole, dimethomorph, dithianon, dodine, endosulfan, epoxiconazole, etofenprox, famoxadone, fenamiphos, fenazaquin, fenbuconazole, fenitrothion, fenoxycarb, fenpropathrin, fenpropimorph, fenpyroxiamte, fenvalerate, fipronil, fluopyram, fluquinconazole, flusilazole, flutriafol, fosthiazate, glyphosate, heptachlor, hexaconazole, imidacloprid, indoxacarb, lindane, linuron, malathion, mepanipyrim, mepiquat, metalaxyl, methidathion, methomyl, methoxyfenozide, myclobutanil, oxadixyl, oxamyl, paclobutrazol, parathion, penconazole, pendimethalin, permethrin, phosmet, pirimicarb, pirimiphos-methyl, procymidone, profenofos, propargite, propiconazole, propyzamide, pymetrozine, pyridaben, spiromesifen, spiroxamine, tau-fluvalinate, tebufenpyrad, terbuthylazine, tetraconazole, thiacloprid, thiamethoxam, thiophanate-methyl, tolylfluanid, triadimenol, trifloxystrobin and vinclozolin.

For 33 pesticides, the screening for potential short-term consumer risk was positive for at least one sample for one or several of the food products in focus, meaning that the estimated short-term exposure exceeded the ARfD: acetamiprid, acrinathrin, bifenthrin, carbendazim, carbofuran, chlorfenapyr, chlorothalonil, chlorpyrifos, cyfluthrin, cypermethrin, deltamethrin, dithianon, ethephon, fenamiphos, fenpyroximate, folpet, formetanate, hexaconazole, imazalil, imidacloprid, indoxacarb, iprodione, lambda-cyhalothrin, methamidophos, methiocarb, phosmet, pirimicarb, propamocarb, pyraclostrobin, tebuconazole, tebufenpyrad, thiabendazole and thiacloprid. In addition, the calculated exposure exceeded the toxicological reference values for one or several commodities in the five dithiocarbamates scenarios (mancozeb, maneb, propineb, thiram and ziram scenarios) as well as for both dimethoate scenarios.

For the remaining pesticides not above mentioned, no acute exposure was calculated, either because no ARfD was necessary due to its low acute toxicity or either no ARfD/ADI was allocated, even if quantified residues in one or several commodities were reported.

Pesticides	Ap	Pe	Wg	St	To	Hc	Lt	Le	Ry	Sm	Mc
2-phenylphenol[b]											
Abamectin (RD)		6		19	7		46				
Acephate					0.7						
Acetamiprid (RD)	74	35	1	10	163	29	344				
Acrinathrin	97	100		48	46		20				
Aldicarb (RD)											
Azinphos-methyl		4									
Azoxystrobin[b]											
Bifenthrin	8				19	158	2				
Biphenyl[c]											
Bitertanol									6		
Boscalid (RD)[b]											
Bromide ion[b]											
Bromopropylate[c]	23				4						
Bupirimate[b]											
Buprofezin	1	0.20	0.03		4						
Captan (RD)	33	10		6							
Carbaryl	2				41						
Carbendazim (RD)	250	92	28	18	166	13	62				
Carbofuran (RD)					155		105				
Chlorantraniliprole[b]											
Chlordane (RD)[c]										15	17
Chlorfenapyr				2	136	116					
Chlormequat			5		6				13		
Chlorothalonil (RD)	2	3		7	7	11	69	4			
Chlorpropham (RD)	0.31	4		0.06	0.21	0.01	0.06	0.24			
Chlorpyrifos	1078	2729		56	779	1126	48	1592	10.3		
Chlorpyrifos-methyl	10	18		4	55		3	4	5	0.005	
Clofentezine (RD)[b]											
Clothianidin	2	2	0.24	0.20	3	0.21	1		1.3		
Cyfluthrin	15	47				6	54	4			
Cymoxanil					4		2				
Cypermethrin	12	34		0.09	26	3	21	12	0.19	0.085	0.10
Cyproconazole		14		4	4		2				
Cyprodinil (RD)[b]											
DDT (RD)[b]											
Deltamethrin	87	261		11	215	26	248	28	20	0.22	1.4
Diazinon											
Dichlorvos				9					10		
Dicloran											
Dicofol (RD)					2						
Dieldrin (RD)										0.85	2.3
Diethofencarb[b]											
Difenoconazole	6	9		7	9	20	7	7			
Diflubenzuron (RD)[b]											
Dimethoate (RD) – dimethoate sc.	445	208	37	67	576	7	73				
Dimethoate (RD) – omethoate sc.	2068	966	173	313	2677	34	339				
Dimethomorph	0.23	0.19	0.88	0.32	3		19	0.88			
Diniconazole											
Diphenylamine											
Dithianon	98	7									
Dithiocarbamates (RD) - mancozeb sc.	90	26	4.5	17	110		184	18	0.4		
Dithiocarbamates (RD) - maneb sc.	276	81	14	52	338		563	54	1.1		
Dithiocarbamates (RD) - metiram sc.[b]											
Dithiocarbamates (RD) - propineb sc.	573	168	29	109	702		1168	111	2.3		
Dithiocarbamates (RD) - thiram sc.	1215	356	60	231	1489		2475	236	4.8		
Dithiocarbamates (RD) - ziram sc.	759	223	38	144	930		1547	147	3.0		
Dodine	41	4		0.45							
Endosulfan (RD)				3						0.15	
EPN											

Pesticides	Ap	Pe	Wg	St	To	Hc	Lt	Le	Ry	Sm	Mc
Epoxiconazole						15	0.23		5		
Ethephon	55		1.3		140				2.4		
Ethion											
Ethirimol[b]											
Etofenprox	7	15		0.48	2	0.21	0.43				
Famoxadone				0.25	11			19			
Fenamidone[d]				*	*		*				
Fenamiphos (RD)			9	53	53						
Fenarimol											
Fenazaquin	2	17		5	7						
Fenbuconazole	3	2	0.12	0.05	0.39						
Fenbutatin oxide											
Fenhexamid[b]											
Fenitrothion	13										
Fenoxycarb	0.25	0.13	0.03								
Fenpropathrin	3	2		2	9						
Fenpropidin (RD)											
Fenpropimorph (RD)				3				10	0.42		
Fenpyroximate	15	8		62	47						
Fenthion (RD)											
Fenvalerate (RD)	11	8			30			9			
Fipronil (RD)							1.5				
Fludioxonil (RD)[b]											
Flufenoxuron[b]											
Fluopyram (RD)	8	7	0.7	4	2	1	5	0.35			
Fluquinconazole	10										
Flusilazole (RD)		12									
Flutriafol	9			3	7		0.54				
Folpet (RD)	276	0.3	1.8	7.8			76				
Formetanate		1187			279		29				
Fosthiazate			5.1		19						
Glyphosate									1.5		
Heptachlor (RD)[c]										18.7	
Hexachlorobenzene[d]										*	*
Hexachlorocyclohexane (alpha)[d]										*	*
Hexachlorocyclohexane (beta)											
Hexaconazole[c]				5	27			66	2.5		
Hexythiazox[b]											
Imazalil	157	17		0.16	13		2				
Imidacloprid	51	26	0.6	2	16	6	60	5			
Indoxacarb	9	15	1.5	0.42	33	11	28	42			
Iprodione (RD)	1763	238	395	96	49	307	1125	1			
Iprovalicarb[b]											
Isocarbophos[d]					*						
Kresoxim-methyl (RD)[b]											
Lambda-cyhalothrin (RD)	386	235		34	130	51	455	27			
Lindane										0.02	0.01
Linuron							8	6			
Lufenuron[b]											
Malathion (RD)	0.33	0.38							0.05		
Mandipropamid[b]											
Mepanipyrim				17	7						
Mepiquat					0.7				3		
Metalaxyl			1	0.27	1.5	0.31	2.6				
Methamidophos				187	58						
Methidathion	2										
Methiocarb (RD)				13			340	178			
Methomyl (RD)				62							
Methoxychlor[c]											
Methoxyfenozide	14	9	2	1	34		1				

Figure 59: Results of short-term (acute) dietary risk assessment (expressed as a percentage of the toxicological reference value)

Pesticides	Ap	Pe	Wg	St	To	Hc	Lt	Le	Ry	Sm	Mc
Monocrotophos											
Myclobutanil (RD)	5	2	0.3	4	1	0.37	0.11				
Oxadixyl							4				
Oxamyl					23						
Oxydemeton-methyl (RD)											
Paclobutrazol	11	0.71									
Parathion							6				
Parathion-methyl (RD)											
Penconazole	0.39	0.23		2	0.26						
Pencycuron[b]											
Pendimethalin	0.85	0.08		0.07		0.02	0.58	1			
Permethrin	0.07			0.03			0.02	0.04	0.05	0.01	
Phosmet (RD)	54	83									
Pirimicarb (RD)	40	5		47		23	45				
Pirimiphos-methyl					24				5	0.01	
Procymidone (RD)		5	1.4	3	73						
Profenofos				0.05	0.76						
Propamocarb (RD)	0.21		0.03		10	9	170				
Propargite	70	67		3	45						
Propiconazole	3	2		0.58		0.58	0.30	1			
Propyzamide (RD)				0.01		0.49	37				
Pymetrozine (RD)				2	17		40				
Pyraclostrobin	102	152	0.9	78	63	46	233	94			
Pyridaben	14	3		0.59	28	5					
Pyrimethanil (RD) [b]											
Pyriproxyfen[b]											
Quinoxyfen[b]											
Spinosad[b]											
Spirodiclofe[b]n											
Spiromesifen	0.05			0.20	0.82						
Spiroxamine (RD)	0.98	0.71	1	0.97	5						
tau-Fluvalinate	8	7		4	11						

Pesticides	Ap	Pe	Wg	St	To	Hc	Lt	Le	Ry	Sm	Mc
Tebuconazole (RD)	96	218	5	10	97	102	63	45	0.84		
Tebufenozide[b]											
Tebufenpyrad	37	18		10	44			0.59			
Teflubenzuron[b]											
Tefluthrin											
Terbuthylazine				4				7			
Tetraconazole	4	10	1.5	6	27			4	0.38		
Tetradifon[b]											
Thiabendazole (RD)	225	11		0.31	0.87		0.83	0.94			
Thiacloprid	98	38		47	74	34	28	2			
Thiamethoxam (RD)	0.69	0.3	0.07	0.27	2	1.2	4				
Thiophanate-methyl (RD)	14	33	3	3	5	2	19	0.68			
Tolclofos-methyl[b]											
Tolylfluanid (RD)				1							
Triadimenol (RD)	16	10	1.3	16	31		9	9			
Triazophos											
Trifloxystrobin (RD)	5	2	0.08	4	0.98		3	2			
Triflumuron[b]											
Vinclozolin							0.63				

Sc.: scenario.

(a): Ap: apples, Pe: peaches, Wg: wine grapes, St: strawberries, To: tomatoes, Hc: head cabbage, Lt: lettuce, Le: leek, Ry: rye, Sm: swine meat (swine fat results recalculated to swine meat), Mc: cow's milk.

(b): No ARfD necessary due to low acute toxicity.

(c): Acute risk assessment was performed with the ADI, since no ARfD is available for the active substance.

(d): No ADI/ARfD allocated, but quantified residues in one or several commodities. See exposure assessment in Table 12.

Figure 59: Continued

The detailed results of the short-term dietary exposure assessment for the pesticide residues found in the 11 food products covered by the 2016 EU-coordinated control programme are presented in Appendix D, Figures D.1–D.11. In these charts, the results for the samples containing residues at or above the LOQ are presented individually, expressing the exposure as percentage of the ARfD. The blue dots refer to results reported under the EU-coordinated programme, whereas the orange dots refer to findings in samples that were analysed in the framework of the national control programmes. The figures in brackets next to the name of the pesticides represent the number of samples with residues below the LOQ, number of samples with quantified residues below or at the MRL, and the number of samples with residues above the MRL (the asterisk in the graphs' labels indicates that the MRL changed during the 2016 monitoring year). The different dithiocarbamate scenarios have not been represented in Appendix D – neither omethoate scenario.[52]

Overall, 209 samples were calculated to exceed the ARfD in the exposure assessment screening for one or more quantified pesticide residues.[53] Out of these, 82 samples were also found to exceed the MRL.

The highest number of cases with exceedances of the ARfD was identified for apples (76 samples), followed by lettuce (46 samples), peaches (39 samples) and tomatoes (29 samples), then, leeks (eight samples), strawberries (one sample[54]) and wine (one sample). For rye, swine meat and cow's milk no results exceeding the toxicological threshold were observed.

From the pesticide perspective, the highest number of exceedance of the ARfD was related to chlorpyrifos residues for a total of 68 samples (45 in apples, 11 in peaches, 7 in leeks, 3 in tomatoes and 2 in head cabbage). It should be highlighted that following the lowering of the ARfD for chlorpyrifos in 2014, the legal limits were lowered in 2016, which became applicable from August 2016.[55]

A substantial number of exceedances of the ARfD were also identified for iprodione for a total of 49 samples (in 25 samples of lettuce, 14 samples of apples, 8 samples of peaches, one sample of head cabbage and one sample of wine). It should be noted that recently a decision was taken at the EU level, not to renew the approval for iprodione.[56] Furthermore, EFSA was requested to provide recommendation for the possible setting of transitional measures for lowering of the MRLs regarding iprodione in a Technical Report (EFSA, 2018b). The revision of the current MRLs is on-going.

In 18 samples, the ARfD of lambda-cyhalothrin was exceeded (5 apple samples, 5 peach samples, 5 tomato samples and 5 lettuce samples). The lowering of the existing MRLs is also on-going after new toxicological reference values for gamma-cyhalothrin were derived (EFSA, 2017c) and after the MRLs were revised (EFSA, 2015d).

In all the different dithiocarbamate scenarios, the estimated exposure exceeded the ARfD for more than one commodity. In the cases of propineb, thiram and ziram, six of the 2016 EUCP commodities exceeded the ARfD. As previously indicated, it is not possible to conclude which active substance was used on the crop. For leek, the occurrence of CS_2 is most likely resulting from naturally occurring substances. In previous years, EFSA recommended to develop analytical methods that allow the differentiation of the dithiocarbamate really applied in the field and to derive the background levels of CS_2 of the untreated food products. For this last point, activities have been started to build a database collecting data on background CS_2 residue levels.

In the case of dimethoate – scenario dimethoate[52] – 14 samples accounted for more than 100% of the ARfD (9 samples of tomatoes, 3 samples of peaches and 2 samples of apples). Additionally, a residue of dimethoate in a strawberry sample only exceeded the ARfD in the omethoate scenario.

Deltamethrin exceeded the ARfD in 12 samples (5 samples of peaches, 4 samples of lettuce and 3 samples of tomatoes).

[53] For dimethoate (omethoate scenario) and dithiocarbamates (mancozeb, maneb, metiram, propineb, thiram and ziram scenarios), no unambiguous risk assessment could be calculated. Therefore, possible exceedances coming from these, were not included in the number samples exceeding the ARfD.

[54] In strawberries, the consideration of the different scenarios, lead to an exceedance of the ARfD in the omethoate scenario, not so in the dimethoate.

[55] Commission Regulation (EU) 2016/60 of 19 January 2016 amending Annexes II and III to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for chlorpyrifos in or on certain products. OJ L 14, 21.1.2016, p. 1–17.

[56] Commission Implementing Regulation (EU) 2017/2091 of 14 November 2017 concerning the non-renewal of approval of the active substance iprodione, in accordance with Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market, and amending Commission Implementing Regulation (EU) No 540/2011. OJ L 297, 15.11.2017, p. 25–27.

For each of the remaining 15 active substances with exposure for acute exposure, less than 10 samples contained residues exceeding the ARfD: acetamiprid, pyraclostrobin, tebuconazole, carbendazim, methiocarb, thiabendazole, formetanate, imazalil, chlorfenapyr, ethephon, carbofuran, propamocarb, acrinathrin, bifenthrin and methamidophos.

It should be stressed again that the results of the acute exposure assessment reflect the outcome of a conservative screening for risks. Furthermore, the exposure calculations were performed without taking into account that the residues expected in the food consumed after peeling, processing or washing might be significantly lower. For many pesticides, usual consumer practices like washing are reducing the residue concentrations significantly. Other practices, like peeling (apples), removal of outer leaves (head cabbage, leeks) cooking and baking (tomatoes, head cabbage, leeks, rye) are further reducing the residue concentrations in the consumed food. Given the conservatism of the calculations and the frequency of exceedances of the ARfD, EFSA concludes that the probability of being exposed to pesticide residues exceeding concentrations that may lead to negative health effects was low.

For four pesticides (fenamidone,[51] hexachlorobenzene, hexachlorocyclohexane (alpha) and isocarbophos), residues were present in quantified concentrations, but due to the absence of toxicological reference values no short-term dietary exposure assessment could be carried out. None of these pesticides are authorised in the EU. The estimated short-term exposure to these pesticides, using the food consumption data of EFSA PRIMo rev. 2 is presented in Table 12.

Considering the above results, EFSA recommends to continue monitoring the residues of chlorpyrifos, iprodione, lambda-cyhalothrin and dimethoate/omethoate. In addition, it is recommended to investigate what data might be available to set toxicological reference values for fenamidone, hexachlorobenzene, hexachlorocyclohexane (alpha) and isocarbophos and to follow-up on the CS_2 issue.

Table 12: Estimated short-term exposure to active substances without ARfD/ADI values

Pesticide	Food product	Short-term exposure (in µg/kg bw)
Fenamidone	Strawberries	0.06
	Tomatoes	1.39
	Lettuce	2.21
Hexachlorobenzene	Swine meat	0.02
	Cow's milk	0.01
Hexachlorocyclohexane (alpha)	Swine meat	0.03
	Cow's milk	0.04
Isocarbophos	Tomatoes	0.11

bw: body weight.

5.2. Long-term (chronic) risk assessment – individual pesticides

5.2.1. Method

The chronic or long-term dietary exposure assessment estimates the expected exposure of an individual consumer over a long period, predicting the lifetime exposure to pesticide residues in the diet. The underlying model assumptions for the long-term risk assessment are explained in detail in the 2010 and 2011 EU reports on pesticide residues (EFSA, 2013, 2014a,b).

A new approach for estimating the chronic exposure was used, including all food products in the exposure calculation. In the previous years, the long-term exposure was calculated based on the residue concentrations found in the food commodities covered by the 3-years' cycle of the EU coordinated programmes (around 30 commodities). Thus, the 2016 exposure calculations are more comprehensive compared to the previous years.

On the basis of the 2016 pesticide monitoring results, EFSA calculated two long-term risk assessment scenarios that are here referred to as adjusted upper-bound and lower-bound approaches.[57] The adjusted upper-bound exposure assessment methodology should be considered as a conservative screening, which is likely to overestimate the real risk as for samples without quantifiable residues it was assumed that residues were present at the numerical level of the LOQ. The lower-bound approach is based on assumptions that may underestimate the exposure to a certain extent, since it postulates that

[57] Last year, both approaches were calculated considering only EUCP food items. Thus, for comparing results of the 2015 exposure calculations with 2016, discrepancies due to the number of food items accounted for are to be considered.

samples with residues reported as below the LOQ are completely free of the pertinent pesticide. However, the lower-bound calculations are useful to complement the upper-bound exposure assessments in order to better understand the uncertainties of the exposure assessment resulting from the samples without quantified residues (residues below the LOQ).

To conduct the upper-bound and lower-bound scenarios, the residue levels used as input values for the chronic exposure were derived according to the following approaches:

- For each pesticide/crop combination, an overall mean residue concentration was calculated.
- In the adjusted upper-bound approach, the calculation of the overall mean residue for a given pesticide/crop combination was performed assuming that the residue levels reported below the LOQ contained residues corresponding to the numerical value of the LOQ.[58] If no positive findings were reported for any of the samples analysed for a given pesticide/crop combination (i.e. all results were reported as below the LOQ), the contribution of these crops to the total dietary intake was not considered, assuming a 'no use/no residue' situation.
- In the lower-bound scenario, the results below the LOQ were numerically replaced by zero values, assuming that the pesticide was not present in the sample.
- Only results for unprocessed products were used for the exposure calculation.
- The mean residue concentration was calculated for the pesticides in the 2016 EUCP and for all the food products covered by Annex 1 of Regulation (EC) No 396/2005 for which consumption data are inputted in the PRIMo tool.
- For fat-soluble pesticides reported in milk and eggs samples where the results were expressed on a fat basis, the residue levels have been recalculated to the whole product by assuming a default fat content of 4% in milk and a 10% in eggs. This approach has only been implemented in case of results reported at or above the LOQ (positive quantifications).
- Results concerning samples analysed with analytical methods for which the LOQ was greater than the corresponding MRL were disregarded.
- The residue values reported according to the residue definition for enforcement (in accordance with the EU MRL legislation) were not recalculated to the residue definition for risk assessment, lacking a comprehensive list of conversion factors.

The toxicological reference values (ADI) used for the risk assessment are reported in Appendix D – Table D.1, and in the respective Appendices of the 2013, 2014 and 2015 EU report on pesticide residues (EFSA, 2015b, 2016c, 2017).

The residue definitions for fenvalerate, methomyl and triadimenol contain compounds with different toxicities. To perform the chronic risk assessment, it was assumed that the residues found are related to the presence of the authorised substance only (esfenvalerate, methomyl and triadimenol, respectively).

For dimethoate, EFSA calculated two scenarios[52]: the optimistic dimethoate scenario where it was assumed that the calculated mean residue concentrations in each food item are related only to the less toxic component of the legal residue definition, i.e. dimethoate; in the pessimistic omethoate scenario the total residue concentration reported was assumed to refer only to the more toxic compound (i.e. omethoate).

For dithiocarbamates, six scenarios were calculated, assuming that the measured CS_2 concentration referred exclusively to maneb, mancozeb, metiram, propineb, thiram or ziram.

5.2.2. Results

The results for the long-term dietary exposure assessment for each pesticide (upper-bound and lower-bound scenarios) are reported in Table 13. The calculated exposure was expressed as percentage of the ADI.

[58] SANCO/12574/2014 (rev. 5) document (European Commission, 2017) on particular provisions related to the reporting of the LOQ to be reported in case of multicomponent residue definitions entered into force on 1st January 2017. Thus, for the data generated in 2016 and reported to EFSA in 2017, the new LOQ coding approach was not meant to be implemented. However, a few countries reported the summed LOQ for a small number of 'complex' residue definitions as '9999' (according to the document, the value should have been '99999'). When calculating the upper-bound scenario EFSA replaced the values of 9999 by 0.01 mg/kg in order to not lose the analytical results reported.

Table 13: Results of long-term dietary risk assessment

Pesticide	Long-term exposure (in % of ADI)	
	Ad. upper-bound	Lower-bound
2-phenylphenol	0.30	0.22
Abamectin (RD)	3.6	0.02
Acephate	0.22	0.01
Acetamiprid (RD)	1.2	0.31
Acrinathrin	2.6	0.17
Aldicarb (RD)	n.r.	
Azinphos-methyl	0.15	0.00004
Azoxystrobin	0.23	0.06
Bifenthrin	1.8	0.11
Biphenyl	0.03	0.02
Bitertanol	1.7	0.05
Boscalid (RD)	1.7	0.98
Bromide ion*	Quantified residues in one or several commodities	
Bromopropylate	0.52	0.001
Bupirimate	0.40	0.02
Buprofezin	2.8	0.20
Captan (RD)	0.85	0.69
Carbaryl	2.7	0.005
Carbendazim (RD)	1.6	0.22
Carbofuran (RD)	27.5	1.1
Chlorantraniliprole	0.02	0.003
Chlordane (RD)	34.1	0.07
Chlorfenapyr	0.68	0.06
Chlormequat	2.4	2.0
Chlorothalonil (RD)	2.4	0.19
Chlorpropham (RD)	3.7	3.3
Chlorpyrifos	45.8	12.6
Chlorpyrifos-methyl	3.6	0.77
Clofentezine (RD)	0.98	0.01
Clothianidin	0.27	0.002
Cyfluthrin	9.4	0.05
Cymoxanil	0.38	0.002
Cypermethrin	1.4	0.18
Cyproconazole	0.59	0.004
Cyprodinil (RD)	1.7	0.69
DDT (RD)	9.5	0.07
Deltamethrin	7.1	1.0
Diazinon	22.2	0.89
Dichlorvos	145	2.8
Dicloran	1.5	0.61
Dicofol (RD)	2.9	0.01
Dieldrin (RD)	518	1.6
Diethofencarb	0.01	0.00002
Difenoconazole	3.3	0.36
Diflubenzuron (RD)	0.18	0.0006
Dimethoate (RD) – dimethoate sc.	32.7	2.0
Dimethoate (RD) – omethoate sc.	101	6.1

Pesticide	Long-term exposure (in % of ADI)	
	Ad. upper-bound	Lower-bound
Dimethomorph	0.66	0.16
Diniconazole	0.15	0.0003
Diphenylamine	0.29	0.04
Dithianon	4.7	2.6
Dithiocarbamates (RD) – mancozeb sc.	10.9	2.7
Dithiocarbamates (RD) – maneb sc.	10.5	2.6
Dithiocarbamates (RD) – metiram sc.	72.6	17.8
Dithiocarbamates (RD) – propineb sc.	76.1	18.6
Dithiocarbamates (RD) – thiram sc.	30.4	7.5
Dithiocarbamates (RD) – ziram sc.	101	24.9
Dodine	0.25	0.10
Endosulfan (RD)	0.90	0.01
EPN*	n.r.	
Epoxiconazole	1.3	0.02
Ethephon	3.0	0.58
Ethion	0.82	0.01
Ethirimol	0.46	0.01
Etofenprox	0.96	0.17
Famoxadone	1.5	0.05
Fenamidone*	Quantified residues in one or several commodities	
Fenamiphos (RD)	6.6	0.07
Fenarimol	0.48	0.0001
Fenazaquin	4.0	0.02
Fenbuconazole	3.8	0.08
Fenbutatin oxide	0.36	0.05
Fenhexamid	0.25	0.21
Fenitrothion	3.4	0.01
Fenoxycarb	0.33	0.004
Fenpropathrin	0.71	0.01
Fenpropidin (RD)	0.48	0.004
Fenpropimorph (RD)	3.0	0.10
Fenpyroximate	2.3	0.04
Fenthion (RD)	0.06	0.0001
Fenvalerate (RD)	1.4	0.01
Fipronil (RD)	44.9	0.23
Fludioxonil (RD)	0.35	0.30
Flufenoxuron	0.41	0.001
Fluopyram (RD)	2.1	0.64
Fluquinconazole	11.0	0.02
Flusilazole (RD)	1.6	0.01
Flutriafol	2.5	0.02
Folpet (RD)	0.95	0.69
Formetanate	1.4	0.04
Fosthiazate	3.8	0.04
Glyphosate	0.33	0.14
Heptachlor (RD)	8.5	0.02
Hexachlorobenzene*	Quantified residues in one or several commodities	
Hexachlorocyclohexane (alpha)*	Quantified residues in one or several commodities	

Pesticide	Long-term exposure (in % of ADI)	
	Ad. upper-bound	Lower-bound
Hexachlorocyclohexane (beta)*	Quantified residues in one or several commodities	
Hexaconazole	1.8	0.04
Hexythiazox	0.85	0.02
Imazalil	17.4	16.3
Imidacloprid	0.65	0.06
Indoxacarb	4.2	0.26
Iprodione (RD)	3.5	1.5
Iprovalicarb	0.54	0.18
Isocarbophos*	Quantified residues in one or several commodities	
Kresoxim-methyl (RD)	0.05	0.001
Lambda-cyhalothrin (RD)	11.0	0.72
Lindane	4.4	0.003
Linuron	1.7	0.26
Lufenuron	1.4	0.005
Malathion (RD)	0.80	0.01
Mandipropamid	0.08	0.01
Mepanipyrim	0.32	0.04
Mepiquat	0.17	0.05
Metalaxyl	0.22	0.03
Methamidophos	4.9	0.09
Methidathion	18.6	0.07
Methiocarb (RD)	0.48	0.03
Methomyl (RD)	1.3	0.26
Methoxychlor	0.02	0.00002
Methoxyfenozide	0.23	0.03
Monocrotophos	1.7	0.03
Myclobutanil (RD)	1.4	0.13
Oxadixyl	0.07	0.0002
Oxamyl	4.3	0.40
Oxydemeton-methyl (RD)	0.09	0.0001
Paclobutrazol	0.59	0.005
Parathion	1.7	0.002
Parathion-methyl (RD)	n.r.	
Penconazole	0.63	0.02
Pencycuron	0.04	0.004
Pendimethalin	0.23	0.002
Permethrin	0.49	0.01
Phosmet (RD)	2.9	0.24
Pirimicarb (RD)	0.64	0.10
Pirimiphos-methyl	17.3	12.7
Procymidone (RD)	3.4	0.02
Profenofos	0.25	0.04
Propamocarb (RD)	0.19	0.13
Propargite	0.84	0.02
Propiconazole	1.2	0.59
Propyzamide (RD)	0.04	0.002
Pymetrozine (RD)	0.25	0.02
Pyraclostrobin	1.0	0.31

Pesticide	Long-term exposure (in % of ADI)	
	Ad. upper-bound	Lower-bound
Pyridaben	2.3	0.05
Pyrimethanil (RD)	1.1	0.92
Pyriproxyfen	0.23	0.01
Quinoxyfen	0.08	0.01
Spinosad	0.93	0.11
Spirodiclofen	1.4	0.14
Spiromesifen	0.64	0.05
Spiroxamine (RD)	0.68	0.04
tau-Fluvalinate	5.1	0.04
Tebuconazole (RD)	1.4	0.23
Tebufenozide	1.2	0.07
Tebufenpyrad	2.7	0.07
Teflubenzuron	2.0	0.01
Tefluthrin	0.69	0.02
Terbuthylazine	2.5	0.01
Tetraconazole	6.7	0.14
Tetradifon	0.33	0.0001
Thiabendazole (RD)	1.9	1.8
Thiacloprid	2.6	0.40
Thiamethoxam (RD)	1.1	0.03
Thiophanate-methyl (RD)	0.46	0.02
Tolclofos-methyl	0.11	0.002
Tolylfluanid (RD)	0.01	0.0001
Triadimenol (RD)	0.66	0.07
Triazophos	2.3	0.34
Trifloxystrobin (RD)	0.28	0.05
Triflumuron	1.1	0.03
Vinclozolin	0.13	0.01

sc.: scenario; ADI: acceptable daily intake; RD: residue definition; n.r.: No quantified residues in any of the samples analysed.
*: Active substance for which no ADI was established.

In the adjusted upper-bound scenario of the exposure calculation, the long-term exposure amounted to less than 100% of the ADI for all pesticides except for dieldrin, dichlorvos, dimethoate (omethoate scenario) and the dithiocarbamates (ziram scenario, being ziram the dithiocarbamate with the highest chronic toxicity). For the majority of pesticides considered, a wide safety margin to the toxicological reference value was observed; in fact, for 142 pesticides/scenarios the estimated long-term exposure was less than 10% of the ADI, for 73 thereof the result was lower than 1% of the ADI. Therefore, EFSA could conclude that for these pesticides, according to the current scientific knowledge, no long-term consumer health risk is expected.

In the lower-bound scenario, for none of the substances, the estimated exposure exceeded ADI.

For dieldrin, the estimated long-term exposure reached 518% of the ADI in the adjusted upper-bound scenario. The major food contributor to the total long-term exposure was milk. Potatoes, carrots, cucumbers and bovine meat also contributed to the total exposure, but to a minor extent. Dieldrin was analysed in 56,024 samples, of which quantifiable residues were reported in 79 samples (0.14% of the total samples). In the lower-bound scenario, the result was significantly lower (i.e. only 1.6% of the ADI was exhausted), giving an indication that the result in the adjusted upper-bound scenario was mainly driven by LOQ values used to calculate the mean residue concentrations in each food item tested for dieldrin; this substance is not approved in the EU, and the positive findings mostly come from the persistence of the substance in the environment and the following residues' uptake of the animals through their diet.

For dichlorvos, the mean estimated long-term exposure reached 145% of the ADI in the upper-bound scenario. The major food contributors to the total long-term exposure were identified in wheat and rye, and – to a minor extent – in strawberries. Among all the 63,677 samples considered for the long-term exposure assessment that were analysed for dichlorvos residues, quantified residues of dichlorvos were found in only nine samples (0.01%). In the lower-bound scenario, the estimated exposure was significantly lower (i.e. 2.8% of the ADI), giving an indication that the result in the adjusted upper bound scenario was mainly driven by LOQ values used to calculate the mean residue concentration.

For dimethoate – omethoate scenario, the mean estimated long-term exposure reached 101% of the ADI in the upper-bound scenario. The major food contributors to the total long-term exposure were apples (39%), wheat (13.5%) and oranges (12.7%). In the lower-bound scenario, the result was lower (i.e. 6.1% of the ADI); also in this case, the upper-bound exposure scenario was mainly driven by LOQ values used to derive the mean residue level for each of the food item tested for dimethoate. However, it has to be considered that the residues for omethoate scenario were derived by converting the residue levels expressed as dimethoate into omethoate. Dimethoate (RD) was analysed in 61,811 samples. Thereof, 354 samples had quantifiable residues (0.57%).

For dithiocarbamate – ziram scenario, the mean estimated long-term exposure reached 101% of the ADI in the adjusted upper-bound scenario. The major contributors to the total long-term exposure were apples (32%), oranges (18.7%) and wheat (16.7%). Excluding the food products that are likely to give false positive CS_2 results (i.e. Brassicaceae and Alliaceae), the exposure in the ziram scenario was found to be below the ADI (99%). In the lower-bound scenario, the result was significantly lower (i.e. 24.9% of the ADI), and presumably mainly driven by LOQ values reported and used to calculate the mean residue input value. A total number of 11,467 samples were analysed for dithiocarbamates; in 1,709 samples quantifiable results were reported (15%).

In general, the estimated exposure was significantly lower in the lower-bound scenario compared to the upper-bound approach, which gives an indication on the high conservatism of the risk assessment methodology used. For pesticides with a significant difference between the upper-bound and lower-bound scenarios, the calculated exposure in the upper-bound scenario was mainly driven by results at the LOQ. For those substances for which the difference was not so significant (e.g. fenhexamid, fludioxonil, propamocarb and thiabendazole), the mean was derived from frequently positive findings above the LOQ and low LOQ values derived with sensitive analytical methods.

For three pesticides covered by the 2016 EUCP, no quantifiable residues were reported among all food items tested for this substance (aldicarb, EPN and parathion-methyl).[59]

For six pesticides (bromide ion, fenamidone, hexachlorobenzene, hexachlorocyclohexane (alpha), hexachlorocyclohexane (beta) and isocarbophos), residues were quantified in food but no long-term dietary risk assessment could be performed; in fact, for these substances no internationally agreed toxicological reference values are available. None of these pesticides is currently approved in Europe, but residues may be present in food due to either their presence and/or persistence in the environment or due to their use in third countries. The estimated exposure to these pesticides, using the food consumption data of EFSA PRIMo rev. 2, was low (see Table 14).

Table 14: Results of long-term exposure assessment for active substances without ADI values

Pesticide	Long-term exposure (in µg/kg bw per day)	
	Upper-bound approach	Lower-bound approach
Bromide ion	8.7	1.1
Fenamidone[52]	0.01	0.0002
Hexachlorobenzene	0.03	0.00003
Hexachlorocyclohexane (alpha)	0.03	0.00003
Hexachlorocyclohexane (beta)	0.002	0.00002
Isocarbophos	0.003	0.00003

bw: body weight.

[59] To be clarified that the total number of samples are EUCP and national covering the pesticides listed in the EUCP and for all crops related in Annex I of Regulation 396/2005.

Regarding this year assessment and taking into consideration all food items for which consumption data are provided in PRIMo, it is shown that those items covered by the 3-years cycle of the EUCP are the higher contributors to the overall dietary exposure of the EU citizens.

Overall, EFSA concludes that based on the results of the 2016 pesticide monitoring programmes (EUCP and NP), the long-term dietary exposure to the pesticides covered by the 2016 EUCP and for which toxicological data are available, was unlikely to pose a health risk to consumers.

6. Conclusions and recommendations

Compared to 2015, in 2016 the number of samples analysed by reporting countries for pesticide residues has slightly increased. As regards to overall MRL exceedance rate, EFSA noted an increase (in the frame of the EUCP the rate increased from 0.9% in 2013 to 1.7%, whereas in the national programme the increase was from 2.8% in 2015 to 3.8% in 2016). This has to be seen in an overall context and can be explained by some very specific issues arising in 2016 that have contributed to this result, demonstrating the importance and effect that targeted controls can have on detecting MRL exceedances, in particular also in connection with preceding legal changes towards lower MRLs (e.g. chlorpyrifos). At the same time, the percentage of samples with residues below the LOQ remained stable in the EUCP (from 52.8% in 2013 to 52.3% in 2016), demonstrating that the overall situation remained stable compared to previous years. In the EUCP, the increased number of MRL exceedances mainly concerns chlorpyrifos in samples of lettuces, peaches and head cabbage as well as dimethoate in tomatoes. As regards chlorpyrifos, MRLs were lowered to the limit of quantification for many commodities in 2016 following an EFSA reasoned opinion. The MRL exceedances may be the result of delayed responses from food business operators to this change of the legal situation. As regards the exceedances of dimethoate MRLs, the intensified controls in France of tomatoes produced in the Mayotte oversea territory is considered to be the main reason. In addition, a number of MRL exceedances were reported for non-approved substances in domestically produced samples in the EU. Considering the results of the national control programmes, the increase in the MRL exceedance rate was mainly attributed to residues of chlorate, which have been reported to EFSA for the first time under the pesticide residue monitoring data collection following the start of discussions triggered by the European Commission on amended MRLs.

The results of the monitoring programmes are a valuable source of information to estimate the dietary exposure of EU consumers to pesticide residues. As in previous years, EFSA performed the acute (short-term) dietary risk assessment for the pesticide/food product combinations covered by the EUCP. With the deterministic models currently used for this purpose, exceedances of the acute reference dose have been identified for a number of food/pesticide combinations. In the future, the use of probabilistic models for acute dietary exposure assessment along with the use of food processing factors would allow more realistic exposure estimates. Overall, 122 pesticides were assessed for acute exposure with a deterministic approach. EFSA concluded that the probability of being exposed to pesticide residues exceeding concentrations that may lead to negative health effects is low.

The long-term (chronic) exposure was calculated, taking into account all unprocessed food products for which residue data on the pesticides covered by the EUCP were reported. Overall, the estimated exposure was well below the ADI in most of the calculated scenarios. Therefore, EFSA concluded that according to the current scientific knowledge, the long-term dietary exposure to pesticides covered by the 2016 EUCP was unlikely to pose a health risk to consumers.

On the basis of the 2016 pesticide monitoring findings, EFSA recommends the following:

- In the framework of the EUCP, two Member States (Hungary and Bulgaria) failed to submit results for the minimum number of samples as requested in the 2016 monitoring regulation. The countries concerned should provide further clarification as to why they did not comply with the requirements of the regulation.
- A number of non-approved substances were found repeatedly in samples produced in the EU, in some cases exceeding the legal limit, e.g.
  - apples: carbendazim, diphenylamine and propargite;
  - strawberries: propargite, hexaconazole, dicofol, dichlorvos and carbendazim;
  - lettuce: linuron;
  - peaches: propargite and carbendazim;
  - tomatoes: procymidone, carbaryl, chlorfenapyr, dicofol, hexaconazole, fenpropathrin and propargite;

Since these results give an indication of possible misuses of non-approved active substances, Member States should follow-up on these findings, investigating the reasons and take corrective measures where appropriate.

- Following the revision of the toxicological reference values for chlorpyrifos, EU MRLs were lowered in August 2016 to the LOQ for several commodities. It was noted that a high number of samples produced in the EU and third countries was found with residues of chlorpyrifos exceeding the lowered legal limits after that date. Investigations of the reasons for this are recommended.
- In total, 1,131 honey samples were analysed. In 20.1% of these samples, residues were detected, while 1.7% exceeded the legal limits. Since honey is a very minor contributor to exposure, EFSA recommends the analysis of honey samples by Member States to be done under their national programmes, keeping the analytical scope as wide as possible, taking into account the fact that unexpected residues were found in honey in the 2016 monitoring.
- Pesticides were also found occasionally in organic food that are not permitted in this type of products, such as chlorpyrifos, thiacloprid, imidacloprid, iprodione, tebuconazole, acetamiprid, carbendazim, glyphosate. Member States should try to elucidate the reasons for these findings.
- There are indications of chlormequat used in wine grapes. Although no MRL exceedances were noted so far for wine produced in the EU, Member States should be aware of these findings and should include chlormequat in the analytical scope for their analyses of wine grapes and wine samples. It should be born in mind that due to the persistent nature of chlormequat, the substance can remain in some plants years after its use.
- The detailed analysis of national control programmes revealed some unexpected results, e.g. the finding of nicotine residues in spinach, lettuce and chard, residues of ethephon in currants, or residues of mepiquat in apples. Member States are made aware of these findings and are invited to include the pesticide/crop combinations in their national control programmes and – in case of positive detections – to investigate the reasons.
- A high frequency of MRL exceedances for anthraquinone in tea was identified; the highest residues amounted to up to 0.37 mg/kg while the MRL is set at the LOQ of 0.02 mg/kg. Measures in tea producing countries are needed to fully investigate the causes and to implement best practices in tea production.
- Considering that the residues of three pesticides (i.e. aldicarb, EPN and parathion-methyl), which are currently included in the EUCP, were not quantified in any of the samples analysed, risk managers may consider to take them out of the mandatory testing in the framework of the EU-coordinated programme. Instead, it might be sufficient to test samples taken under the national programmes.
- EFSA reiterated its previous recommendation to develop analytical methods that allow the differentiation of the actual dithiocarbamate applied in the field as well as to distinguish the contribution of the untreated (blank) commodity to the total CS_2 reported. To this last recommendation, Member States and the EURLs on pesticide residues are currently in the process of establishing a database containing background residue concentrations of CS_2 in untreated food commodities. This information will be used in the framework of the MRL review for diethiocarbamates, and will allow EFSA to perform a more accurate dietary risk assessment for pesticides belonging to the group of dithiocarbamates in food.
- EFSA was repeatedly asked to provide information on the percentage of samples free of residues (i.e. residues below the limit of detection (LOD). This information would also be of importance to perform a more realistic dietary risk assessment. At the moment, reporting countries are not providing systematically information whether the residue levels below the LOD have been found in samples analysed. It was highlighted by different enforcement laboratories that more guidance on the validation methodology for reporting the LOD would be required. Therefore it is recommended that the EURLs include this parameter in the new revision of the guidance document on the method validation (known as AQC guidelines (European Commission, 2018)), in order to use a harmonised EU approach accepted by the accreditation bodies.

This report is intended to provide information to the interested public and all partners who have responsibilities in the food chain, in particular food business operators. The report gives information how to enhance the efficiency of self-control systems. The report should be consulted to identify which pesticides and food products are to be controlled with high priority, taking into account the findings of

the official controls performed by the competent Member State authorities. Efficient strategies to identify at an early stage food products that potentially violate the EU food safety standards can contribute to the reduction of non-compliant food being placed on the market and will have an effect on the dietary exposure of European consumers to pesticide residues.

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Abbreviations

EU/EEA country codes

AT	Austria	**IS**	Iceland
BE	Belgium	**IT**	Italy
BG	Bulgaria	**LT**	Lithuania
CY	Cyprus	**LU**	Luxembourg
CZ	Czech Republic	**LV**	Latvia
DE	Germany	**MT**	Malta
DK	Denmark	**NL**	Netherlands
EE	Estonia	**NO**	Norway
EL	Greece	**PL**	Poland
ES	Spain	**PT**	Portugal
FI	Finland	**RO**	Romania
FR	France	**SE**	Sweden
HR	Croatia	**SI**	Slovenia
HU	Hungary	**SK**	Slovak Republic
IE	Ireland	**UK**	United Kingdom

ADI	acceptable daily intake
ARfD	acute reference dose
BAC	benzalkonium chloride
bw	body weight
CAG	Cumulative Assessment Group
CI	confidence interval
CS_2	carbon disulfide
DDAC	didecyldimethylammonium chloride
EC	European Commission
EEA	European Economic Area
EFSA	European Food Safety Authority
EFTA	European Free Trade Association
EU	European Union
EUCP	EU-coordinated control programme
EURL	European Union Reference Laboratory
FAO	Food and Agriculture Organization of the United Nations
FYRM	The Former Yugoslav Republic of Macedonia
GAP	Good Agricultural Practice

HCH	hexachlorocyclohexane
HRM	highest residue measured
LOD	limit of detection
LOQ	limit of quantification
MRL	maximum residue level
NP	National control programme
POP	persistent organic pollutants
PRIMo	Pesticide Residue Intake Model
RD	residue definition
SSD	Standard Sample Description
WHO	World Health Organization

Appendix A – Authorities responsible in the reporting countries for pesticide residue monitoring

Country	National competent authority	Web address for published national monitoring reports
Austria	Federal Ministry for Health	https://www.verbrauchergesundheit.gv.at/lebensmittel/lebensmittelkontrolle/monitoring/pestizid.html
	Austrian Agency for Health and Food Safety	http://www.ages.at/themen/rueckstaende-kontaminanten/pflanzenschutzmittel-rueckstaende/pestizidmonitoringberichte/
Belgium	Federal Agency for the Safety of the food Chain (FASFC)	http://www.afsca.be
Bulgaria	Risk Assessment Centre on Food Chain	The Web site is under construction
Croatia	Ministry of Agriculture	http://www.mps.hr/
Cyprus	Pesticides Residues Laboratory of the State General Laboratory of Ministry of Health	http://www.moh.gov.cy/sgl
Czech Republic	Czech Agriculture and Food Inspection Authority	http://www.szpi.gov.cz/lstDoc.aspx?nid=11386
	State Veterinary Administration	http://www.svscr.cz
Denmark	Danish Veterinary and Food Administration	http://www.food.dtu.dk/publikationer/kemikaliepaavirkninger/pesticider-i-kosten
	National Food Institute, Technical University of Denmark	
Estonia	Veterinary and Food Board	http://www.vet.agri.ee
Finland	Finnish Food Safety Authority Evira and Finnish Customs	http://www.evira.fi/portal/fi/tietoa+evirasta/asiakokonaisuudet/vierasaineet/kasvinsuojeluainejaamat/valvonta/
France	Ministère de l'économie et des finances/Direction générale de la concurrence, de la consommation et de la répression des fraudes (DGCCRF)	http://www.economie.gouv.fr/dgccrf/securite/produits-alimentaires
	Ministère de l'agriculture, de l'agroalimentaire et de la forêt, Direction générale de l'alimentation (DGAL)	http://agriculture.gouv.fr/plans-de-surveillance-et-de-controle
Germany	Federal Office of Consumer Protection and Food Safety (BVL)	www.bvl.bund.de/berichtpsm
Greece	Ministry of Rural Development and Food	http://www.minagric.gr/index.php/en/citizen-menu/foodsafety-menu
	General Directorate of Sustainable Plant Produce Directorate of Plant Produce Protection Department of Plant Protection Products & Biocides	http://www.minagric.gr/index.php/el/for-farmer-2/crop-production/fytoprostasiamenu/ypoleimatafyto
Hungary	National Food Chain Safety Office	https://www.nebih.gov.hu
Iceland	MAST – The Icelandic Food and Veterinary Authority	http://www.mast.is
Ireland	Department of Agriculture Food and the Marine	www.pcs.agriculture.gov.ie
Italy	Ministero della Salute – Direzione Generale per l'Igene e la Sicurezza degli Alimenti e la Nutrizione – Ufficio 7	http://www.salute.gov.it/portale/temi/p2_6.jsp?lingua=italiano&id=1105&area=fitosanitari&menu=vegetali

Country	National competent authority	Web address for published national monitoring reports
Latvia	Ministry of Agriculture Food and Veterinary Service of Latvia	www.zm.gov.lv
Lithuania	National Food and Veterinary Risk Assessment Institute	http://www.nmvrvi.lt
Luxembourg	Food Safety Service (Secualim)	http://www.securite-alimentaire.public.lu/organisme/pcnp/sc/cs9_prod_phyto/ppp_residus_pesticides/index.html
	Administration of Veterinary Services (ASV)	
Malta	Malta Competition and Consumer Affairs Authority	www.mccaa.org.mt
Netherlands	Netherlands Food and Consumer Product Safety Authority (NVWA)	www.nvwa.nl
Norway	Norwegian Food Safety Authority	www.mattilsynet.no http://www.mattilsynet.no/mat_og_vann/uonskede_stofferimaten/rester_av_plantevernmidler_i_mat/lavt_innhold_av_plantevernmiddelrester_i_maten_i_2015.22925
Poland	The State Sanitary Inspection	http://www.gis.gov.pl
Portugal	Direção Geral de Alimentação e Veterinária (DGAV)	http://www.dgv.min-agricultura.pt/portal/page/portal/DGV/genericos?generico=4217393&cboui=4217393t
Romania	National Sanitary Veterinary and Food Safety Authority	http://www.ansvsa.ro
	Ministry of Agriculture and Rural Development	http://www.madr.ro
	Ministry of Health	
Slovakia	State Veterinary and Food Administration of the Slovakian Republic	http://www.svps.sk/
	Public Health Authority of the Slovakian Republic	
Slovenia	Administration of the Republic of Slovenia for Food Safety, Veterinary Sector and Plant Protection	http://www.uvhvvr.gov.si/si/delovna_podrocja/ostanki_pesticidov/porocila/
Spain	Spanish Agency for Consumer Affairs, Food Safety and Nutrition (AECOSAN)	http://www.aecosan.msssi.gob.es/AECOSAN/web/seguridad_alimentaria/subseccion/programa_control_residuos.htm
Sweden	National Food Agency	www.livsmedelsverket.se
United Kingdom	Health and Safety Executive	https://www.gov.uk/government/publications/expert-committee-on-pesticide-residues-in-food-prif-annual-report-for-2015

Appendix B – Background information on the EU-coordinated programme

Table B.1: Description of the 2016 EU-coordinated control programme

Pesticide[(d)]	Type of food analysed[(a)]	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs[(b)]	Analysis mandatory for the following food products[(c)]
2-phenylphenol	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Abamectin (RD)	P	Abamectin (sum of avermectin B1a, avermectin B1b and delta-8,9 isomer of avermectin B1a) Abamectin (sum of avermectin B1a, avermectin B1b and delta-8,9 isomer of avermectin B1a, expressed as avermectin B1a)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Acephate	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Acetamiprid (RD)	P	Acetamiprid	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Acrinathrin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Aldicarb (RD)	P	Aldicarb (sum of aldicarb, its sulfoxide and its sulfone, expressed as aldicarb)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Azinphos-methyl	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Azoxystrobin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Bifenthrin	PA		Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Biphenyl	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Bitertanol	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Boscalid (RD)	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Bromide ion	P		Lt, To
Bromopropylate	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Bupirimate	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Buprofezin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Captan (RD)	P	Captan Captan/Folpet (sum) for apples, strawberries and tomatoes Sum of captan and THPI, expressed as captan	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Carbaryl	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Carbendazim (RD)	P	Carbendazim and benomyl (sum of benomyl and carbendazim expressed as carbendazim)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Carbofuran (RD)	P	Carbofuran (sum of carbofuran (including any carbofuran generated from carbosulfan, benfuracarb or furathiocarb) and 3-OH carbofuran expressed as carbofuran)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Chlorantraniliprole	P	Chlorantraniliprole (DPX E-2Y45)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Chlordane (RD)	A	Chlordane (sum of *cis*- and *trans*-isomers and oxychlordane expressed as chlordane)	Mc, Sf
Chlorfenapyr	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Chlormequat	P		Ry, To, Wg
Chlorothalonil (RD)	P	Chlorothalonil	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Chlorpropham (RD)	P	Chlorpropham	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg

Pesticide[(d)]	Type of food analysed[(a)]	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs[(b)]	Analysis mandatory for the following food products[(c)]
Chlorpyrifos	PA		Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Chlorpyrifos-methyl	PA		Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Clofentezine (RD)	P	Clofentezine	Ap, Hc, Le, Lt, Pe, St, To, Wg
Clothianidin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Cyfluthrin	P	Cyfluthrin (cyfluthrin including other mixtures of constituent isomers (sum of isomers))	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Cymoxanil	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Cypermethrin	PA	Cypermethrin (cypermethrin including other mixtures of constituent isomers (sum of isomers))	Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Cyproconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Cyprodinil (RD)	P	Cyprodinil	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
DDT (RD)	A	DDT (sum of *p,p'*-DDT, *o,p'*-DDT, *p,p'*-DDE and *p,p'*-TDE (DDD) expressed as DDT)	Mc, Sf
Deltamethrin	PA	Deltamethrin (cis-deltamethrin)	Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Diazinon	PA		Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Dichlorvos	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Dicloran	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Dicofol (RD)	P	Dicofol (sum of *p,p'* and *o,p'* isomers)	Ap, Hc, Le, Lt, Pe, St, To, Wg
Dieldrin (RD)	PA	Aldrin and Dieldrin (Aldrin and dieldrin combined expressed as dieldrin)	Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Diethofencarb	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Difenoconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Diflubenzuron (RD)	P	Diflubenzuron	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Dimethoate (RD)	P	Dimethoate (sum of dimethoate and omethoate expressed as dimethoate)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Dimethomorph	P		Ap, Hc, Le, Lt, Pe, St, To, Wg
Diniconazole	P	Diniconazole (sum of isomers)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Diphenylamine	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Dithianon	P		Ap, Pe
Dithiocarbamates (RD)	P	Dithiocarbamates (dithiocarbamates expressed as CS_2, including maneb, mancozeb, metiram, propineb, thiram and ziram)	Ap, Le, Lt, Pe, Ry, St, To, Wg
Dodine	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Endosulfan (RD)	PA	Endosulfan (sum of alpha- and beta-isomers and endosulfan-sulfate expresses as endosulfan)	Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
EPN	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Epoxiconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Ethephon	P		Ap, Ry, To, Wg

Pesticide[d]	Type of food analysed[a]	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs[b]	Analysis mandatory for the following food products[c]
Ethion	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Ethirimol	P		Ap, Hc, Le, Lt, Pe, St, To, Wg
Etofenprox	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Famoxadone	PA		Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Fenamidone	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenamiphos (RD)	P	Fenamiphos (sum of fenamiphos and its sulfoxide and sulfone expressed as fenamiphos)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenarimol	P		Ap, Hc, Le, Lt, Pe, St, To, Wg
Fenazaquin	P		Ap, Hc, Le, Lt, Pe, St, To, Wg
Fenbuconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenbutatin oxide	P		Ap, To, Wg
Fenhexamid	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenitrothion	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenoxycarb	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenpropathrin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenpropidin (RD)	P	Fenpropidin (sum of fenpropidin and its salts, expressed as fenpropidin)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenpropimorph (RD)	P	Fenpropimorph	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenpyroximate	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenthion (RD)	P	Fenthion (fenthion and its oxygen analogue, their sulfoxides and sulfone expressed as parent)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fenvalerate (RD)	PA	Fenvalerate (any ratio of constituent isomers (*RR*, *SS*, *RS* & *SR*) including esfenvalerate)	Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Fipronil (RD)	P	Fipronil (sum fipronil and sulfone metabolite (MB46136) expressed as fipronil)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fludioxonil (RD)	P	Fludioxonil	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Flufenoxuron	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fluopyram (RD)	P	Fluopyram	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fluquinconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Flusilazole (RD)	P	Flusilazole	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Flutriafol	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Folpet (RD)	P	Folpet Captan/Folpet (sum) for apples, strawberries and tomatoes Sum of folpet and phthalimide, expressed as folpet	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Formetanate	P	Formetanate: sum of formetanate and its salts expressed as formetanate (hydrochloride)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Fosthiazate	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Glyphosate	P		Ry
Heptachlor (RD)	A	Heptachlor (sum of heptachlor and heptachlor epoxide expressed as heptachlor)	Mc, Sf

Pesticide[d]	Type of food analysed[a]	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs[b]	Analysis mandatory for the following food products[c]
Hexachlorobenzene	A		Mc, Sf
Hexachlorocyclohexane (alpha)	A	Hexachlorocyclohexane (HCH), alpha-isomer	Mc, Sf
Hexachlorocyclohexane (beta)	A	Hexachlorocyclohexane (HCH), beta-isomer	Mc, Sf
Hexaconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Hexythiazox	P		Ap, Hc, Le, Lt, Pe, St, To, Wg
Imazalil	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Imidacloprid	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Indoxacarb	PA	Indoxacarb (sum of indoxacarb and its *R* enantiomer)	Ap, Hc, Le, Lt, Mc, Pe, Ry, St, To, Wg
Iprodione (RD)	P	Iprodione	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Iprovalicarb	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Isocarbophos	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Kresoxim-methyl (RD)	P	Kresoxim-methyl	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Lambda-cyhalothrin (RD)	P	Lambda-cyhalothrin	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Lindane	A	Lindane (Gamma-isomer of hexachlorocyclohexane (HCH))	Mc, Sf
Linuron	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Lufenuron	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Malathion (RD)	P	Malathion (sum of malathion and malaoxon expressed as malathion)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Mandipropamid	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Mepanipyrim	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Mepiquat	P		Ry, To
Metalaxyl	P	Metalaxyl and metalaxyl-M (metalaxyl including other mixtures of constituent isomers including metalaxyl-M (sum of isomers))	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Methamidophos	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Methidathion	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Methiocarb (RD)	P	Methiocarb (sum of methiocarb and methiocarb sulfoxide and sulfone, expressed as methiocarb)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Methomyl (RD)	P	Methomyl and Thiodicarb (sum of methomyl and thiodicarb expressed as methomyl)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Methoxychlor	A		Mc, Sf
Methoxyfenozide	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Monocrotophos	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Myclobutanil (RD)	P	Myclobutanil	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Oxadixyl	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Oxamyl	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Oxydemeton-methyl (RD)	P	Oxydemeton-methyl (sum of oxydemeton-methyl and demeton-S-methylsulfone expressed as oxydemeton-methyl)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg

Pesticide[d]	Type of food analysed[a]	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs[b]	Analysis mandatory for the following food products[c]
Paclobutrazol	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Parathion	PA		Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Parathion-methyl (RD)	P	Parathion-methyl (sum of Parathion-methyl and paraoxon-methyl expressed as Parathion-methyl)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Penconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pencycuron	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pendimethalin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Permethrin	PA	Permethrin (sum of isomers)	Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Phosmet (RD)	P	Phosmet (phosmet and phosmet oxon expressed as phosmet)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pirimicarb (RD)	P	Pirimicarb (sum of pirimicarb and desmethyl pirimicarb expressed as Pirimicarb) Pirimicarb	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pirimiphos-methyl	PA		Ap, Hc, Le, Lt, Mc, Pe, Ry, St, Sf, To, Wg
Procymidone (RD)	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Profenofos	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Propamocarb (RD)	P	Propamocarb (sum of propamocarb and its salt expressed as propamocarb)	Ap, Hc, Lt, To, Wg
Propargite	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Propiconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Propyzamide (RD)	P	Propyzamide	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pymetrozine (RD)	P	Pymetrozine	Hc, Lt, St, To
Pyraclostrobin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pyridaben	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pyrimethanil (RD)	P	Pyrimethanil	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Pyriproxyfen	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Quinoxyfen	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Spinosad	P	Spinosad (sum of Spinosyn A and Spinosyn D, expressed as spinosad)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Spirodiclofen	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Spiromesifen	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Spiroxamine (RD)	P	Spiroxamine	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
tau-Fluvalinate	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tebuconazole (RD)	P	Tebuconazole	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tebufenozide	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tebufenpyrad	P		Ap, Hc, Le, Lt, Pe, St, To, Wg
Teflubenzuron	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tefluthrin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Terbuthylazine	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tetraconazole	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tetradifon	P		Ap, Hc, Le, Lt, Pe, St, To, Wg
Thiabendazole (RD)	P	Thiabendazole	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg

Pesticide[(d)]	Type of food analysed[(a)]	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs[(b)]	Analysis mandatory for the following food products[(c)]
Thiacloprid	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Thiamethoxam (RD)	P	Thiamethoxam (sum of thiamethoxam and clothianidin expressed as thiamethoxam) Thiamethoxam	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Thiophanate-methyl (RD)	P	Thiophanate-methyl	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tolclofos-methyl	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Tolylfluanid (RD)	P	Tolylfluanid (sum of tolylfluanid and dimethylaminosulfotoluidide expressed as tolylfluanid)	Ap, Hc, Le, Lt, Pe, St, To, Wg
Triadimenol (RD)	P	Triadimefon and triadimenol (sum of triadimefon and triadimenol)	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Triazophos	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Trifloxystrobin (RD)	P	Trifloxystrobin	Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Triflumuron	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg
Vinclozolin	P		Ap, Hc, Le, Lt, Pe, Ry, St, To, Wg

MRL: maximum residue level.
(a): P: to be analysed in plant products; A: to be analysed in animal products.
(b): Legal residue definition applicable in 2016 for the relevant food products covered by the EUCP; if not specifically mentioned, the residue definition comprises the parent compound only.
(c): Ap: Apples; Hc: Head cabbage; Le: Leek; Lt: Lettuce; Mc: Cow's milk; Pe: Peaches; Ry: Rye; Sf: Swine fat; St: Strawberries; To: Tomatoes; Wg: Wine (from grape).
(d): The term '(RD)' refers to residue definition of the active substance to which it follows. The residue definition to which it refers, could be the same or different if there was a change during the 2016.

Appendix C – Background information and detailed results on the overall control programmes

Table C.1: Scope of the 2016 pesticide analyses in alphabetical order by pesticide name

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
1,1-Dichloro-2,2-bis(4-ethylphenyl)ethane	4,659	0	0.00	7	
1,2-Dibromo-3-chloropropane	2,748	0	0.00	6	
1,3-Dichloropropene	10	0	0.00	1	
1,4-Dimethylnaphthalene	171	0	0.00	2	
1-Methylcyclopropene	10	0	0.00	1	
1-Naphthylacetamide	17,810	24	0.13	12	
1-Naphthylacetic acid	4,150	10	0.24	4	
2,3,4,5-TCNB (2,3,4,5-Tetrachloronitrobenezene)	1,502	0	0.00	1	
2,3,5-Trimethacarb	5,638	0	0.00	2	
2,4,5-T (RD)	4,718	0	0.00	10	
2,4-D (RD)	18,776	72	0.38	18	
2,4-DB (RD)	17,970	0	0.00	13	
2,4-Dichlorobenzamide	310	0	0.00	1	
2-Naphthyloxyacetic acid	5,986	0	0.00	5	
2-Phenylphenol	48,696	727	1.49	29	Yes
3,4,5-Trimethacarb	2,754	0	0.00	3	
4-CPA	12,312	6	0.05	9	
6-Benzyladenine	10,136	0	0.00	7	
Abamectin (RD)	46,046	94	0.20	26	Yes
Acephate	68,232	56	0.08	30	Yes
Acequinocyl	1,673	0	0.00	4	
Acetamiprid (RD)	67,541	3,578	5.30	30	Yes
Acetochlor	23,360	0	0.00	18	
Acibenzolar-S-methyl (RD)	19,052	0	0.00	10	
Acifluorfen	2,481	0	0.00	3	
Aclonifen	39,870	42	0.11	23	
Acrinathrin	66,941	118	0.18	30	Yes
Alachlor	32,608	0	0.00	19	
Alanycarb	5,219	0	0.00	4	
Aldicarb (RD)	60,654	0	0.00	28	Yes
Aldimorph	27	0	0.00	2	
Allethrin	9,994	2	0.02	12	
Allidochlor	2,308	0	0.00	2	
Alloxydim	260	0	0.00	2	
Ametoctradin (RD)	29,568	231	0.78	17	
Ametryn	24,474	1	0.00	15	
Amidithion	1,906	0	0.00	2	
Amidosulfuron (RD)	17,892	0	0.00	12	
Aminocarb	14,439	0	0.00	11	
Aminopyralid	4,656	0	0.00	4	
Amisulbrom	9,728	2	0.02	11	
Amitraz (RD)	31,954	29	0.09	25	
Amitrole	4,320	0	0.00	8	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Ampropylfos	10	0	0.00	1	
Ancymidol	8,181	0	0.00	4	
Anilazine	2,650	0	0.00	4	
Anilofos	5,280	0	0.00	5	
Anthraquinone	27,294	206	0.75	17	
Aramite	80	0	0.00	3	
Aspon	6,811	0	0.00	4	
Asulam	14,803	0	0.00	11	
Atraton	2,803	0	0.00	5	
Atrazine	48,677	6	0.01	25	
Azaconazole	22,161	0	0.00	16	
Azadirachtin	16,476	23	0.14	8	
Azafenidin	10	0	0.00	1	
Azamethiphos	11,957	0	0.00	13	
Azimsulfuron	7,951	0	0.00	9	
Azinphos-ethyl	57,263	4	0.01	28	
Azinphos-methyl	68,814	4	0.01	30	Yes
Aziprotryne	5,158	1	0.02	5	
Azoxybenzene	1,603	0	0.00	2	
Azoxystrobin	72,842	3,526	4.84	30	Yes
BAC (RD)	7,917	105	1.33	11	
Barban	2,270	0	0.00	3	
Beflubutamid	16,895	0	0.00	12	
Benalaxyl	46,138	14	0.03	23	
Benazolin	2,480	0	0.00	2	
Benazolin-Ethyl	10	0	0.00	1	
Bendiocarb	28,105	0	0.00	18	
Benfluralin	30,297	5	0.02	14	
Benfuresate	2,509	0	0.00	3	
Benodanil	4,248	0	0.00	4	
Bensulfuron	30	0	0.00	2	
Bensulfuron-methyl	9,066	0	0.00	9	
Bensulide	4,146	0	0.00	2	
Bensultap	2,480	0	0.00	2	
Bentaluron	10	0	0.00	1	
Bentazone (RD)	16,521	2	0.01	15	
Benthiavalicarb	8,064	1	0.01	8	
Benzobicyclon	1,844	0	0.00	2	
Benzovindiflupyr	187	0	0.00	1	
Benzoximate	5,176	0	0.00	8	
Benzoylprop	366	0	0.00	2	
Benzoylprop-Ethyl	7,064	0	0.00	7	
Benzthiazuron	10	0	0.00	1	
Bifenazate (RD)	27,262	86	0.32	11	
Bifenox	24,663	0	0.00	15	
Bifenthrin	72,819	786	1.08	30	Yes
Bioallethrin	2,928	1	0.03	6	
Bioresmethrin	3,453	0	0.00	6	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Biphenyl	53,316	172	0.32	28	Yes
Bis(tributyltin) oxide	61	0	0.00	1	
Bispyribac	6,063	0	0.00	7	
Bitertanol	66,453	5	0.01	30	Yes
Bixafen (RD)	35,878	6	0.02	20	
Blasticidin-S	10	0	0.00	1	
Boscalid (RD)	71,990	6,815	9.47	30	Yes
Brodifacoum	12	0	0.00	2	
Bromacil	26,466	1	0.00	15	
Bromadiolone	234	0	0.00	2	
Bromethalin	10	0	0.00	1	
Bromfenvinfos	2,709	0	0.00	6	
Bromfenvinfos-methyl	102	0	0.00	3	
Bromide ion	4,514	928	20.56	23	Yes
Bromobutide	1,179	0	0.00	2	
Bromocyclen	6,264	1	0.02	5	
Bromofenoxim	11	0	0.00	2	
Bromophos	37,625	0	0.00	24	
Bromophos-ethyl	50,501	1	0.00	25	
Bromopropylate	71,239	11	0.02	30	Yes
Bromoxynil	28,017	2	0.01	15	
Brompyrazon	10	0	0.00	1	
Bromuconazole	58,392	1	0.00	30	
Bronopol	10	0	0.00	1	
Bufencarb	10	0	0.00	1	
Bupirimate	71,564	260	0.36	30	Yes
Buprofezin	71,335	732	1.03	30	Yes
Butachlor	7,241	0	0.00	10	
Butafenacil	10,116	0	0.00	9	
Butamifos	5,245	0	0.00	3	
Butocarboxim	14,998	0	0.00	12	
Butoxycarboxim	12,719	0	0.00	11	
Butralin	18,894	0	0.00	13	
Butroxydim	10	0	0.00	1	
Buturon	4,358	0	0.00	8	
Butylate	10,971	0	0.00	10	
Cadusafos	56,458	0	0.00	28	
Cafenstrole	3,432	0	0.00	3	
Camphechlor (RD)	187	0	0.00	2	
Captafol	19,505	0	0.00	16	
Captan (RD)	25,043	287	1.15	22	Yes
Carbanolate	10	0	0.00	1	
Carbaryl	70,997	20	0.03	30	Yes
Carbendazim (RD)	60,877	1,798	2.95	27	Yes
Carbetamide	24,580	1	0.00	16	
Carbofuran (RD)	57,798	67	0.12	26	Yes
Carbon tetrachloride	272	154	56.62	2	
Carbophenothion	26,809	0	0.00	16	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Carboxin	48,240	4	0.01	28	
Carfentrazone-ethyl	16,866	0	0.00	11	
Carpropamid	3,072	0	0.00	5	
Cartap	10	0	0.00	1	
Carvone	10	0	0.00	1	
Chinomethionat	32,823	0	0.00	20	
Chlomethoxyfen	10	0	0.00	1	
Chloramben	10	0	0.00	1	
Chloraniformethan	10	0	0.00	1	
Chloranil	10	0	0.00	1	
Chlorantraniliprole	57,561	1,644	2.86	27	Yes
Chlorate	5,273	744	14.11	7	
Chlorbenside	7,948	0	0.00	14	
Chlorbromuron	19,485	0	0.00	15	
Chlorbufam	19,023	0	0.00	16	
Chlordane (RD)	39,523	93	0.24	26	Yes
Chlordecone	1,747	30	1.72	5	
Chlordimeform	6,219	0	0.00	9	
Chlorethoxyfos	10	0	0.00	1	
Chlorfenapyr	65,852	292	0.44	29	Yes
Chlorfenethol	1,603	0	0.00	2	
Chlorfenprop	10	0	0.00	1	
Chlorfenprop-Methyl	8,224	0	0.00	6	
Chlorfenson	26,604	1	0.00	21	
Chlorfenvinphos	64,850	3	0.00	30	
Chlorfluazuron	19,749	5	0.03	14	
Chlorflurenol	395	0	0.00	2	
Chlorflurenol-Methyl	395	0	0.00	2	
Chloridazon	26,208	3	0.01	17	
Chlormephos	21,019	0	0.00	16	
Chlormequat	10,267	787	7.67	27	Yes
Chlornitrofen	1,846	0	0.00	2	
Chlorobenzilate	42,817	4	0.01	27	
Chloroneb	7,418	0	0.00	9	
Chloropicrin	10	0	0.00	1	
Chloropropylate	11,284	0	0.00	9	
Chlorothalonil (RD)	55,337	396	0.72	28	Yes
Chlorotoluron	28,856	1	0.00	18	
Chloroxuron	19,997	0	0.00	15	
Chlorpropham (RD)	64,606	630	0.98	29	Yes
Chlorpyrifos	76,228	3,371	4.42	30	Yes
Chlorpyrifos-methyl	76,022	839	1.10	30	Yes
Chlorsulfuron	8,925	0	0.00	13	
Chlorthal	10	0	0.00	1	
Chlorthal-dimethyl	38,604	3	0.01	20	
Chlorthiamid	4,146	0	0.00	7	
Chlorthion	1,404	0	0.00	5	
Chlorthiophos	14,352	0	0.00	11	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Chlozolinate	40,032	0	0.00	23	
Chromafenozide	13,167	0	0.00	5	
Cinidon-ethyl	7,144	0	0.00	8	
Cinmethylin	10	0	0.00	1	
Cinosulfuron	10,111	0	0.00	7	
Clethodim (RD)	18,970	2	0.01	13	
Climbazole	1,722	0	0.00	2	
Clodinafop	6,567	0	0.00	7	
Cloethocarb	10	0	0.00	1	
Clofencet	10	0	0.00	1	
Clofentezine (RD)	58,367	92	0.16	28	Yes
Clomazone	45,584	17	0.04	25	
Clopyralid	21,682	9	0.04	14	
Cloransulam-Methyl	10	0	0.00	1	
Clothianidin	40,594	223	0.55	27	Yes
Copper	3,103	2,258	72.77	3	
Coumachlor	4,075	0	0.00	2	
Coumaphos	35,164	3	0.01	24	
Coumatetralyl	4,853	0	0.00	2	
Crimidine	3,184	0	0.00	6	
Crotoxyphos	1,605	0	0.00	2	
Crufomate	1,672	0	0.00	3	
Cyanamide	187	0	0.00	1	
Cyanazine	29,703	0	0.00	18	
Cyanofenphos	13,044	0	0.00	16	
Cyanophos	12,880	0	0.00	11	
Cyantraniliprole	5,291	13	0.25	6	
Cyazofamid	47,067	118	0.25	24	
Cybutryne	366	0	0.00	2	
Cyclanilide	5,726	0	0.00	5	
Cycloate	12,031	0	0.00	13	
Cycloprothrin	10	0	0.00	1	
Cyclosulfamuron	10	0	0.00	1	
Cycloxydim (RD)	15,798	0	0.00	15	
Cycluron	7,916	0	0.00	6	
Cyenopyrafen	2,657	0	0.00	2	
Cyflufenamid	33,407	105	0.31	18	
Cyflumetofen	9,768	1	0.01	7	
Cyfluthrin	56,933	127	0.22	29	Yes
Cyhalofop-butyl (RD)	6,156	0	0.00	8	
Cyhalothrin	1,562	9	0.58	7	
Cyhalothrin, gamma-	644	0	0.00	4	
Cyhexatin (RD)	1,755	0	0.00	4	
Cymiazole	6,297	0	0.00	13	
Cymoxanil	52,955	22	0.04	29	Yes
Cypermethrin	69,375	1,532	2.21	29	Yes
Cyphenothrin	3,874	1	0.03	5	
Cyprazin	4,146	0	0.00	2	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Cyproconazole	71,708	125	0.17	30	Yes
Cyprodinil (RD)	70,659	3,721	5.27	30	Yes
Cyprofuram	1,978	0	0.00	3	
Cyromazine	32,562	53	0.16	21	
Cythioate	1,341	0	0.00	2	
DDAC	8,012	69	0.86	10	
DDT (RD)	55,502	362	0.65	27	Yes
DNOC	3,551	0	0.00	6	
Daimuron	2,480	0	0.00	2	
Dalapon	2,480	0	0.00	2	
Daminozide (RD)	1,903	0	0.00	5	
Dazomet (RD)	409	0	0.00	5	
Deltamethrin	74,334	892	1.20	30	Yes
Demephion-O	10	0	0.00	1	
Demephion-S	10	0	0.00	1	
Demeton	61	0	0.00	2	
Demeton-S	3,294	0	0.00	6	
Demeton-S-Methyl	34,340	0	0.00	26	
Desmedipham	24,174	0	0.00	19	
Desmetryn	16,713	0	0.00	14	
Di-allate	4,913	0	0.00	8	
Diafenthiuron	28,293	15	0.05	19	
Dialifos	16,791	0	0.00	12	
Diazinon	75,523	91	0.12	30	Yes
Dicamba	19,523	2	0.01	15	
Dichlobenil	32,930	1	0.00	18	
Dichlofenthion	20,375	0	0.00	15	
Dichlofluanid	56,345	0	0.00	28	
Dichlone	14	0	0.00	2	
Dichlorophen	6,213	0	0.00	4	
Dichlorprop (RD)	15,996	3	0.02	15	
Dichlorvos	71,415	10	0.01	30	Yes
Dichlozoline	10	0	0.00	1	
Diclobutrazol	24,454	0	0.00	13	
Diclofop (RD)	13,611	0	0.00	9	
Dicloran	67,465	20	0.03	30	Yes
Diclosulam	29	0	0.00	2	
Dicofol (RD)	55,229	12	0.02	29	Yes
Dicrotophos	53,308	0	0.00	30	
Dicyclanil	52	0	0.00	2	
Dieldrin (RD)	62,912	95	0.15	29	Yes
Dienochlor	10	0	0.00	1	
Diethatyl	10	0	0.00	1	
Diethofencarb	65,411	7	0.01	30	Yes
Difenacoum	22	0	0.00	2	
Difenoconazole	71,558	2,266	3.17	30	Yes
Difenoxuron	2,934	0	0.00	6	
Difenzoquat	2,791	0	0.00	4	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Diflubenzuron (RD)	57,279	127	0.22	29	Yes
Diflufenican	45,091	5	0.01	21	
Diflufenzopyr	5,067	0	0.00	4	
Dikegulac	2,630	3	0.11	5	
Dimefox	4,246	0	0.00	9	
Dimefuron	13,215	0	0.00	7	
Dimepiperate	2,805	0	0.00	3	
Dimethachlor	16,602	0	0.00	13	
Dimethametryn	10	0	0.00	1	
Dimethenamid–p	14,894	0	0.00	13	
Dimethipin	987	0	0.00	2	
Dimethirimol	1,361	0	0.00	3	
Dimethoate (RD)	69,371	397	0.57	30	Yes
Dimethomorph	65,388	1,469	2.25	30	Yes
Dimethylvinphos	4,100	0	0.00	5	
Dimetilan	1,827	0	0.00	3	
Dimexano	10	0	0.00	1	
Dimoxystrobin (RD)	34,498	17	0.05	24	
Diniconazole	63,889	5	0.01	29	Yes
Dinitramine	4,625	0	0.00	8	
Dinobuton	2,209	0	0.00	4	
Dinocap (RD)	9,663	1	0.01	12	
Dinoseb (RD)	4,252	0	0.00	3	
Dinotefuran	33,822	25	0.07	20	
Dinoterb (RD)	3,457	0	0.00	3	
Diofenolan	10	0	0.00	1	
Dioxabenzofos	1,676	0	0.00	6	
Dioxacarb	12,727	0	0.00	9	
Dioxathion	11,100	0	0.00	12	
Diphacinone	10	0	0.00	1	
Diphenamid	14,947	0	0.00	13	
Diphenylamine	67,188	57	0.08	30	Yes
Dipropetryn	3,383	0	0.00	5	
Diquat	552	7	1.27	8	
Disulfiram	10	0	0.00	1	
Disulfoton (RD)	38,036	0	0.00	24	
Ditalimfos	21,584	0	0.00	18	
Dithianon	14,853	371	2.50	19	Yes
Dithiocarbamates (RD)	12,750	1,775	13.92	27	Yes
Dithiopyr	5,335	0	0.00	4	
Diuron	41,538	9	0.02	22	
Dodemorph	13,003	0	0.00	13	
Dodine	46,931	419	0.89	25	Yes
Drazoxolon	10	0	0.00	1	
EPN	65,826	0	0.00	30	Yes
EPTC	12,887	0	0.00	14	
Edifenphos	8,324	0	0.00	9	
Emamectin	18,254	10	0.05	13	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Empenthrin	661	0	0.00	4	
Endosulfan (RD)	72,176	54	0.07	29	Yes
Endothal	10	0	0.00	1	
Endrin	49,997	2	0.00	28	
Epoxiconazole	71,221	37	0.05	30	Yes
Esprocarb	5,564	0	0.00	5	
Etaconazole	12,627	0	0.00	10	
Ethalfluralin	7,648	0	0.00	9	
Ethametsulfuron-methyl	3,712	0	0.00	7	
Ethephon	8,734	318	3.64	26	Yes
Ethidimuron	3,495	0	0.00	7	
Ethiofencarb	39,751	0	0.00	20	
Ethion	72,120	38	0.05	30	Yes
Ethiprole	8,307	0	0.00	9	
Ethirimol	56, 086	126	0.22	28	Yes
Ethoate-Methyl	10	0	0.00	1	
Ethofumesate (RD)	24,206	8	0.03	17	
Ethoprophos	66,856	9	0.01	30	
Ethoxyquin	24,336	2	0.01	18	
Ethoxysulfuron	5,865	0	0.00	7	
Ethylene oxide (RD)	16	15	93.75	1	
Etobenzanid	29	0	0.00	2	
Etofenprox	68,701	804	1.17	30	Yes
Etoxazole	39,492	123	0.31	20	
Etridiazole	29,567	3	0.01	17	
Etrimfos	37,534	0	0.00	25	
Famoxadone	63,491	156	0.25	30	Yes
Famphur	7,870	0	0.00	7	
Fenamidone	66,638	64	0.10	30	Yes
Fenaminosulf	10	0	0.00	1	
Fenamiphos (RD)	58,301	20	0.03	28	Yes
Fenarimol	71,981	5	0.01	30	Yes
Fenazaflor	713	0	0.00	2	
Fenazaquin	66,478	57	0.09	30	Yes
Fenbuconazole	67,233	355	0.53	30	Yes
Fenbutatin oxide	18,498	59	0.32	23	Yes
Fenchlorphos (RD)	21,565	1	0.00	20	
Fenfluthrin	1,499	0	0.00	3	
Fenfuram	6,162	0	0.00	3	
Fenhexamid	70,955	1,873	2.64	30	Yes
Fenitrothion	71,493	10	0.01	30	Yes
Fenobucarb	16,617	11	0.07	14	
Fenothiocarb	11,065	0	0.00	9	
Fenoxanil	29	0	0.00	2	
Fenoxaprop	14,637	0	0.00	5	
Fenoxaprop-P	5,685	0	0.00	9	
Fenoxaprop-P-Ethyl	7,351	0	0.00	11	
Fenoxaprop-ethyl	1,734	0	0.00	4	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Fenoxycarb	69,338	100	0.14	29	Yes
Fenpiclonil	17,655	0	0.00	11	
Fenpropathrin	70,893	105	0.15	29	Yes
Fenpropidin (RD)	44,886	13	0.03	28	Yes
Fenpropimorph (RD)	68,193	95	0.14	30	Yes
Fenpyrazamine	15,308	68	0.44	13	
Fenpyroximate	63,598	230	0.36	29	Yes
Fenridazon	10	0	0.00	1	
Fenson	23,744	0	0.00	14	
Fensulfothion	30,077	0	0.00	24	
Fenthion (RD)	60,060	1	0.00	27	Yes
Fentin	1,374	0	0.00	10	
Fentrazamide	29	0	0.00	2	
Fenuron	11,011	0	0.00	12	
Fenvalerate (RD)	58,472	103	0.18	29	Yes
Ferbam	10	0	0.00	1	
Fipronil (RD)	51,430	57	0.11	28	Yes
Flamprop	1,201	0	0.00	3	
Flamprop-M-Isopropyl	410	0	0.00	4	
Flamprop-M-Methyl	29	0	0.00	2	
Flamprop-isopropyl	2,807	0	0.00	5	
Flamprop-methyl	5,032	0	0.00	6	
Flazasulfuron	15,275	0	0.00	13	
Flocoumafen	4,853	0	0.00	2	
Flonicamid (RD)	39,556	368	0.93	22	
Florasulam	17,661	0	0.00	18	
Fluacrypyrim	5,152	1	0.02	4	
Fluazifop-P-butyl (RD)	30,964	36	0.12	21	
Fluazinam	33,577	12	0.04	21	
Fluazolate	10	0	0.00	1	
Fluazuron	5,233	0	0.00	4	
Flubendiamide	31,394	47	0.15	25	
Flubenzimine	1,583	0	0.00	3	
Fluchloralin	6,527	0	0.00	6	
Flucycloxuron	6,626	0	0.00	5	
Flucythrinate	26,019	2	0.01	20	
Fludioxonil (RD)	67,202	4,255	6.33	30	Yes
Flufenacet	27,247	1	0.00	20	
Flufenoxuron	63,199	13	0.02	30	Yes
Flufenprox	10	0	0.00	1	
Flufenzin	857	0	0.00	5	
Flumethrin	1,685	0	0.00	5	
Flumetralin	14,022	0	0.00	11	
Flumetsulam	1,178	0	0.00	2	
Flumiclorac	10	0	0.00	1	
Flumiclorac-Pentyl	29	0	0.00	2	
Flumioxazine	15,863	0	0.00	11	
Fluometuron	11,918	1	0.01	12	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Fluopicolide	59,504	417	0.70	27	
Fluopyram (RD)	48,917	2,181	4.46	27	Yes
Fluoride ion	10	0	0.00	1	
Fluorodifen	2,306	0	0.00	2	
Fluoroglycofene	29	0	0.00	2	
Fluoroimide	10	0	0.00	1	
Fluotrimazole	9,782	0	0.00	6	
Fluoxastrobin	31,604	3	0.01	16	
Flupoxam	10	0	0.00	1	
Flupyradifurone	2,143	0	0.00	3	
Flupyrsulfuron	10	0	0.00	1	
Flupyrsulfuron-methyl	6,739	0	0.00	7	
Fluquinconazole	64,453	9	0.01	30	Yes
Flurenol	10	0	0.00	1	
Flurenol-butyl	10	0	0.00	1	
Fluridone	3,168	0	0.00	5	
Flurochloridone	21,298	7	0.03	15	
Fluroxypyr (RD)	30,170	2	0.01	20	
Flurprimidole	8,232	1	0.01	7	
Flurtamone	23,416	0	0.00	12	
Flusilazole (RD)	70,529	23	0.03	30	Yes
Flusulfamide	3,382	0	0.00	3	
Fluthiacet-Methyl	2,822	0	0.00	5	
Flutolanil (RD)	55,971	22	0.04	27	
Flutriafol	67,771	266	0.39	30	Yes
Fluvalinate	4,668	4	0.09	10	
Fluxapyroxad	35,670	12	0.03	21	
Folpet (RD)	30,801	981	3.18	23	Yes
Fomesafen	9,903	1	0.01	9	
Fonofos	33,903	0	0.00	22	
Foramsulfuron	8,931	0	0.00	12	
Forchlorfenuron	23,809	21	0.09	14	
Formetanate	48,530	43	0.09	27	Yes
Formothion	39,443	0	0.00	27	
Fosamine	10	0	0.00	1	
Fosetyl-Al (RD)	4,895	1,422	29.05	4	
Fosthiazate	58,271	53	0.09	29	Yes
Fosthietan	10	0	0.00	1	
Fuberidazole	21,971	0	0.00	18	
Furalaxyl	22,226	0	0.00	13	
Furconazole	10	0	0.00	1	
Furfural	10	0	0.00	1	
Furmecyclox	3,854	0	0.00	5	
Genite	1,989	0	0.00	3	
Gibberellic acid	2,731	33	1.21	4	
Glufosinate (RD)	3,665	31	0.85	8	
Glyphosate	6,693	207	3.09	26	Yes
Griseofulvin	44	0	0.00	2	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Halfenprox	5,557	0	0.00	6	
Halofenozide	11,805	0	0.00	6	
Halosulfuron	400	0	0.00	2	
Halosulfuron-methyl	7,256	0	0.00	5	
Haloxyfop (RD)	24,019	27	0.11	22	
Heptachlor (RD)	32,204	7	0.02	26	Yes
Heptenophos	39,860	0	0.00	26	
Hexachlorobenzene	52,426	267	0.51	29	Yes
Hexachlorobutadiene	185	0	0.00	3	
Hexachlorocyclohexane (RD)	40,775	1	0.00	23	
Hexachlorocyclohexane (alpha)	32,725	32	0.10	29	Yes
Hexachlorocyclohexane (beta)	32,213	57	0.18	29	Yes
Hexaconazole	70,314	71	0.10	30	Yes
Hexaflumuron	33,620	1	0.00	20	
Hexazinone	23,095	0	0.00	16	
Hexythiazox	64,908	483	0.74	30	Yes
Hydramethylnon	30	0	0.00	3	
Hydrogen cyanide	23	22	95.65	1	
Hydrogen phosphide	49	11	22.45	2	
Hymexazol	4,620	0	0.00	5	
Imazalil	70,661	4,061	5.75	30	Yes
Imazamethabenz	4,712	0	0.00	6	
Imazamox	14,421	6	0.04	11	
Imazapic	10	0	0.00	1	
Imazapyr	15,224	0	0.00	12	
Imazaquin	18,361	0	0.00	9	
Imazethapyr	10,511	1	0.01	10	
Imazosulfuron	7,897	0	0.00	7	
Imibenconazole	7,969	0	0.00	7	
Imidacloprid	69,361	2,861	4.12	30	Yes
Iminoctadine	10	0	0.00	1	
Inabenfide	2,733	0	0.00	4	
Indoxacarb	71,532	787	1.10	30	Yes
Iodofenphos	15,544	0	0.00	13	
Iodosulfuron-methyl	13,328	0	0.00	12	
Ioxynil (RD)	11,242	0	0.00	18	
Ipconazole	15,290	0	0.00	12	
Iprobenfos	14,389	0	0.00	12	
Iprodione (RD)	66,132	1,759	2.66	30	Yes
Iprovalicarb	70,154	228	0.32	30	Yes
Isazofos	12,025	0	0.00	11	
Isobenzan	2,984	0	0.00	4	
Isocarbamid	1,603	0	0.00	2	
Isocarbophos	54,450	6	0.01	29	Yes
Isodrin	9,652	0	0.00	12	
Isofenphos	40,087	0	0.00	24	
Isofenphos-methyl	58,320	1	0.00	28	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Isolane	10	0	0.00	1	
Isomethiozin	3,674	0	0.00	4	
Isonoruron	1,755	0	0.00	5	
Isoprocarb	49,642	3	0.01	28	
Isopropalin	8,234	0	0.00	9	
Isoprothiolane	55,964	66	0.12	29	
Isoproturon	45,068	3	0.01	27	
Isopyrazam	11,079	6	0.05	10	
Isouron	1,115	0	0.00	1	
Isoxaben	23,005	2	0.01	14	
Isoxaflutole (RD)	13,458	0	0.00	13	
Isoxathion	10,881	0	0.00	8	
Ivermectin	621	0	0.00	3	
Kadethrin	10	0	0.00	1	
Karbutilate	1,171	0	0.00	2	
Karetazan	10	0	0.00	1	
Kasugamycin	67	0	0.00	2	
Kelevan	10	0	0.00	1	
Kresoxim-methyl (RD)	70,184	247	0.35	30	Yes
Lactofen	5,640	0	0.00	5	
Lambda-cyhalothrin (RD)	56,016	1,317	2.35	30	Yes
Lenacil	30,841	13	0.04	17	
Leptophos	8,690	0	0.00	11	
Lindane	63,176	19	0.03	30	Yes
Linuron	66,681	423	0.63	30	Yes
Lufenuron	59,390	61	0.10	29	Yes
MCPA (RD)	27,645	24	0.09	16	
Malathion (RD)	67,509	105	0.16	29	Yes
Maleic hydrazide (RD)	4,625	77	1.66	8	
Mandipropamid	61,407	448	0.73	30	Yes
Mecarbam	50,855	1	0.00	28	
Mecoprop	15,596	0	0.00	15	
Medinoterb	10	0	0.00	1	
Mefenacet	7,755	0	0.00	8	
Mefluidide	4,376	0	0.00	3	
Mepanipyrim	66,824	187	0.28	29	Yes
Mephosfolan	10,343	0	0.00	9	
Mepiquat	9,841	229	2.33	26	Yes
Mepronil	34,943	0	0.00	21	
Meptyldinocap (RD)	10,054	12	0.12	9	
Mercury	1,635	197	12.05	1	
Merphos	10	0	0.00	1	
Mesosulfuron	11,487	0	0.00	11	
Mesotrione (RD)	6,895	0	0.00	10	
Metaflumizone	45,244	23	0.05	25	
Metalaxyl	55,359	1,129	2.04	28	Yes
Metaldehyde	9,402	12	0.13	5	
Metamitron	42,526	14	0.03	21	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Metazachlor (RD)	13,113	0	0.00	15	
Metconazole	58,372	8	0.01	29	
Methabenzthiazuron	26,675	2	0.01	14	
Methacrifos	41,333	3	0.01	27	
Methamidophos	67,216	37	0.06	30	Yes
Methazole	225	0	0.00	2	
Methfuroxam	10	0	0.00	1	
Methidathion	73,844	21	0.03	30	Yes
Methiocarb (RD)	66,617	67	0.10	30	Yes
Methomyl (RD)	60,192	65	0.11	29	Yes
Methoprene	3,141	0	0.00	9	
Methoprotryne	8,962	0	0.00	9	
Methothrin	10	0	0.00	1	
Methoxychlor	57,141	2	0.00	30	Yes
Methoxyfenozide	66,377	638	0.96	30	Yes
Methyldymron	10	0	0.00	1	
Metobromuron	49,719	5	0.01	27	
Metolachlor	17,645	0	0.00	16	
Metolcarb	13,267	0	0.00	10	
Metominostrobin	4,264	1	0.02	3	
Metosulam	18,653	0	0.00	13	
Metoxuron	22,692	0	0.00	18	
Metrafenone	51,500	548	1.06	26	
Metribuzin	57,532	14	0.02	29	
Metsulfovax	10	0	0.00	1	
Metsulfuron	10	0	0.00	1	
Metsulfuron-methyl	22,665	0	0.00	16	
Mevinphos (RD)	55,629	0	0.00	27	
Milbemectin (RD)	7,380	0	0.00	4	
Mirex	14,858	0	0.00	14	
Molinate	24,497	0	0.00	16	
Monalide	6,583	0	0.00	4	
Monocrotophos	67,688	7	0.01	29	Yes
Monolinuron	28,630	0	0.00	19	
Monuron	13,835	0	0.00	10	
Myclobutanil (RD)	70,241	1,131	1.61	30	Yes
Nabam	10	0	0.00	1	
Naled	12,230	0	0.00	8	
Naphthalene	10	0	0.00	1	
Napropamide	36,382	8	0.02	19	
Naptalam	5,227	0	0.00	4	
Neburon	7,997	1	0.01	11	
Niclosamide	10	0	0.00	1	
Nicosulfuron	17,101	1	0.01	14	
Nicotine	2,015	38	1.89	4	
Nitenpyram	49,489	2	0.00	28	
Nithiazine	10	0	0.00	1	
Nitralin	5,796	0	0.00	8	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Nitrapyrin	5,454	0	0.00	4	
Nitrofen	42,372	1	0.00	28	
Nitrothal-Isopropyl	15,869	0	0.00	12	
Norflurazon	6,184	0	0.00	10	
Noruron	10	0	0.00	1	
Novaluron	27,438	15	0.05	16	
Noviflumuron	2,480	0	0.00	2	
Nuarimol	36,133	0	0.00	21	
Octhilinone	28	0	0.00	2	
Ofurace	22,150	0	0.00	13	
Orbencarb	3,706	0	0.00	4	
Orthosulfamuron	713	0	0.00	2	
Oryzalin	7,774	0	0.00	4	
Oxadiargyl	14,502	0	0.00	10	
Oxadiazon	34,429	9	0.03	17	
Oxadixyl	67,169	6	0.01	30	Yes
Oxamyl	64,020	13	0.02	28	Yes
Oxasulfuron	7,984	0	0.00	8	
Oxaziclomefone	29	0	0.00	2	
Oxycarboxin	13,179	0	0.00	12	
Oxydemeton-methyl (RD)	56,499	1	0.00	26	Yes
Oxyfluorfen	35,054	33	0.09	18	
Paclobutrazol	65,164	18	0.03	30	Yes
Paraquat	552	3	0.54	7	
Parathion	73,148	6	0.01	29	Yes
Parathion-methyl (RD)	61,160	0	0.00	28	Yes
Pebulate	7,050	0	0.00	9	
Penconazole	72,196	516	0.71	30	Yes
Pencycuron	68,009	73	0.11	30	Yes
Pendimethalin	71,864	348	0.48	30	Yes
Penflufen	5,190	0	0.00	8	
Penfluron	4,146	0	0.00	2	
Penoxsulam	9,924	0	0.00	7	
Pentachlorophenol	7,123	2	0.03	7	
Pentanochlor	7,079	0	0.00	7	
Penthiopyrad	14,381	8	0.06	11	
Perfluidone	10	0	0.00	1	
Permethrin	69,936	105	0.15	30	Yes
Pethoxamid	17,420	0	0.00	14	
Phenkapton	4,417	0	0.00	5	
Phenmedipham (RD)	39,431	27	0.07	20	
Phenothrin	10,812	0	0.00	13	
Phenthoate	61,916	11	0.02	30	
Phorate (RD)	36,387	5	0.01	23	
Phosalone	70,379	8	0.01	30	
Phosfolan	3,833	0	0.00	6	
Phosmet (RD)	61,501	328	0.53	30	Yes
Phosphamidon	45,198	1	0.00	26	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Phosphines and phosphides (RD)	89	1	1.12	2	
Phoxim	54,246	3	0.01	29	
Picloram	5,824	0	0.00	11	
Picolinafen	26,720	0	0.00	18	
Picoxystrobin	45,378	14	0.03	23	
Pinoxaden	8,918	0	0.00	11	
Piperalin	10	0	0.00	1	
Piperophos	1,641	0	0.00	5	
Pirimicarb (RD)	72,227	768	1.06	29	Yes
Pirimiphos-ethyl	39,382	0	0.00	24	
Pirimiphos-methyl	75,446	669	0.89	30	Yes
Prallethrin	172	0	0.00	3	
Pretilachlor	5,237	0	0.00	8	
Primisulfuron	1,120	0	0.00	2	
Primisulfuron-Methyl	4,039	0	0.00	6	
Probenazole	4,073	1	0.02	2	
Prochloraz (RD)	39,526	483	1.22	25	
Procymidone (RD)	68,014	31	0.05	30	Yes
Profenofos	72,761	104	0.14	30	Yes
Profluralin	13,779	0	0.00	10	
Profoxydim	6,540	0	0.00	5	
Prohexadione	3,816	3	0.08	3	
Promecarb	36,292	3	0.01	16	
Prometon	7,098	0	0.00	10	
Prometryn	42,647	3	0.01	24	
Propachlor	21,115	2	0.01	17	
Propamocarb (RD)	62,428	1,591	2.55	29	Yes
Propanil	22,925	1	0.00	16	
Propaphos	2,499	0	0.00	3	
Propaquizafop	30,111	0	0.00	20	
Propargite	70,444	173	0.25	30	Yes
Propazine	22,339	0	0.00	17	
Propetamphos	21,609	0	0.00	15	
Propham	41,920	0	0.00	26	
Propiconazole	71,957	838	1.16	30	Yes
Propineb	224	0	0.00	2	
Propisochlor	1,184	0	0.00	2	
Propoxur	56,224	14	0.02	29	
Propoxycarbazone (RD)	7,515	0	0.00	6	
Propyl-3-t-butylphenoxyacetate	10	0	0.00	1	
Propyzamide (RD)	67,473	83	0.12	30	Yes
Proquinazid	45,827	56	0.12	23	
Prosulfocarb	44,147	136	0.31	23	
Prosulfuron	13,957	0	0.00	12	
Prothiocarb	1,332	0	0.00	1	
Prothioconazole (RD)	55,603	67	0.12	28	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Prothiofos	58,658	4	0.01	29	
Prothoate	4,075	0	0.00	2	
Pymetrozine (RD)	59,716	254	0.43	29	Yes
Pyracarbolid	1,194	0	0.00	4	
Pyraclofos	6,110	0	0.00	8	
Pyraclostrobin	69,180	3,024	4.37	30	Yes
Pyraflufen-ethyl (RD)	5,059	0	0.00	7	
Pyrasulfotole	43	0	0.00	2	
Pyrazophos	59,145	1	0.00	28	
Pyrazoxyfen	418	0	0.00	3	
Pyrethrins	33,267	43	0.13	27	
Pyributicarb	5,335	0	0.00	4	
Pyridaben	70,467	518	0.74	30	Yes
Pyridafol	1,168	0	0.00	1	
Pyridalyl	20,261	31	0.15	12	
Pyridaphenthion	42,801	0	0.00	22	
Pyridate (RD)	14,191	1	0.01	13	
Pyridinitril	10	0	0.00	1	
Pyrifenox	42,524	0	0.00	21	
Pyriftalid	29	0	0.00	2	
Pyrimethanil (RD)	70,834	2,921	4.12	30	Yes
Pyrimidifen	9,737	0	0.00	7	
Pyriminobac-Methyl	29	0	0.00	2	
Pyriofenone	1,499	0	0.00	5	
Pyriproxyfen	69,830	885	1.27	30	Yes
Pyrithiobac	10	0	0.00	1	
Pyroquilon	6,218	0	0.00	8	
Pyroxsulam	8,341	0	0.00	11	
Quassia	2,192	0	0.00	1	
Quinalphos	58,545	10	0.02	28	
Quinclorac	14,490	0	0.00	13	
Quinmerac	16,591	0	0.00	12	
Quinoclamine	12,386	0	0.00	10	
Quinoxyfen	70,135	261	0.37	30	Yes
Quintozene (RD)	46,030	5	0.01	24	
Quizalofop	12,474	8	0.06	13	
Rabenzazole	2,484	0	0.00	2	
Resmethrin	18,414	1	0.01	22	
Rimsulfuron	24,176	0	0.00	19	
Rotenone	44,493	3	0.01	27	
Saflufenacil (RD)	52	0	0.00	1	
Schradan	2,480	0	0.00	2	
Sebuthylazine	6,655	0	0.00	9	
Secbumeton	2,639	0	0.00	8	
Sedaxane	1,482	0	0.00	1	
Siduron	5,929	0	0.00	6	
Silafluofen	6,936	0	0.00	9	
Silthiofam	15,593	0	0.00	10	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Simazine	43,274	0	0.00	25	
Simeconazole	29	0	0.00	2	
Simetryn	3,406	0	0.00	7	
Sodium tetrathiocarbonate	10	0	0.00	1	
Spinetoram	18,374	47	0.26	9	
Spinosad	65,217	1,210	1.86	30	Yes
Spirodiclofen	63,005	242	0.38	29	Yes
Spiromesifen	57,819	464	0.80	30	Yes
Spirotetramat (RD)	30,624	555	1.81	15	
Spiroxamine (RD)	68,587	181	0.26	29	Yes
Streptomycin	179	0	0.00	2	
Sulcotrione	12,307	0	0.00	8	
Sulfallate	28	0	0.00	2	
Sulfentrazone	5,089	0	0.00	10	
Sulfometuron-Methyl	29	0	0.00	2	
Sulfosulfuron	5,585	0	0.00	9	
Sulfotep	40,737	1	0.00	22	
Sulfoxaflor	3,101	1	0.03	5	
Sulfuryl fluoride	10	0	0.00	1	
Sulfur	425	0	0.00	3	
Sulprofos	9,452	0	0.00	12	
Tau-fluvalinate	66,986	66	0.10	29	Yes
TCMTB	2,766	0	0.00	6	
TEPP	4,849	0	0.00	6	
Tebuconazole (RD)	71,309	3,147	4.41	30	Yes
Tebufenozide	66,424	124	0.19	30	Yes
Tebufenpyrad	70,298	266	0.38	30	Yes
Tebupirimphos	1,015	0	0.00	5	
Tebutam	3,745	0	0.00	6	
Tebuthiuron	4,290	0	0.00	6	
Tecloftalam	4,146	0	0.00	2	
Tecnazene	50,625	1	0.00	28	
Teflubenzuron	58,340	33	0.06	29	Yes
Tefluthrin	65,127	24	0.04	29	Yes
Tembotrione (RD)	14,350	0	0.00	6	
Temephos	2,193	0	0.00	6	
Tepraloxydim	25,487	4	0.02	11	
Terbacil	13,779	0	0.00	12	
Terbucarb	2,038	0	0.00	3	
Terbufos	37,727	0	0.00	24	
Terbumeton	12,249	0	0.00	12	
Terbuthylazine	66,307	33	0.05	30	Yes
Terbutryn	41,387	0	0.00	21	
Tetrachlorvinphos	29,174	0	0.00	20	
Tetraconazole	72,593	309	0.43	30	Yes
Tetradifon	67,719	7	0.01	30	Yes
Tetramethrin	48,847	9	0.02	27	
Tetrasul	11,075	0	0.00	8	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Thenylchlor	3,647	0	0.00	3	
Thiabendazole (RD)	67,387	2,423	3.60	29	Yes
Thiacloprid	70,614	1,706	2.42	30	Yes
Thiamethoxam (RD)	76,162	1,050	1.38	29	Yes
Thiazafluron	11	0	0.00	2	
Thiazopyr	2,491	0	0.00	3	
Thidiazuron	3,854	0	0.00	5	
Thiencarbazone	1,880	0	0.00	3	
Thifensulfuron	183	0	0.00	3	
Thifensulfuron-methyl	20,284	0	0.00	14	
Thifluzamide	29	0	0.00	2	
Thiobencarb	17,855	1	0.01	11	
Thiocyclam	5,373	0	0.00	6	
Thiofanox	5,592	0	0.00	8	
Thiometon	24,013	0	0.00	17	
Thionazin	8,787	0	0.00	12	
Thiophanate-ethyl	2,687	0	0.00	6	
Thiophanate-methyl (RD)	61,564	487	0.79	30	Yes
Thioquinox	10	0	0.00	1	
Thiosultap sodium	2,470	0	0.00	1	
Thiram	423	0	0.00	3	
Thymol	10	0	0.00	1	
Tiocarbazil	4,722	0	0.00	6	
Tolclofos-methyl	70,440	44	0.06	30	Yes
Tolfenpyrad	11,607	16	0.14	12	
Tolylfluanid (RD)	54,776	4	0.01	27	Yes
Topramezone	3,986	0	0.00	5	
Tralkoxydim	14,895	0	0.00	11	
Tralomethrin	2,712	0	0.00	6	
Transfluthrin	7,365	0	0.00	11	
Tri-allate	31,191	4	0.01	19	
Triadimenol (RD)	68,714	722	1.05	30	Yes
Triamiphos	1,917	0	0.00	4	
Triapenthenol	1,398	0	0.00	2	
Triasulfuron	12,808	0	0.00	15	
Triazamate	12,597	1	0.01	10	
Triazophos	73,720	41	0.06	30	Yes
Triazoxide	4,757	0	0.00	4	
Tribenuron	10	0	0.00	1	
Tribenuron-methyl	8,760	0	0.00	13	
Tribufos	2,375	0	0.00	3	
Trichlamide	2,480	0	0.00	2	
Trichlorfon	53,411	7	0.01	29	
Trichloronat	17,545	0	0.00	10	
Triclopyr	23,706	7	0.03	16	
Tricyclazole	50,047	173	0.35	28	
Tridemorph	6,897	0	0.00	8	
Tridiphane	1,603	0	0.00	2	

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2016 EUCP
Trietazine	2,484	0	0.00	4	
Trifloxystrobin (RD)	71,033	1,423	2.00	30	Yes
Trifloxysulfuron	4,145	0	0.00	3	
Triflumizole (RD)	31,518	36	0.11	14	
Triflumuron	59,800	60	0.10	30	Yes
Trifluralin	62,594	9	0.01	30	
Triflusulfuron	1,652	0	0.00	3	
Triflusulfuron-Methyl	10,698	1	0.01	7	
Triforine	31,513	0	0.00	21	
Trimethacarb	3,580	0	0.00	5	
Trimethyl-sulfonium cation	3,332	61	1.83	4	
Trinexapac	8,936	32	0.36	8	
Trinexapac-Ethyl	8,337	0	0.00	9	
Triticonazole	58,040	1	0.00	30	
Tritosulfuron	13,711	0	0.00	9	
Uniconazole	4,865	0	0.00	8	
Validamycin	10	0	0.00	1	
Valifenalate	13,259	3	0.02	9	
Vamidothion	30,517	0	0.00	25	
Vernolate	2,480	0	0.00	2	
Vinclozolin	56,861	6	0.01	28	Yes
Warfarin	385	0	0.00	2	
XMC	2,480	0	0.00	2	
Ziram	373	0	0.00	3	
Zoxamide	62,050	100	0.16	29	

LOQ: limit of quantification; RD: residue definition.

Table C.2: Food to be analysed in 2016 according to Regulation (EC) No 669/2009 on import controls

Country of origin	Food	Food name (code) in food classification under Reg. 396/2005[(a)]
Cambodia	Aubergines	
	Chinese celery (*Apium graveolens*)	Celery leaves (0256030)
	Yardlong beans (*Vigna unguiculata* subsp. *sesquipedalis*)	Beans with pods (0260010)
China	Broccoli	
	Tea leaves, whether or not flavoured	
Dominican Republic	Aubergines	
	Bitter melon (*Mormodica charantia*)	Courgettes (0232030)
	Peppers (*Capsicum* spp.)	
	Yardlong beans (*Vigna unguiculata* subsp. *sesquipedalis*)	Beans with pods (0260010)
Egypt	Peppers (*Capsicum* spp.)	
	Strawberries	
Kenya	Peas with pods	
Thailand	Aubergines	
	Peppers (*Capsicum* spp.)	
	Yardlong beans (Vigna unguiculata subsp. sesquipedalis)	Beans with pods (0260010)
Turkey	Lemons	
	Peppers (*Capsicum* spp.)	
	Vine leaves	
Vietnam	Basil (holy, sweet)	
	Coriander leaves	Celery leaves (0256030)
	Dragon fruit (Pitayas)	Prickly pears/cactus fruits (0162040)
	Mint	Basil (0256080)
	Okra	Okra/lady's finger
	Parsley	
	Peppers (*Capsicum* spp.)	

(a): Corresponding name in the food classification under Regulation (EC) No 396/2005 (only if the food product to be analysed under Regulation 669/2005 is not listed in Annex I, Part A of Regulation 212/2013).

Appendix D – Background information and detailed results on dietary risk assessment

Table D.1: New toxicological reference values for compounds included in the 2016 EUCP, compared to the values reported in the 2015 EU report on pesticide residues in food (EFSA, 2017a–d)

Pesticide	ADI (mg/kg bw per day)	Year	Source	ARfD (mg/kg bw)	Year	Source
Propargite	0.03	2018	EFSA	0.06	2018	EFSA
Iprodione	0.02	2017	EFSA	0.06	2017	EFSA
Mepanipyrim	0.012	2017	EFSA	0.1	2017	EFSA
Methoxyfenozide	0.1	2017	EFSA	0.1	2017	EFSA
Propiconazole	0.04	2017	EFSA	0.1	2017	EFSA
Trifloxystrobin	0.1	2017	EFSA	0.5	2017	EFSA

ADI: acceptable daily intake; bw: body weight; ARfD: acute reference dose.

Results of short-term dietary risk assessment for food products in focus of the EUCP, expressed as percentage of the ARfD

In the following figures,[60] the short-term exposure calculated for each sample with residues above the LOQ was presented individually, expressing the result as percentage of the ARfD. The blue dots refer to results reported under the EUCP, whereas the orange dots refer to findings in samples that were analysed in the framework of the national control programmes. The figures in brackets next to the name of the pesticides represent the number of samples with residues below the LOQ, number of samples with quantified residues below the MRL, and the number of samples with residues above the MRL.

[60] In the following figures, there are some cases where the ARfD was exceeded, while the samples were still within the MRL. Some of these cases are related to ARfD values recently amended. However, for the other cases, risk managers should be aware that it is caused of the difference of HR/MRL.

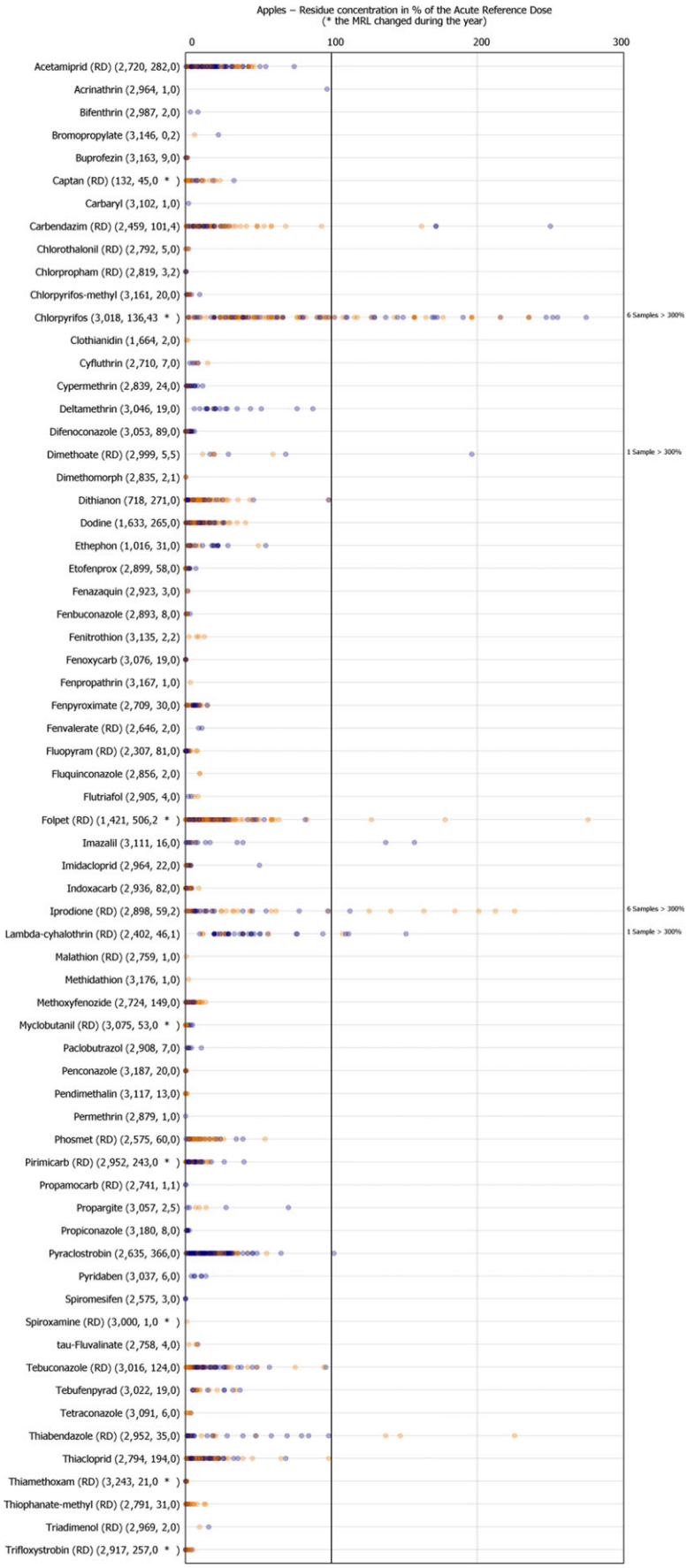


Figure D.1: Short-term dietary exposure assessment – apples

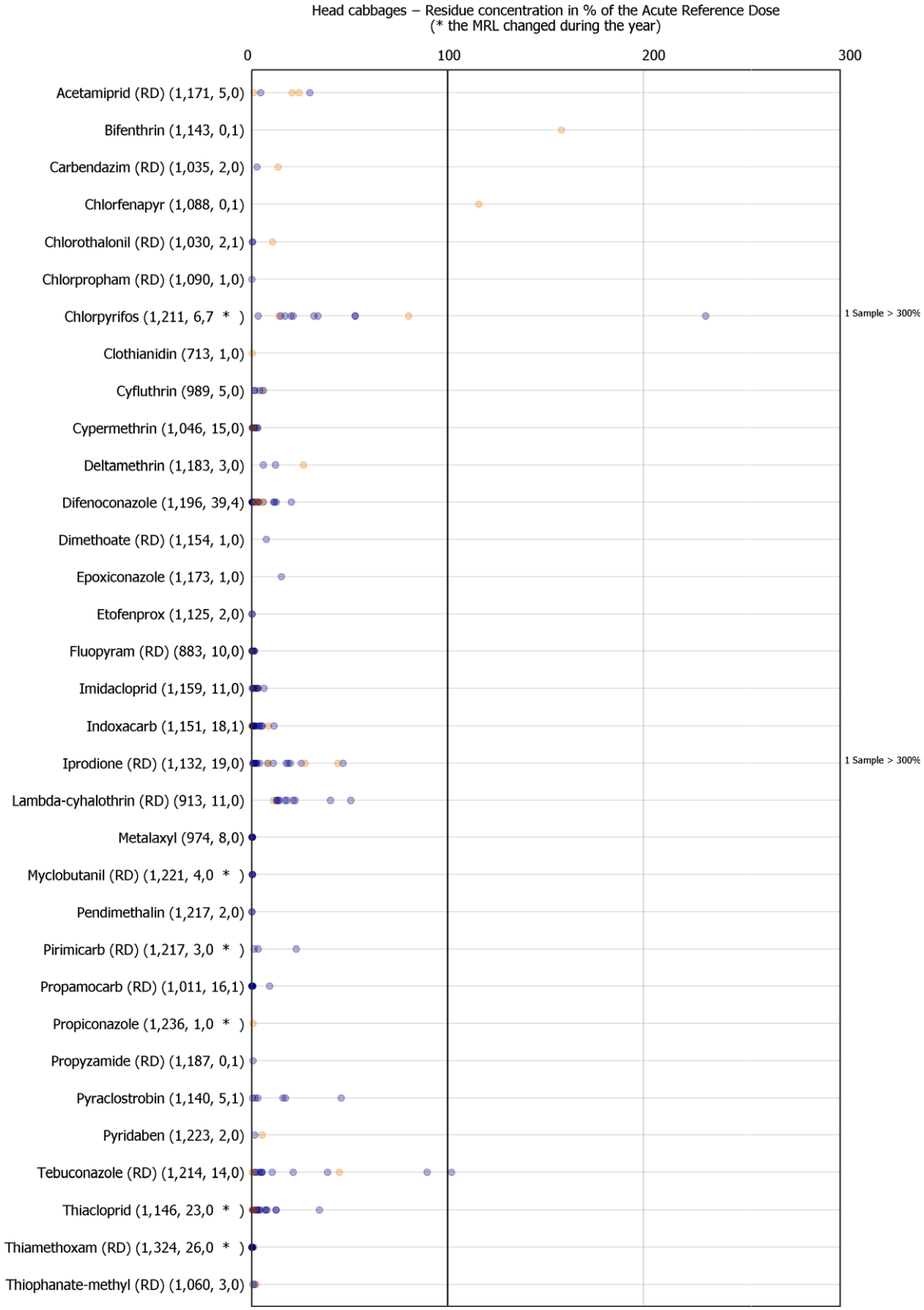


Figure D.2: Short-term dietary exposure assessment – head cabbage

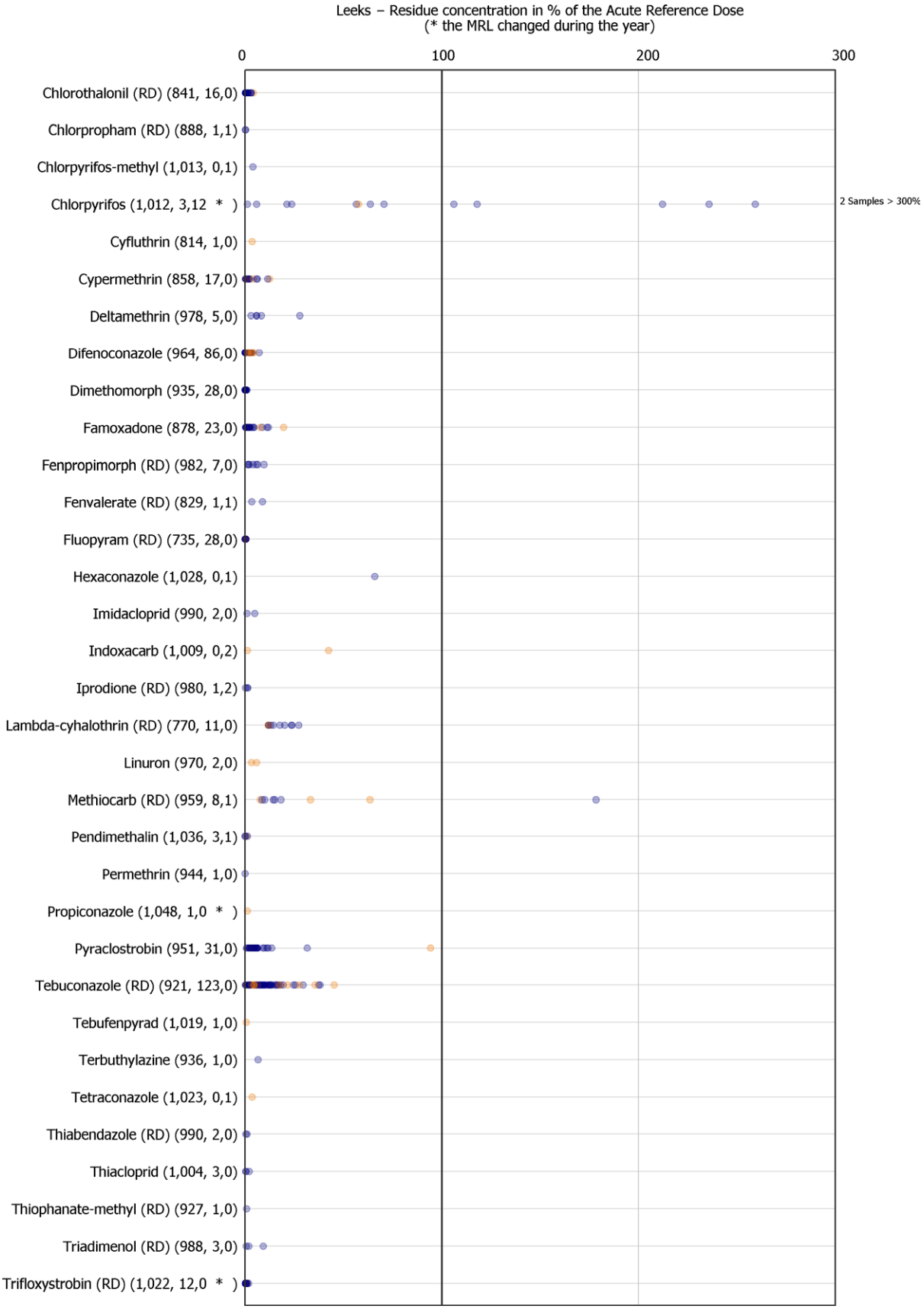


Figure D.3: Short-term dietary exposure assessment – leek

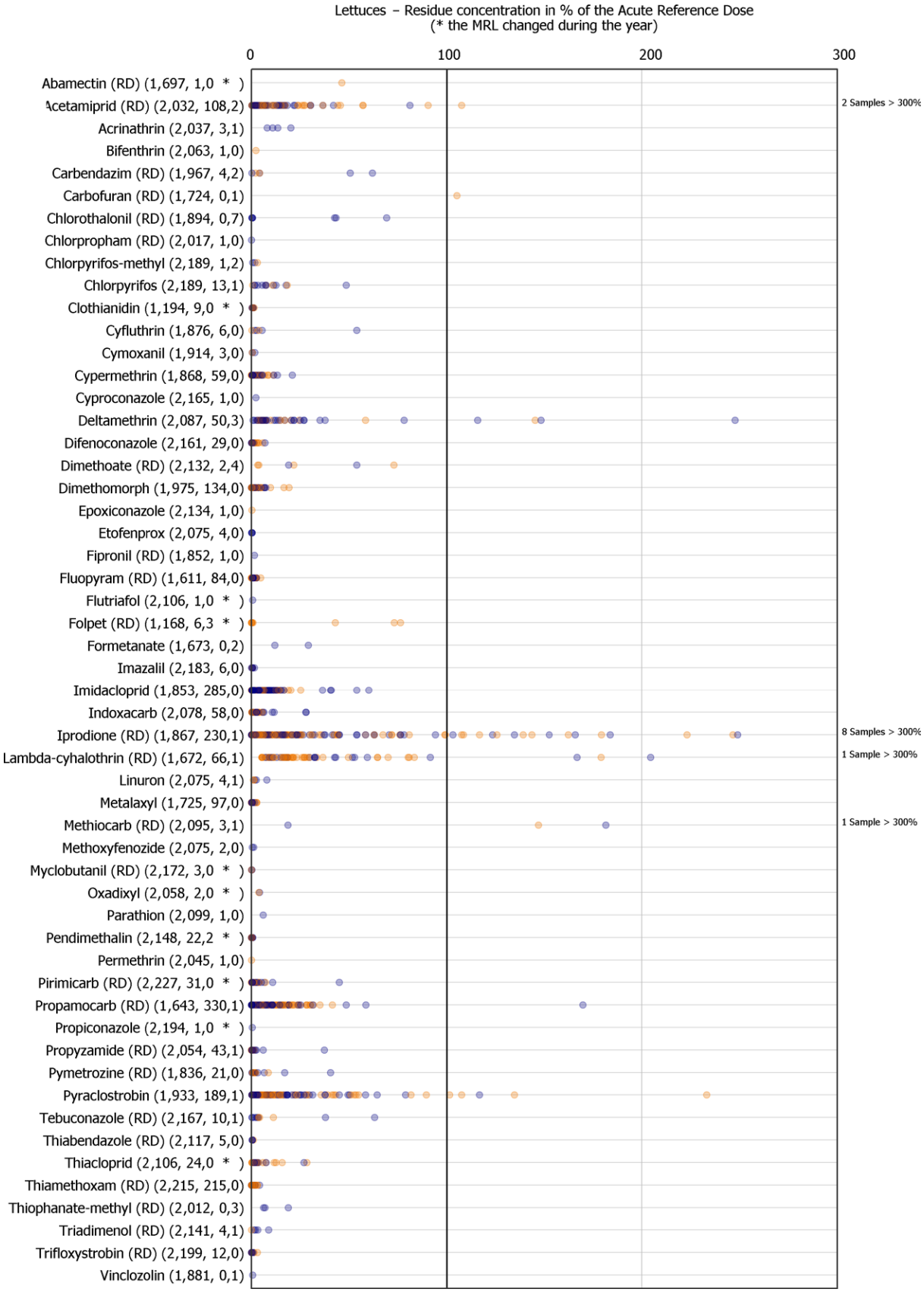


Figure D.4: Short-term dietary exposure assessment – lettuce

Figure D.5: Short-term dietary exposure assessment – peaches

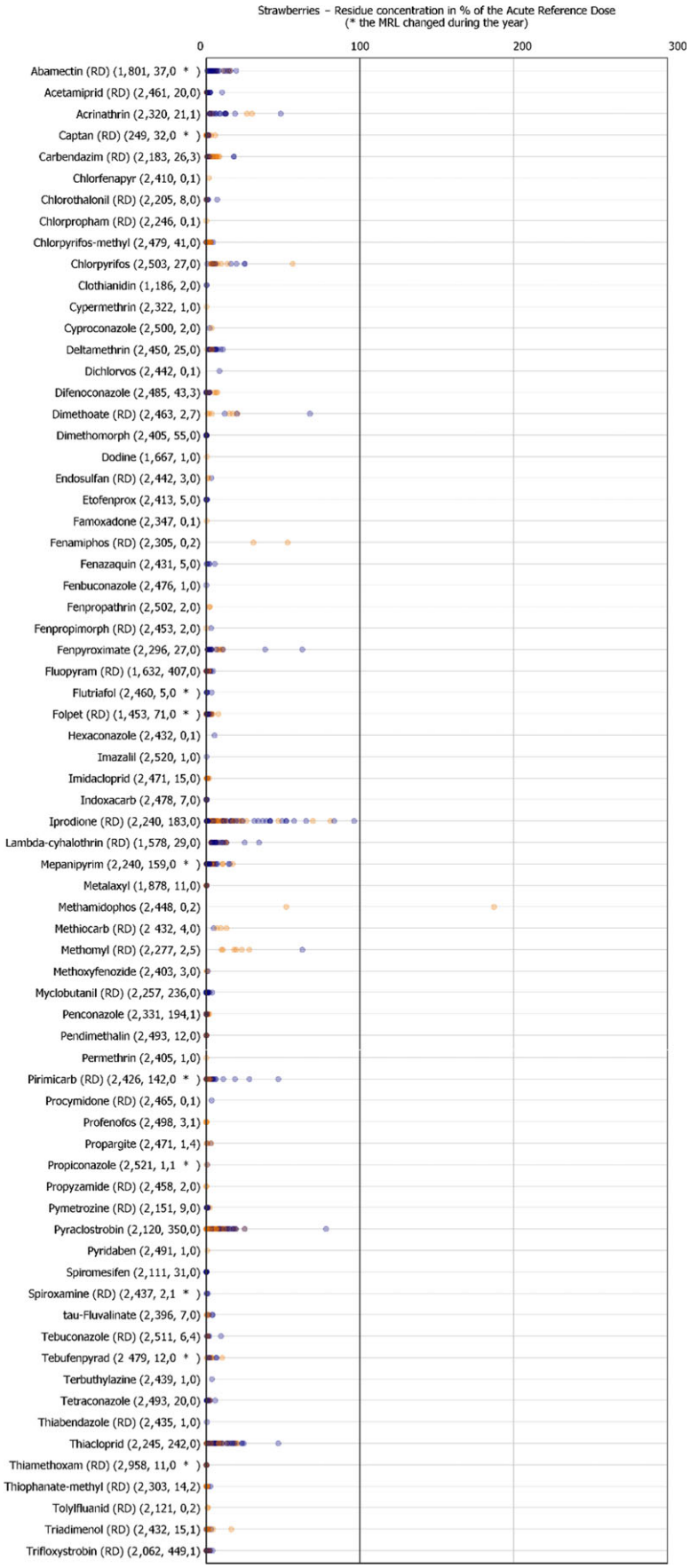
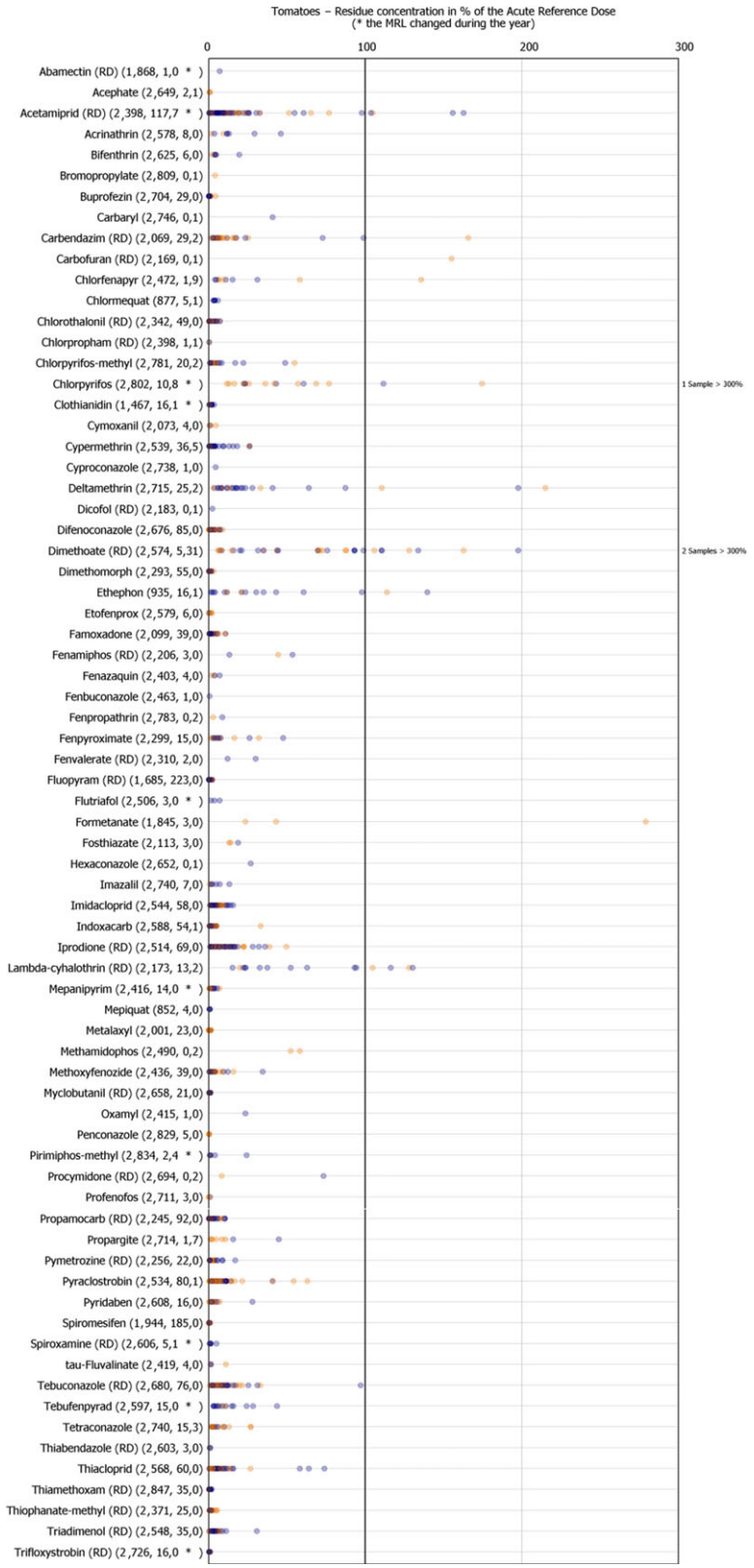


Figure D.6: Short-term dietary exposure assessment – strawberries



(a): The existing MRL for tomatoes seems not to be sufficiently protective. With a concentration value of 0.24 mg/kg that is below the MRL of 0.3, the exposure accounts for 279% of the ARfD. In the MRL review (Art. 12, a HR of 0.12 was used for the acute risk assessment, with no exceedance of the ARfD. Also for deltamethrin, there might be a similar case.

Figure D.7: Short-term dietary exposure assessment – tomatoes[(a)]

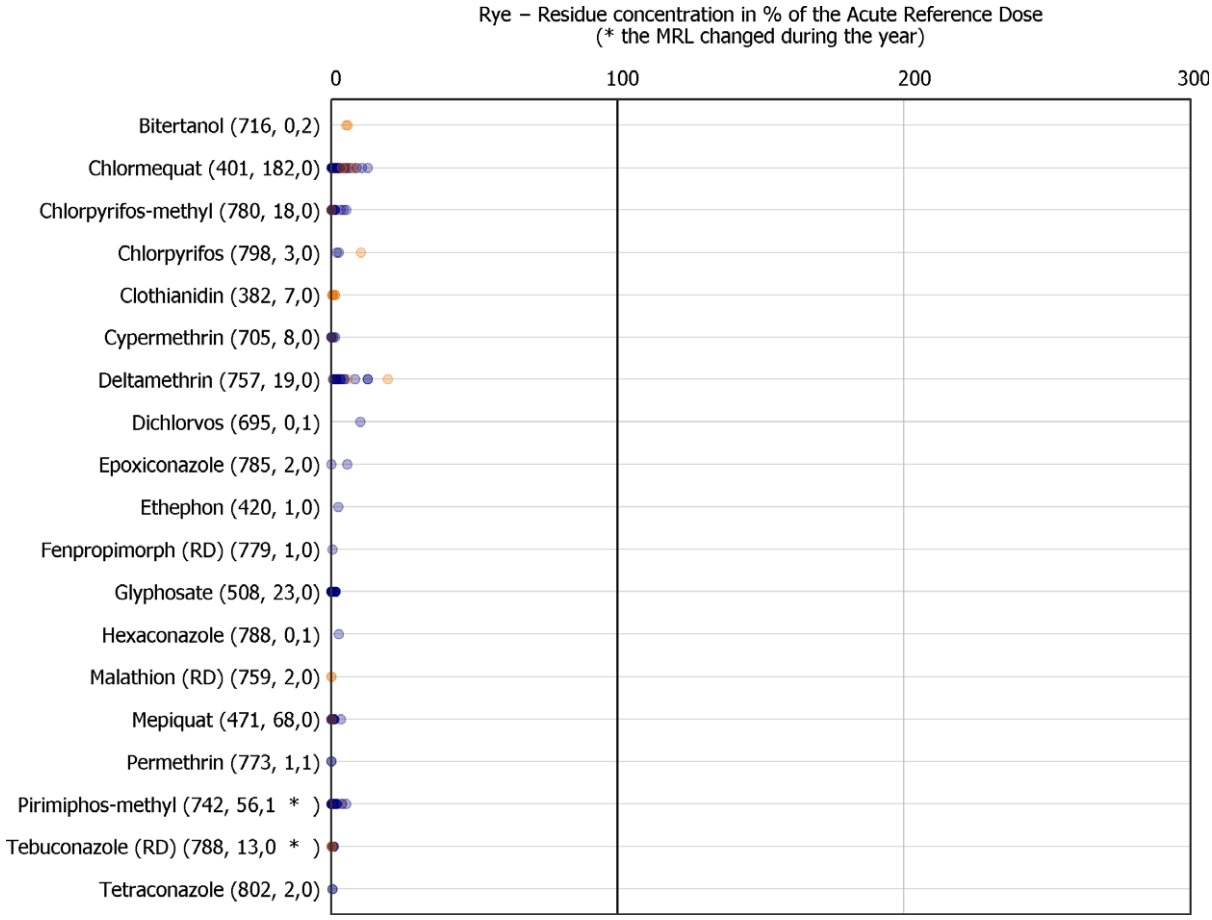


Figure D.8: Short-term dietary exposure assessment – rye

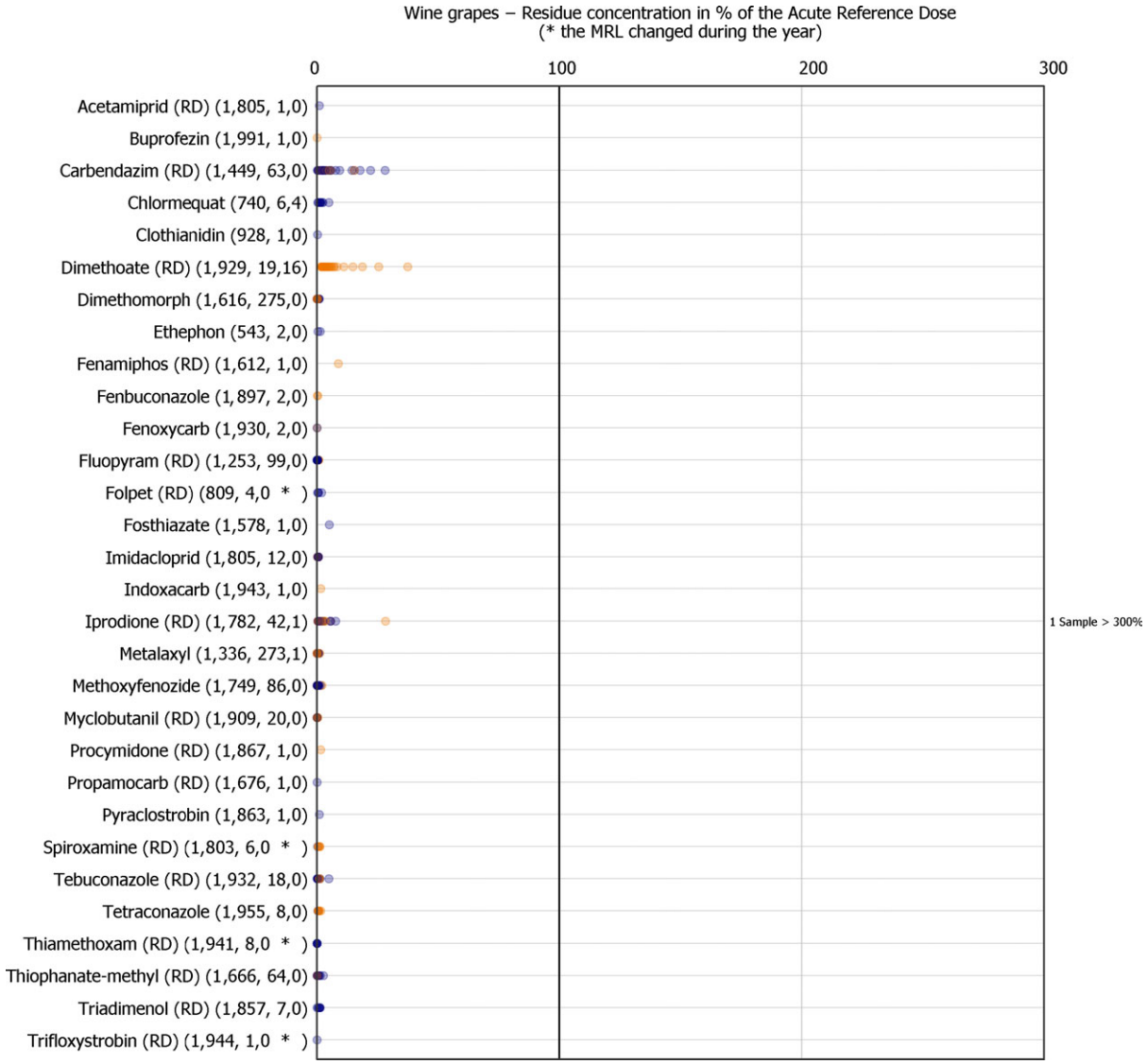


Figure D.9: Short-term dietary exposure assessment – wine

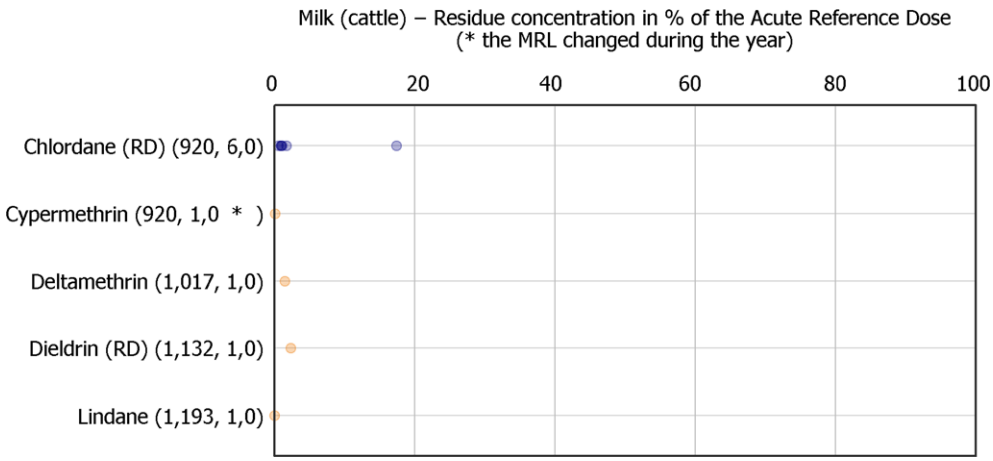


Figure D.10: Short-term dietary exposure assessment – cow's milk

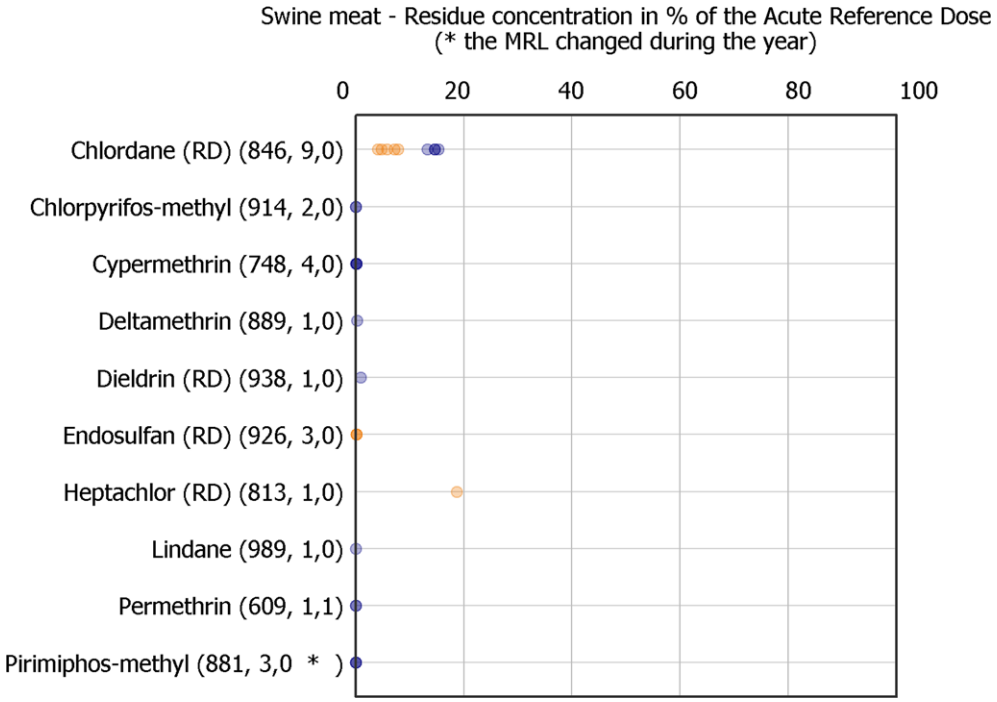


Figure D.11: Short-term dietary exposure assessment – swine fat (recalculated to swine meat)

Supporting information

A: ALL Consultation 2016 EU Report Pesticide Residues
B: PRIMo 2016 monitoring results risk assessment
C: Supplement MRL 2016 exceedances