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The 2015 European Union report on pesticide residues in food

European Food Safety Authority

Abstract

This report provides a detailed insight in the official control activities performed by EU Member States, Iceland and Norway. Overall, 97.2% of the 84,341 samples analysed in 2015 were free of quantifiable residues or contained residues within the legally permitted levels. 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. Moreover, the data were analysed with view to identify pesticides and food products that exceeded the legal limits. It also contains the findings on pesticide residues in imported food, organic products, baby food as well as results for animal products. Based on the analysis of the 2015 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.

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

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Summary

This report provides an overview on the 2015 official control activities of EU Member States, Iceland and Norway. It summarises the results of the 2015 EU-coordinated control programme (EUCP) and the results of national control programmes. While the national control programmes are mostly risk based, often focussing on certain types of products, pesticides or products originating from countries where in the past an increased number of violations was observed, the EUCP aims to retrieve a representative snapshot of the residue situation of food products available to consumers. Moreover, the outcome of the dietary risk assessment based on the results derived in the EUCP is presented in this report.

The comprehensive analysis of the results of all reporting countries provides risk managers with a scientifically sound basis for taking appropriate risk management actions for designing future monitoring programmes efficiently, in particular decisions on which pesticides and food products should be targeted in risk-based national monitoring programmes or other necessary risk management measures, such as the need to review or modify existing legal limits, to guarantee a high level of consumer protection. Because the results of pesticide residue analysis are available only after most of the products have been already consumed, this report is not a tool for informing the public on imminent risks related to food.

In 2015, the reporting countries analysed 84,341 samples for 774 different pesticides. On average, 220 pesticides were analysed per sample. The majority of the samples (58,448 samples, 69.3%) originated from the EU and EEA/EFTA states; 21,747 samples (25.8%) concerned products imported from third countries. For 4,146 samples (4.9%), the origin of the products was not reported.

Overall, 97.2% of the samples analysed (EUCP and national programmes) fell within the legal limits i.e. the measured levels did not exceed the maximum residue levels (MRLs) permitted in the EU legislation; 53.3% of the samples tested were free of quantifiable residues (residue levels below the limit of quantification, LOQ) while 43.9% of the samples analysed contained quantified residues not exceeding the MRLs. In 2.8% of the samples, the residue levels exceeded the MRLs (2,366 samples).[1] Taking into account the measurement uncertainty, 1.6% of the samples (1,346 samples) clearly exceeded these legal limits (non-compliance) triggering legal or administrative actions by competent authorities. The results of 2015 are comparable with the previous year (2014: 97.1% of samples within the legal limits; 53.6% free of quantifiable residues).

In the framework of the 2015 EUCP under Regulation (EC) No 400/2014, reporting countries analysed 10,884 samples of 11 different food products (aubergines, bananas, broccoli, virgin olive oil, orange juice, peas without pods, sweet peppers, table grapes, wheat, butter and eggs). The EUCP covered 164 pesticides (156 in food of plant origin and 22 in food of animal origin). Overall, 0.8% of the samples exceeded the MRLs (89 samples) with 0.4% of the samples being not compliant with the legal limits (44 samples) taking into account the measurement uncertainty. The number of samples with quantified residue levels not exceeding the MRLs was 4,145 (38.1%). In 61.1% of the samples (6,650 samples), no quantifiable residues were found (residues below the LOQ).

<u>Detailed results of the EU-coordinated control programme (EUCP)</u>:

Among the unprocessed plant products analysed in the 2015 EUCP, the highest MRL exceedance rate was identified for broccoli (3.4% of the samples), followed by table grapes (1.7%), sweet peppers (0.8%), peas without pods (0.6%), wheat (0.6%), aubergines (0.4%) and bananas (0.3%). Rare MRL exceedances were found for processed plant products (i.e. olive oil and orange juice) and chicken eggs. No MRL exceedance was identified for butter.

Samples containing more than one pesticide in quantifiable concentrations (multiple residues) were found for all food products analysed in the framework of the EUCP. The foods with the highest percentage of samples with multiple residues were bananas (58.4%), table grapes (58.3%) and sweet peppers (24.4%). Lower occurrence frequencies were observed for broccoli (14.8%), wheat (14.3%),

[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%.

aubergines (10.5%), peas without pods (9.5%), orange juice (5.6%) and olive oil (4.2%). The presence of multiple residues was low in animal products, i.e. butter (3.7%) and eggs (2.1%).

All food products of the 2015 EUCP were also analysed in 2012. Overall, the MRL exceedance rate in 2015 was in the same range as in 2012: 0.9% in 2012 versus 0.8% in 2015. Considering the individual food products separately, a slight decrease in the MRL exceedance rate was noted for aubergines, bananas and sweet peppers, while for broccoli, peas without pods and eggs, a slight increase of the percentage of samples with residue above the legal limit was noted. For the other food products, the frequency of MRL exceedance is similar.

Detailed results of all monitoring programmes (EUCP and national control programmes):

A detailed analysis of the national control programmes revealed the different scopes of the national MRL enforcement strategies, in particular as regards the types and origin of products to be tested, the pesticides analysed and the number of samples taken. Overall, they provide a comprehensive overview on the pesticide residues in food placed on the European market.

Among the samples from third countries, MRLs were exceeded in 5.6% of the samples; for 3.4% of the samples, the legal limit was clearly exceeded taking into account the measurement uncertainty. Products from the EU and EEA countries were found to have lower MRL exceedance and non-compliance rates (1.7% of the samples contained residues that exceeded the MRL; 0.9% of the samples clearly exceeded the MRL taking into account the measurement uncertainty). Compared with 2014, the MRL exceedance rate for imported food products slightly decreased (2014: 6.5%); for products produced in the EU or EEA countries, the situation was similar (2014: 1.6%). While 56.2% of the EU/EEA samples analysed in 2015 were free of quantifiable residues, the result was lower for samples from third countries (44.3%).

In unprocessed products, MRL exceedances were observed for 3% of the samples; 46.9% of the samples contained quantified residues within the legal limits and 50.1% of the unprocessed products were free of quantifiable residues. Processed products had a lower occurrence of quantified residues and MRL exceedances rate, respectively 25.6% and 1.4% of processed samples.

Residues of more than one pesticide (multiple residues) were found in 28% of the samples (23,652 samples). This frequency is similar to the result of 2014 (28.3%).

Among the 3,170 individual determinations that exceeded the legal limit, 1,166 determinations were reported for pesticides that are currently not approved in the EU. In most cases, these MRL exceedances for non-approved pesticides were related to imported products (760 cases) while for products produced in the EU and EEA countries MRL exceedances with non-approved pesticides occurred less frequently (322 results). The rest (84 cases) were found in samples where the sample origin was not reported.

In total, 8,091 consignments of products covered by Regulation (EC) No 669/2009 on increased level of official import controls were selected for laboratory analyses.[2] Overall, 303 of these consignments (3.7%) were considered as non-compliant with EU legislation on pesticide residues, taking into account the measurement uncertainty.

Overall, 1,546 samples of food intended for infants and young children were analysed in 2015. In 89% of the samples, no quantifiable residues were found (residues below the LOQ), whereas 170 samples (11%) contained quantifiable residues at or above the LOQ. According to the reporting countries, 54 samples (3.5% of the baby food samples) were considered as exceeding the MRL of 0.01 mg/kg applicable for baby food.[3] These exceedances were mainly related to residues of fosetyl-Al, benzalkonium chloride (BAC) and didecyldimethylammonium chloride (DDAC). Taking into account the measurement uncertainty, 51 of these samples (3.3%) were considered as non-compliant.

In 13.5% of samples of organic products, pesticide residues were quantified within the legal limits (720 of the 5,331 samples analysed); 276 of these samples contained only residues of substances that

[2] Since not all results for import controls were reported to EFSA, the results presented in the framework of this report are based on the information provided by the European Commission service in charge of import controls.

[3] 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 these Directives.

do not necessarily come from the use of pesticides (e.g. naturally occurring substances, persistent organic pollutants). The MRLs were exceeded for 0.7% of the organic samples analysed (37 samples).

The majority of samples of animal products analysed (7,822 samples) were free of quantifiable residues (6,602 samples, 84.4%). The most frequently quantified pesticides were persistent organic pollutants and compounds resulting from sources other than pesticide use.

Results of dietary risk assessment

Considering the frequency of pesticide residues detected in food commonly consumed, a wide range of European consumers is expected to be exposed to these substances via food. EFSA performed a short-term and long-term dietary risk assessment for the pesticides covered by the EUCP in order to get an estimate of the expected exposure and to identify possible related risk. The deterministic approach used for this calculation is likely to overestimate the real exposure as it is based on conservative model assumptions.

The short-term (acute) dietary exposure was estimated for the 11 food products covered by the 2015 EUCP (i.e. orange juice, table grapes, aubergines, bananas, broccoli, sweet peppers, peas without pods, olive oil, wheat, butter and chicken eggs). For the majority of the samples analysed in 2015, the short-term exposure was found to be negligible or within a range that is unlikely to pose a consumer health concern. For 244 samples of 16,197 samples screened for potential short-term consumer health risks, the estimated dietary intake exceeded the toxicological reference value (ARfD). The most frequent cases of exceedance of the ARfD in this risk assessment screening were related to chlorpyrifos in bananas, table grapes, peppers, broccoli and aubergine, imazalil and acrinathrin in bananas, ethephon in table grapes and peppers and lambda-cyhalothrin in table grapes and peppers. No exceedance of ARfD was identified for orange juice, peas without pods, olive oil, butter or eggs. This assessment is based on conservative assumptions, i.e. consumption of high amounts of these food products without washing or any processing that would reduce the residues such as peeling or cooking. Given this conservatism of the risk assessment methodology, real exposure was expected to be significantly lower. Based on these results, EFSA concluded that the probability of European citizens being exposed to pesticide residues levels that could lead to negative health outcomes was low, but for a limited number of samples an acute dietary risk could not be completely ruled out.

EFSA also calculated the long-term (chronic) dietary exposure of EU consumers for the pesticides included in the 2015 EUCP found in the most commonly consumed food products (i.e. food covered by the three year's cycle of the EUCP). The estimated exposure did not exceed the acceptable daily intake values (ADI), except for one substance (dichlorvos) for which the ADI was exceeded only under the most conservative upper-bound scenario while in this scenario, for the majority of pesticides (n=140), the estimated exposure was lower than 10% of the ADI. Following a more detailed analysis of the residue data for dichlorvos, EFSA noted the low frequency of samples containing quantified residues of dichlorvos (0.02% of the 66,640 samples analysed). Thus, the exceedance of the ADI was mainly driven by the relatively high limit of quantification that led to a high uncertainty related to the dietary exposure assessment. Considering that the active substance is no longer approved in the EU and that residues in imported products were found only sporadically, according to the current scientific knowledge, dichlorvos was not likely to pose a consumer health risk. For bromide ion, fenamidone, hexachlorobenzene (HCB), HCH-alpha, HCH-beta and propargite, no long-term dietary risk assessment could be performed, as there are no internationally agreed toxicological reference values available for these compounds.

EFSA derived a number of recommendations aiming to increase the efficiency of the EU-coordinated and national control programmes.

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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 factor 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[4], 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 2015 was set up in Commission Implementing Regulation (EU) No 400/2014[5] hereafter referred to as "2015 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, EFSA and other Member States. EFSA is in charge of 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[6] and 2006/141/EC[7] 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. The default MRL for this group of products is a Regulation (EC) No 609/2013[8] repeals the aforementioned Directives; however, the pesticide MRLs of Directive 2006/125/EC and 2006/141/EC were still applicable in 2015. In the framework of the 2015 EUCP, each Member State had to take at least 10 samples of processed cereal-based baby food, according to the 2015 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[9]. For these so-called dual use substances, Member States perform controls in accordance

[4] 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.

[5] Commission Implementing Regulation (EU) No 400/2014 of 22 April 2014 concerning a coordinated multiannual control programme of the Union for 2015, 2016 and 2017 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 L119, 23.4.2014, p. 44–56.

[6] 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.

[7] 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.

[8] 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 L181, 29.6.2013, p. 35–56.

[9] 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[10] for veterinary medicinal products; results of the controls for dual use substances[11] 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. Regulation (EC) No 889/2008[12] on organic production of agricultural products defines specific labelling provisions and production methods, which entail significant restrictions on the use of pesticides.

Regulation (EC) No 669/2009[13] 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. certain pesticides, not approved food additives, mycotoxins) are specified in Annex I to this regulation which is regularly updated; for the calendar year 2015, four updated versions were relevant.[14,15,16,17]

Other horizontal legislation relevant for food control and pesticides, which have some relevance for the current report, are outlined in the 2011 European Union Report on Pesticide Residues in Food (EFSA, 2014a).

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 2015.

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[18].

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

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[10] 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.

[11] 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, 2016a)

[12] 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.

[13] 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.

[14] Commission Implementing Regulation (EU) No 1355/2013 of 17 December 2013 amending Annex I to 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 341, 18.12.2013, p. 35–42.

[15] Commission Implementing Regulation (EU) No 323/2014 of 28 March 2014 amending Annex I to 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 95, 29.3.2014, p. 12–23.

[16] Commission Implementing Regulation (EU) No 718/2014 of 27 June 2014 amending Annex I to 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 190, 28.6.2014, p. 55–62.

[17] Commission Implementing Regulation (EU) No 1121/2014 of 26 September 2014 amending Annex I to 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 283, 27.9.2014, p. 32–39.

[18] 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.

2. Introduction

This report provides a detailed insight in the control activities at European level and the most relevant results on the official control activities performed by EU Member States, including Iceland and Norway (Members of the European Free Trade Association, 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:

- 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 graphic-rich report should convey the answers to these questions in a way that can be understood without detailed scientific knowledge of the subject.

Together with this report, EFSA has published an Excel file as supplement were detailed results on the determinations/samples exceeding the legal limit can be found.

Compared to the 2014 report, a new data analysis was performed to allow a more realistic risk assessment for dimethoate. In addition, more detailed results for glyphosate-related residues were provided.

For the 2015 monitoring year, EFSA together with Member States made major efforts to enhance the quality of the data by improving the data validation. This step is essential with a view to the future presentation of the results in the Data Warehouse (DWH) in line with the Open Data approach defined in the EFSA Strategy 2020. Considering the high number of monitoring results (around 20 million analytical results were reported to EFSA), and the complexity of the data, well-structured data are indispensable for performing high quality risk assessments (EFSA, 2016b).

Cumulative risk assessment could not be considered yet in the EFSA annual reports on pesticide residues because the grouping of pesticides in cumulative assessment groups has not been completed. Currently, EFSA is working with high priority not only on the establishment of the cumulative assessment groups, but also on the adaptation of the available cumulative risk assessment methodologies for the practical implementation at EU level.

Following frequently asked questions on the interpretation of the results presented in the previous report, EFSA would like to clarify that the results provided by Member States are presented in the following categories:

- 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 residue levels 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 residue levels 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 2015 guidance document on reporting data on pesticide residues (EFSA, 2015a). It is current practice 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.

It is noted that a separate analysis of samples with residues below the limit of detection (LOD)[19], thus, samples free of any detectable residues, could not be performed, since this information is not reported consistently by the reporting countries. In a previous report (EFSA, 2014b), it was recommended to provide this piece of information. Further discussions with reporting countries on the feasibility to implement this recommendation are ongoing.

In accordance with the principle of engaging stakeholders in the process of scientific assessment defined in the EFSA strategy 2020, interested readers are encouraged to submit further suggestions on the type of data that should be presented in more detail in future reports (pesticides.mrl@efsa.europa.eu).

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 2015 EU-coordinated programme, as defined in Commission Implementing Regulation (EC) No 400/2014 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.

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

Additional information and more detailed results related to the 2015 monitoring activities can be found on the EFSA website and on the websites of the national competent authorities (see Appendix A). In addition, EFSA compiled a technical report (EFSA, 2017) containing the national summary reports submitted by the reporting countries, where further details on the pesticide monitoring activities at national level are provided.

3. EU-coordinated control programme

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

According to the 2015 EU monitoring Regulation (EU) No 400/2014, reporting countries were requested to analyse in total 11 different food products (aubergines, bananas, broccoli, table grapes, orange juice, peas without pod (fresh or frozen), peppers (sweet), virgin olive oil, wheat, butter, chicken eggs). The number of samples per food product to be analysed by each reporting country varied from 15 to 93, depending on the population of the reporting country.

This regulation defined a total of 164 pesticides to be analysed; 156 thereof in food of plant origin and 22 in food of animal origin. The list of pesticides covered by the 2015 EUCP, including further details on the pesticides that had to be analysed on food of plant or animal origin, is presented in Appendix B, Table 15.

[19] 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 can not be quantified reliably.

In 2012[20], basically the same food products were analysed as in 2015. The pesticide list of the 2015 EUCP was reduced (n=164) compared to the 2012 EUCP list (n=205): thus, 43 substances[21] were no longer requested to be analysed as part of the 2015 EUCP. [22] Compared to 2012, two new substances (fenpropidin and fluopyram) were included in the 2015 EUCP. For the common 162 pesticides and food products, EFSA performed a comparative assessment of results reported in 2015 and 2012.

Member States had to take at least one sample from organic production for each of the 11 food products in focus. For the 1,054 organic samples reported under the 2015 EUCP, EFSA did not perform a separate analysis of the results in this section of the report, but 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 4.2.6.

In addition to the food products mentioned above, each reporting country had to take at least 10 samples of processed cereal-based baby food. A comprehensive analysis of the results of the 640 processed cereal-based baby foods is reported in Section 4.2.5 alongside with the results on other baby food products, such as infant formulae and follow-on formulae.

In total, 10,884 samples (excluding the samples of processed cereal-based baby foods) were analysed in the framework of the 2015 EUCP by the 30 reporting countries. The breakdown of the number of samples taken by each country is reported in Figure 1.

[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.

[21] 2,4-D (RD), amitraz (RD), amitrole, azinphos-ethyl, benfuracarb, bixafen (RD), bromuconazole, clorfenvinphos, chlorobenzilate, cymoxanil, cyromazine, dichlofluanid, dicrotophos, endrin, ethoprophos, fluazifop-P-butyl (RD), formothion, haloxyfop-R (RD), 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, vinclozolin (RD) and zoxamide.

[22] 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, 2016a). 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.

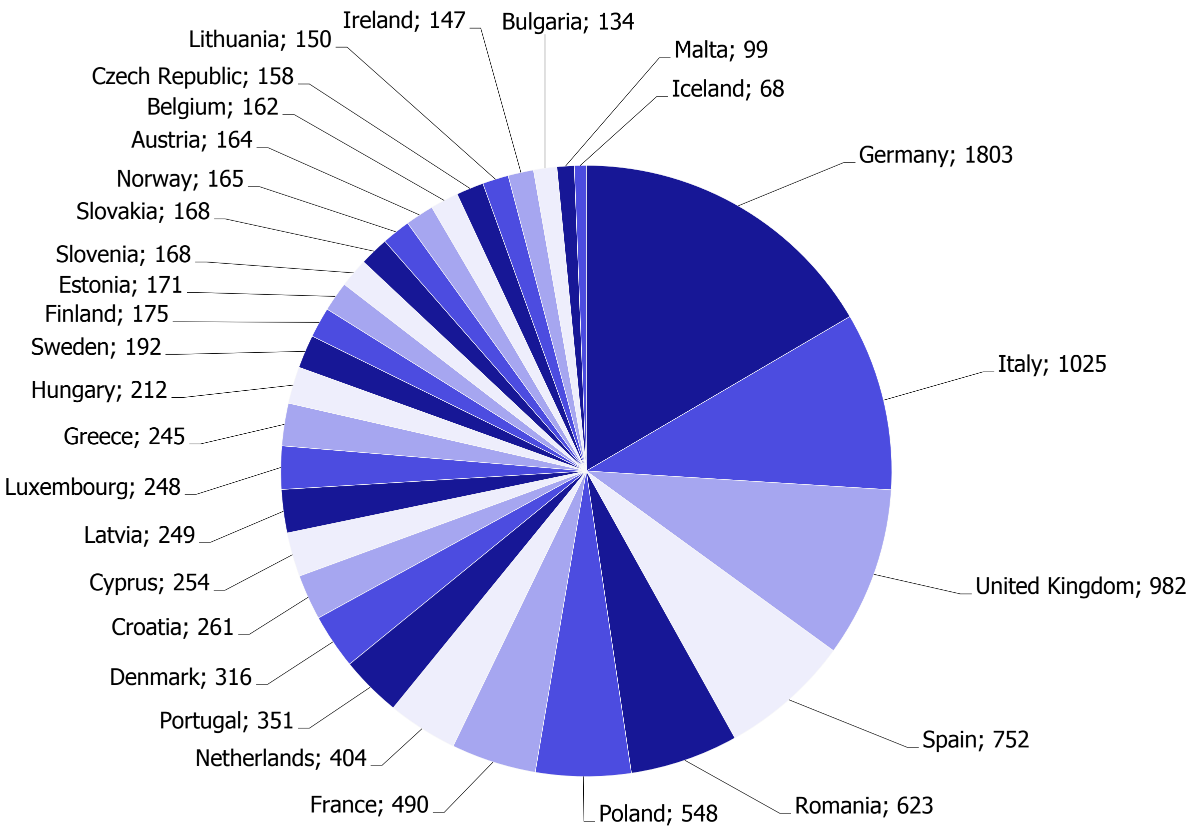


Figure 1: Number of samples taken by reporting country under the EUCP (excluding processed cereal-based baby foods)

3.2. Results by pesticide

Among the 156 pesticides to be analysed in plant products, the following 36 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): acephate (7586), biphenyl (5839), carbaryl (8472), carbofuran (7683), chlorfenapyr (7714), chlorpropham (6574), diazinon (8758), dieldrin (7092), diethofencarb (7620), dithianon (2512), dodine (4935), EPN (7756), ethion (8617), fenarimol (7822), fenitrothion (8575), fipronil (6358), flufenoxuron (7228), fluquinconazole (7413), hexaconazole (8296), isocarbophos (6574), linuron (7748), malathion (7796), methamidophos (7987), methidathion (8681), monocrotophos (7795), oxadixyl (8104), oxamyl (7698), oxydemeton-methyl (6202), paclobutrazol (7673), parathion (8039), parathion-methyl (7012), profenofos (8466), tefluthrin (7345), tetradifon (7675), tolylfluanid (5683) and triazophos (8578).

In plant products, 120 different substances were found in quantifiable concentrations. Residues exceeding the legal limits were related to 40 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 0.02% of the samples analysed, are presented in Figure 2.

The pesticides are ordered alphabetically; 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 legally permitted concentrations and the number of samples exceeding the MRLs, respectively. Among the pesticides that had to be analysed in all plant products, the most frequently found pesticides quantified in more than 4% of the samples analysed were imazalil (7.1%), thiabendazole (6.8%), azoxystrobin (6.4%), boscalid (6.3%) and chlorpyrifos (4.1%). Further details on the pesticides analysed under the EU-coordinated monitoring programme are reported in Appendix B and Section 3.3.

Regarding animal products (butter and eggs), the following 10 of the 22 pesticides covered by the EUCP were not found in quantifiable concentrations in any of the samples analysed (the number in brackets refer to the total number of samples analysed): chlorpyrifos-methyl (1042), deltamethrin (1015), diazinon (1041), famoxadone (154), fenvalerate (812), heptachlor (653), indoxacarb (201), methoxychlor (1187), parathion (929) and pirimiphos-methyl (999).

The 12 other pesticides were found sporadically, DDT and hexachlorobenzene being the most frequently quantified compounds (respectively 4.7% and 2.6% of the samples of butter and eggs analysed in the framework of the 2015 EUCP). The other pesticides were quantified in less than 0.8% of the samples, mainly non-approved pesticides present in the food chain due to their persistence (i.e. the persistent organic pollutants (POP) such as chlordane, dieldrin, HCH-alpha, HCH-beta and lindane), active substances authorised for use in livestock covered by Regulation (EC) No 37/2010 (cypermethrin and permethrin) and other approved (bifenthrin, chlorpyrifos) and not approved pesticide active substances (endosulfan).

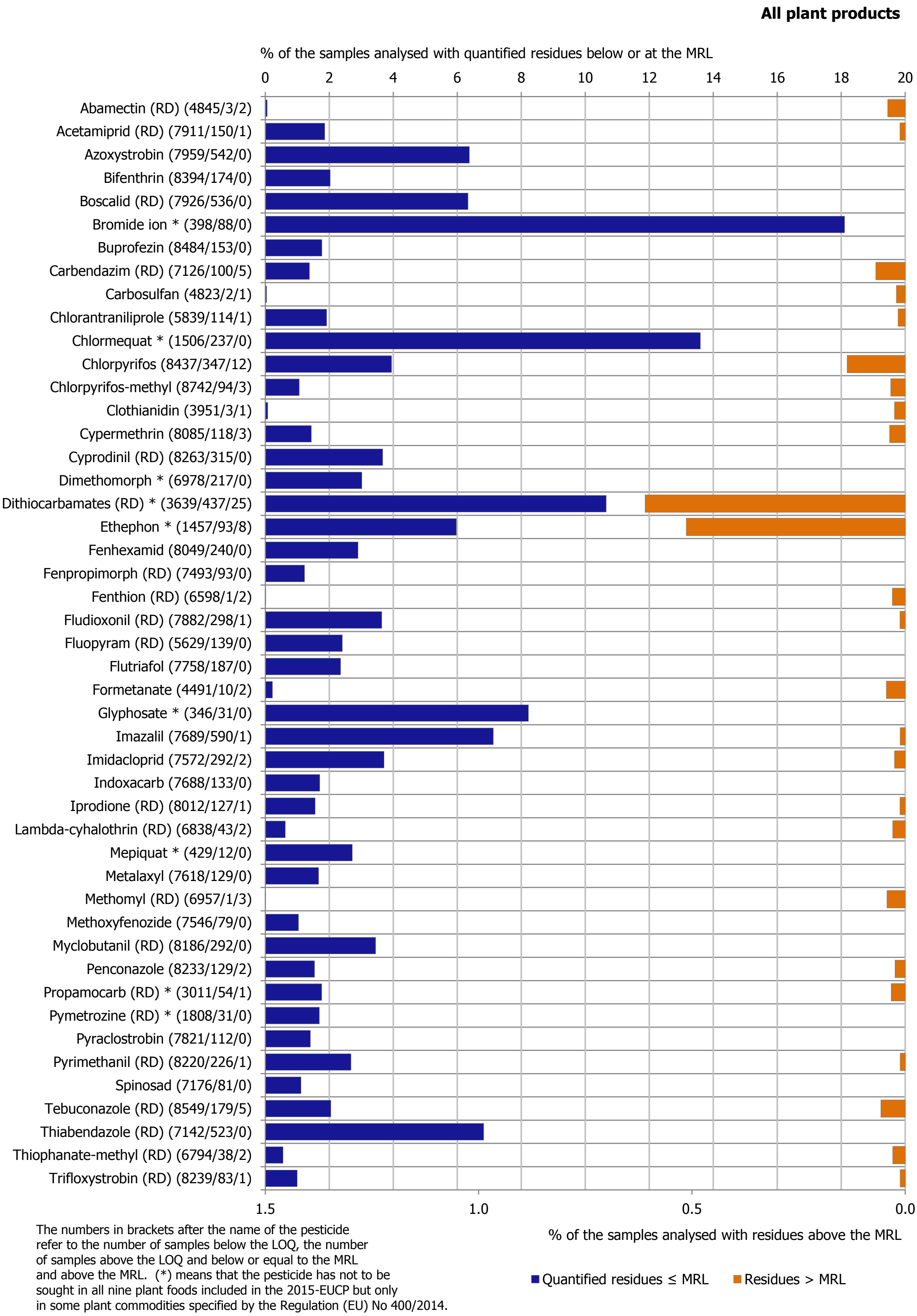


Figure 2: Pesticides quantified in plant products (quantification rate > 1% and/or MRL exceedance rate > 0.02%), sorted alphabetically

3.3. Results by food products

In this section, detailed results concerning the 11 food products covered by the 2015 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)[23] are presented;
- Bar charts present the pesticides found, sorted according to the frequency of quantification in 2015. 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 2012, while the bars in the darker shade refer to the results of 2015. A maximum of 45 pesticides are plotted for each food product. The pesticides not quantified in 2015, but with MRL exceedances observed in 2012, are plotted at the bottom of the bar chart. Pesticides in the scope of the 2015 monitoring programme and not in the 2012 programme are marked with an asterisk.
- 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.[24] 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 2015 was used as a reference value to re-calculate the reported residue concentration as percentage of the MRL.[25,26]
- 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).

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.

[23] Due to the rounding of the results, the total calculated sum may slightly differ from 100%.
[24] The number of samples within and exceeding the legal limit are based on the judgement of the reporting country.
[25] Since the MRL values used by the Member States to assess MRL exceedances were not systematically reported to EFSA, the MRLs applicable at the beginning of the reference period (January 2015) as reported in the database of the European Commission were used for the calculation. For MRLs that changed during the calendar year, the exact date of sampling would be required to decide on which MRL was applicable for the respective sample. Since this information is not available, the MRL applicable at the beginning of the calendar year was used.
[26] 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 figure.

3.3.1. Aubergines

In 2015, 1,074 samples of aubergines were analysed; in 750 samples (70%), no quantifiable pesticide residues were found, while 324 samples (30%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 113 samples (10.5%); up to twelve different pesticides were reported in an individual aubergines sample (Figure 3). Compared to 2012, the overall quantification rate is similar (2012: 32% of the samples contained pesticide residues).

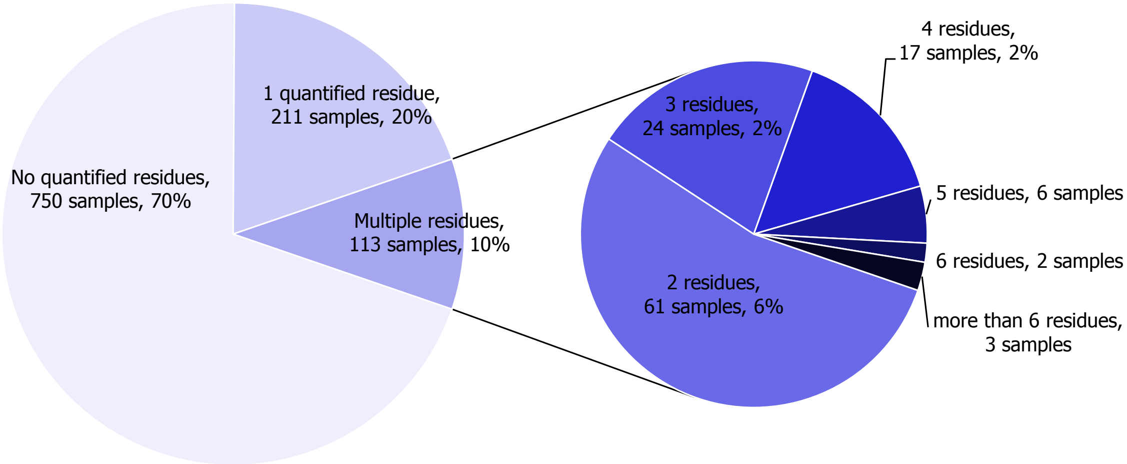


Figure 3: Number of quantified residues in individual aubergine samples

In 0.4% of the samples (4 samples), the residue concentrations exceeded the MRLs; 0.2% of the samples (2 samples) were reported as non-compliant, taking into account the measurement uncertainty. The MRL exceedances were all related to EU products.

In total, 62 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were acetamiprid (quantified in 9.9% of the tested samples), imidacloprid (6.4%) and cyprodinil (5.9%). The MRL was exceeded for 4 different pesticides: acetamiprid (one sample from Spain), bitertanol (one sample from Romania), methomyl (one sample from Spain) and dicloran (one sample from Italy). These MRL exceedances were not identified in the 2012 EUCP.

Figure 4 depicts the results for all pesticides with MRL exceedances and the most frequently quantified pesticides. Compared to 2012, the quantification rate was in the same range for most pesticides; for acetamiprid, chlorantraniliprole, pyriproxyfen and boscalid, an increased quantification rate was observed in 2015. For propamocarb, a decreased quantification rate was observed in 2015.

A decreased number of pesticides with MRL exceedances was noted in 2015. MRL exceedances do not concern the same pesticides as in 2012. It should be also highlighted that no MRL exceedances were reported in 2015 for pesticides that were found to exceed the legal limit in 2012 (e.g. dimethoate, acephate, carbofuran, chlormequat, diazinon, methamidophos, and procymidone).

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 aubergines in 2015 in at least 5% of the samples is compiled in Table 1.

Table 1: Pesticides most frequently quantified in aubergines in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Acetamiprid (RD)	9.9	Approved insecticide
Imidacloprid	6.4	Approved insecticide
Cyprodinil (RD)	5.9	Approved fungicide

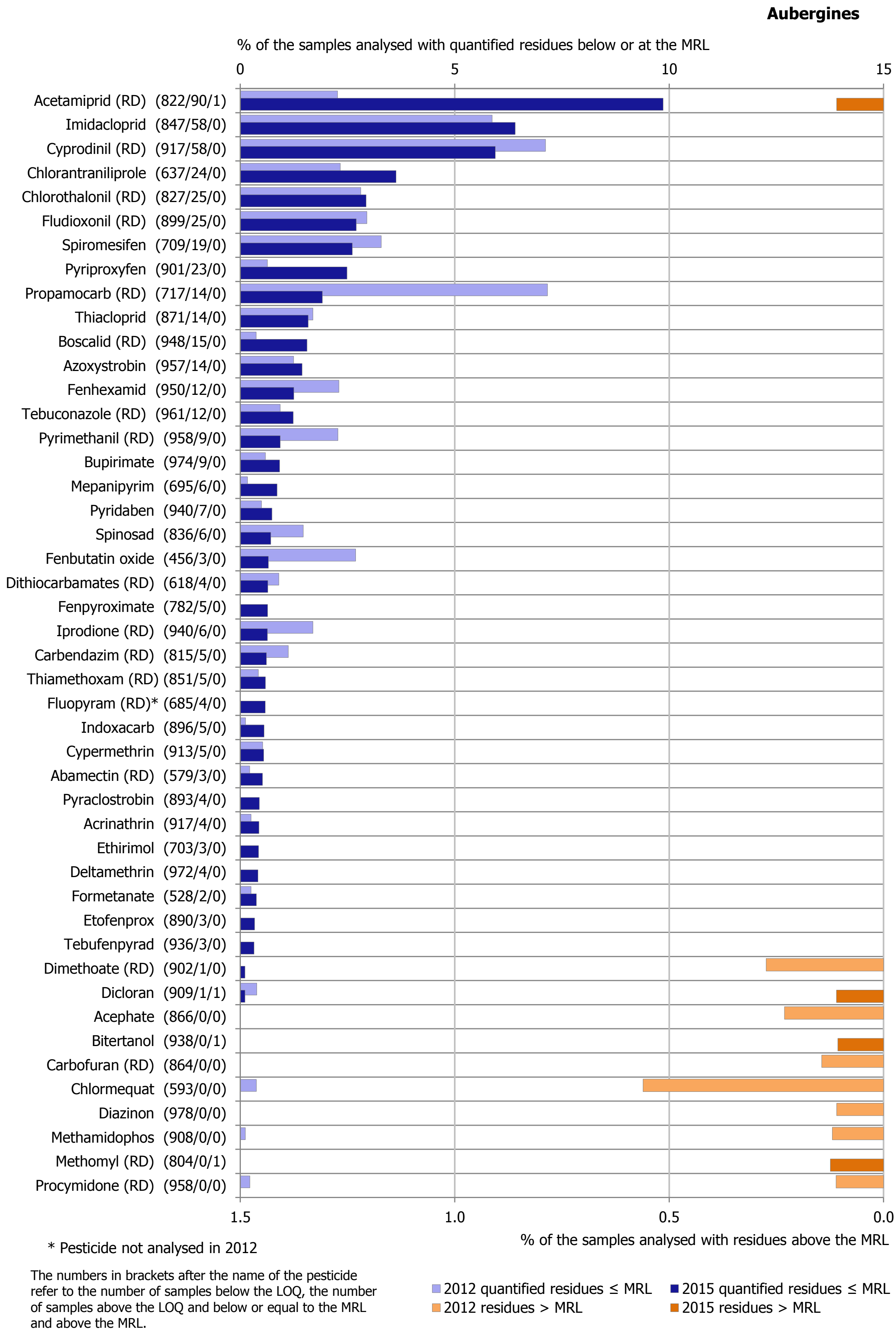


Figure 4: Percentage of aubergine samples with quantified residues below or equal to the MRL and with residues above the MRL

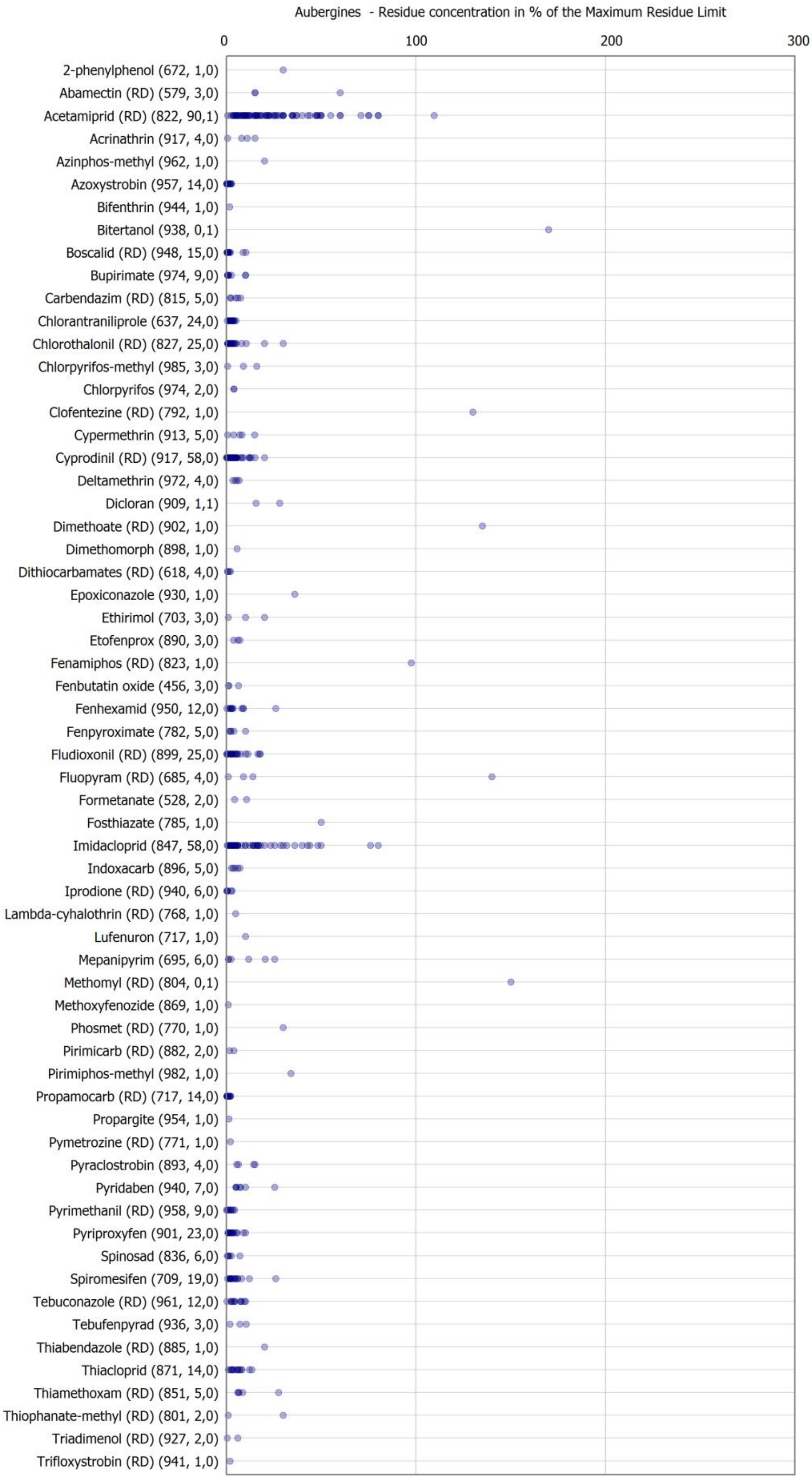


Figure 5: Residue concentrations measured in aubergine, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.3.2. Bananas

In 2015, 1,201 samples of bananas were analysed; in 323 samples (26.9%), no quantifiable pesticide residues were found, while 878 samples (73.1%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 701 samples (58.4%); up to 9 different pesticides were reported in an individual bananas sample (Figure 6). Compared to 2012, a decline of the overall quantification rate was observed (2012: 78% of the samples contained pesticide residues).

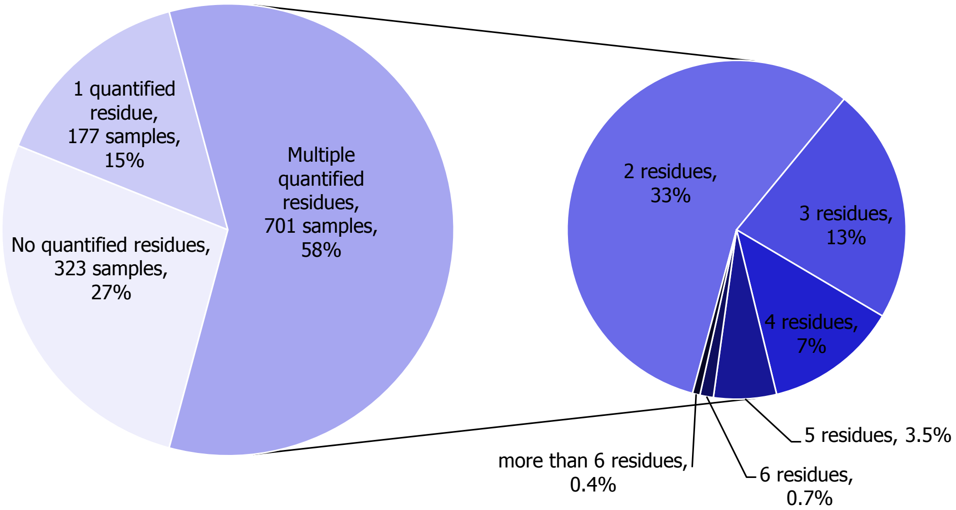


Figure 6: Number of quantified residues in individual bananas samples

In 0.3% of the samples (4 samples), the residue concentrations exceeded the MRLs; one sample was reported as non-compliant, taking into account the measurement uncertainty. The MRL exceedances were mainly related to EU products (3 samples).

In total, 38 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were thiabendazole (quantified in 47.9% of the tested samples), imazalil (45.8%) and azoxystrobin (29.8%). Bitertanol, a fungicide that was frequently found in 2012 (4.7%), was not found in 2015, following the withdrawal authorisations in 2014 (period of grace expired on 01/03/2015). The MRL was exceeded for 4 different pesticides: imazalil in one sample from Ivory Coast, endosulfan (one sample from Portugal), chlorpyrifos-methyl (one sample from Spain), fludioxonil (one sample from Guadeloupe).

Figure 7 depicts the results for all pesticides with MRL exceedances and the most frequently quantified pesticides. Compared to 2012, the quantification rate was in the same range for most pesticides, except for buprofezin where an increased quantification rate was observed. The quantification rate has decreased in 2015 for thiabendazole and chlorpyrifos. A number of pesticides was found exceeding the MRL where no such event was noted in 2012 (e.g. imazalil, endosulfan, chlorpyrifos-methyl and fludioxonil). Conversely, MRL exceedances were noted only in 2012 for buprofezin, acrinathrin, spinosad, imidacloprid and cypermethrin.

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 bananas in 2015 in at least 5% of the samples is compiled in Table 2.

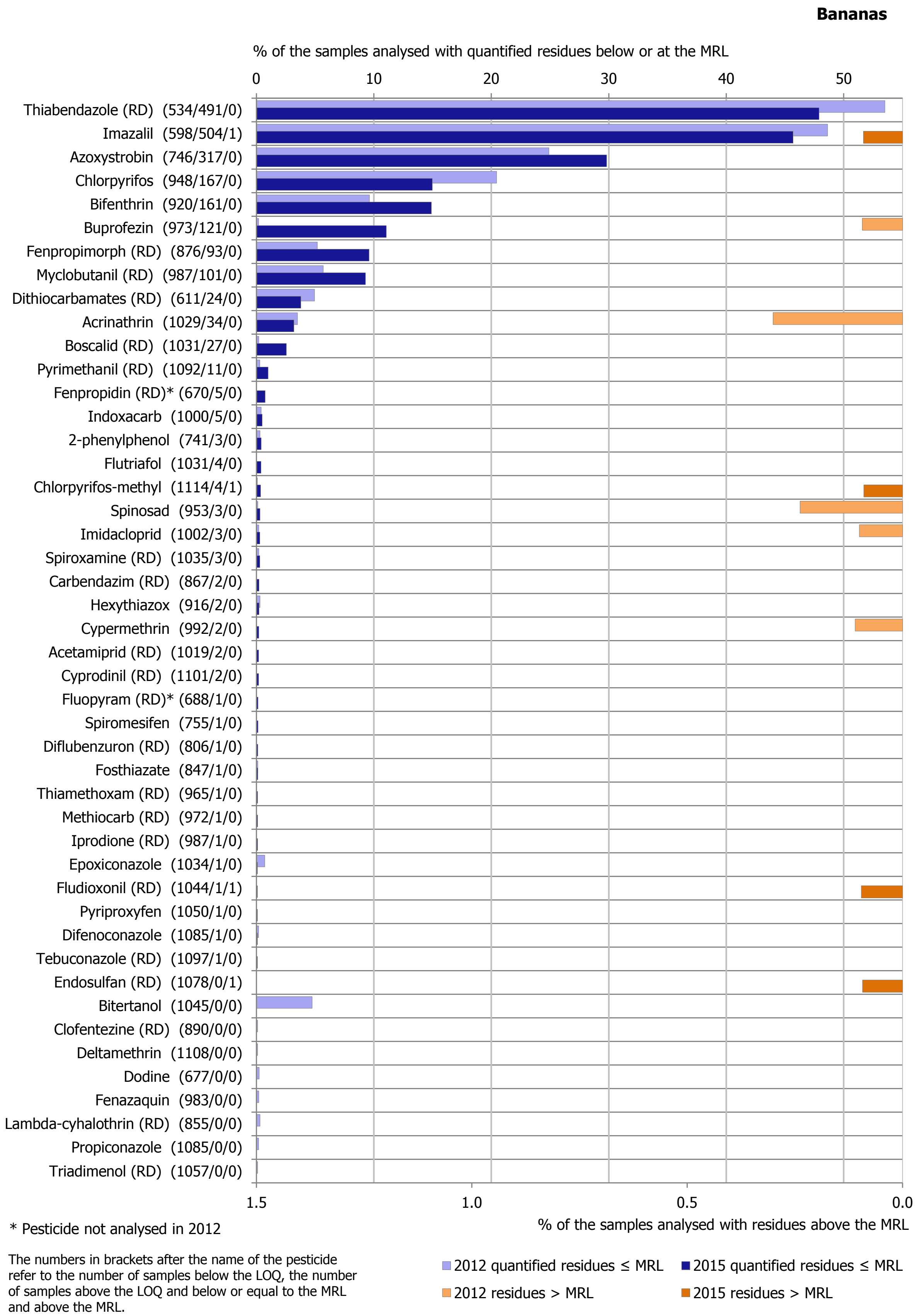


Figure 7: Percentage of bananas samples with quantified residues below or equal to the MRL and with residues above the MRL

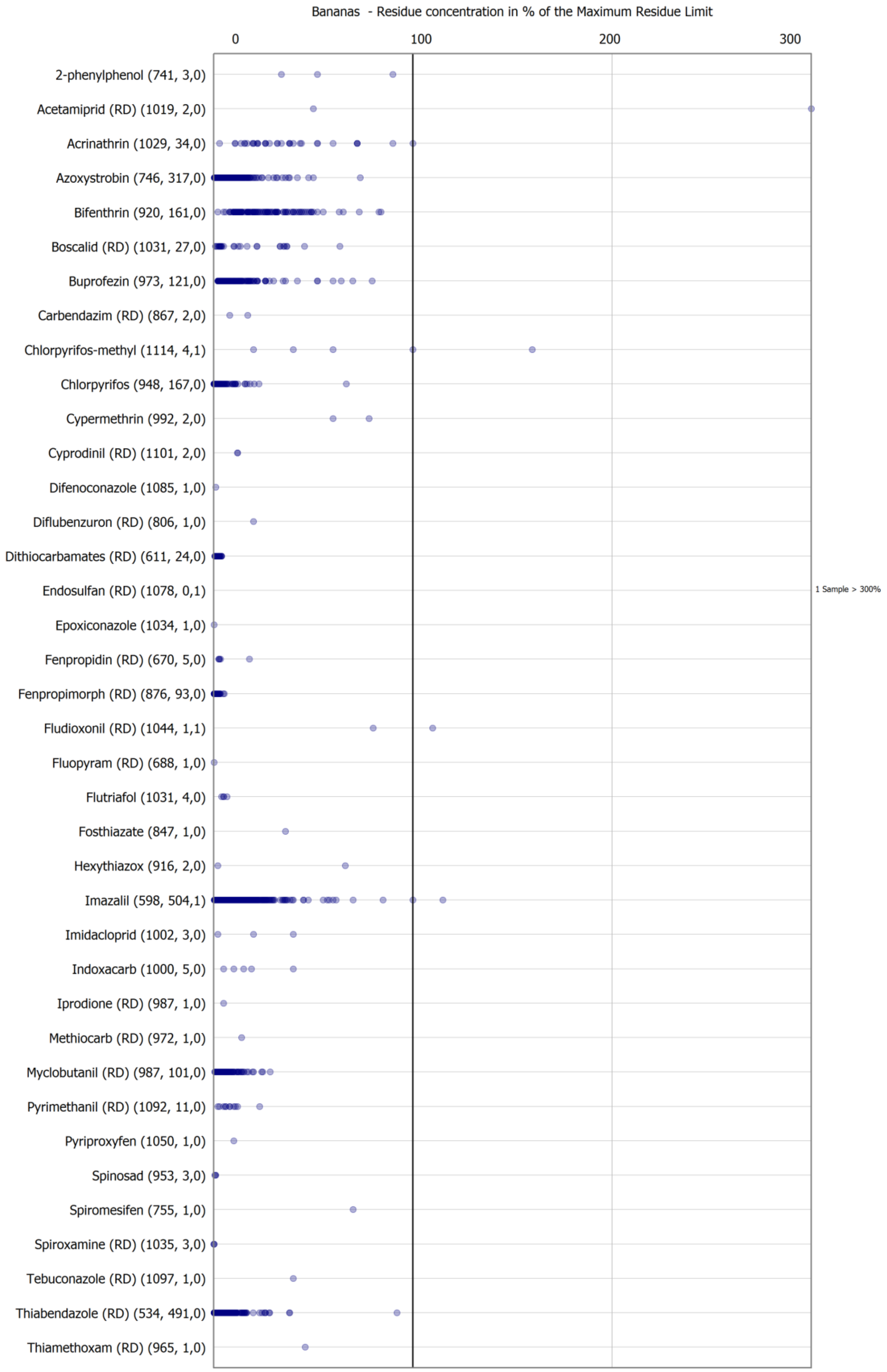


Figure 8: Residue concentrations measured in bananas, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

Table 2: Pesticides most frequently quantified in bananas in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Imazalil	45.8	Approved fungicide
Thiabendazole (RD)	47.9	Approved fungicide
Azoxystrobin	29.8	Approved fungicide
Chlorpyrifos	14.9	Approved insecticide
Bifenthrin	14.9	Approved insecticide
Buprofezin	11.1	Approved insecticide

3.3.3. Broccoli

In 2015, 994 samples of broccoli were analysed; in 543 samples (54.6%), no quantifiable pesticide residues were found, while 451 samples (45.4%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 147 samples (14.8%); up to 6 different pesticides were reported in an individual broccoli sample (Figure 9). Compared to 2012, the overall quantification rate went up (2012: 31.8% of the samples contained pesticide residues).

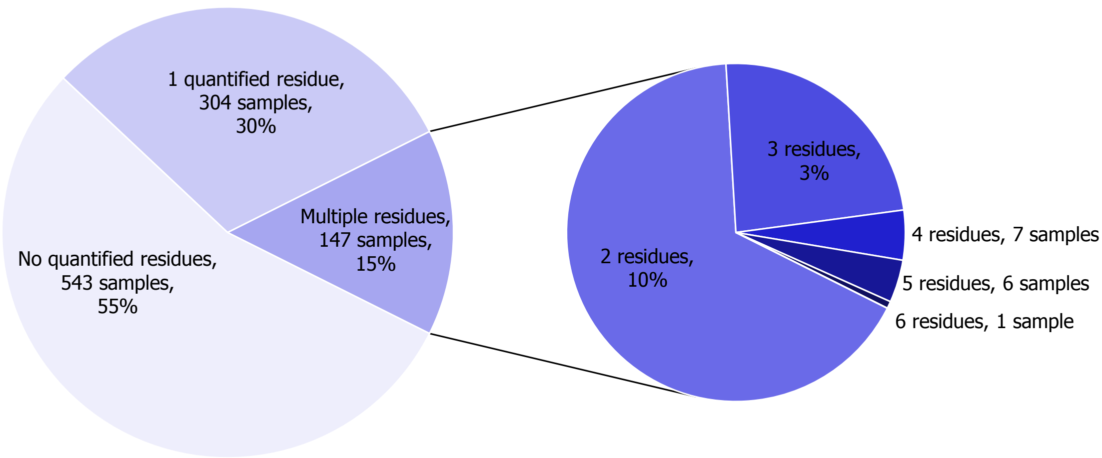


Figure 9: Number of quantified residues in individual broccoli samples

In 3.4% of the samples (34 samples), the residue concentrations exceeded the MRLs; 1.2% of the samples (12 samples) were reported as non-compliant, taking into account the measurement uncertainty.

In total, 41 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were dithiocarbamates (analysed as carbon disulphide, CS_2) quantified in 61% of the tested samples, imidacloprid (8%) and boscalid (5.5%). The MRL was exceeded for 9 different pesticides, most frequently for dithiocarbamates (24 samples mostly from Poland and Spain) and chlorpyrifos (6 samples from Poland, Greece, Austria and Romania). It is noted that CS_2 residues are not only related to the use of pesticides belonging to the group of dithiocarbamates but also originates from naturally occurring compounds that mimic the presence of dithiocarbamates. This is particularly the case for brassica vegetables, such as broccoli that naturally contain CS_2 precursor compounds.

Figure 10 depicts the results for all pesticides with MRL exceedances and the most frequently quantified pesticides with residues below or at the MRL. Compared to 2012, the overall quantification rates and MRL exceedance rates were in the same range for most of the pesticides.

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 broccoli in 2015 in at least 5% of the samples is compiled in Table 3.

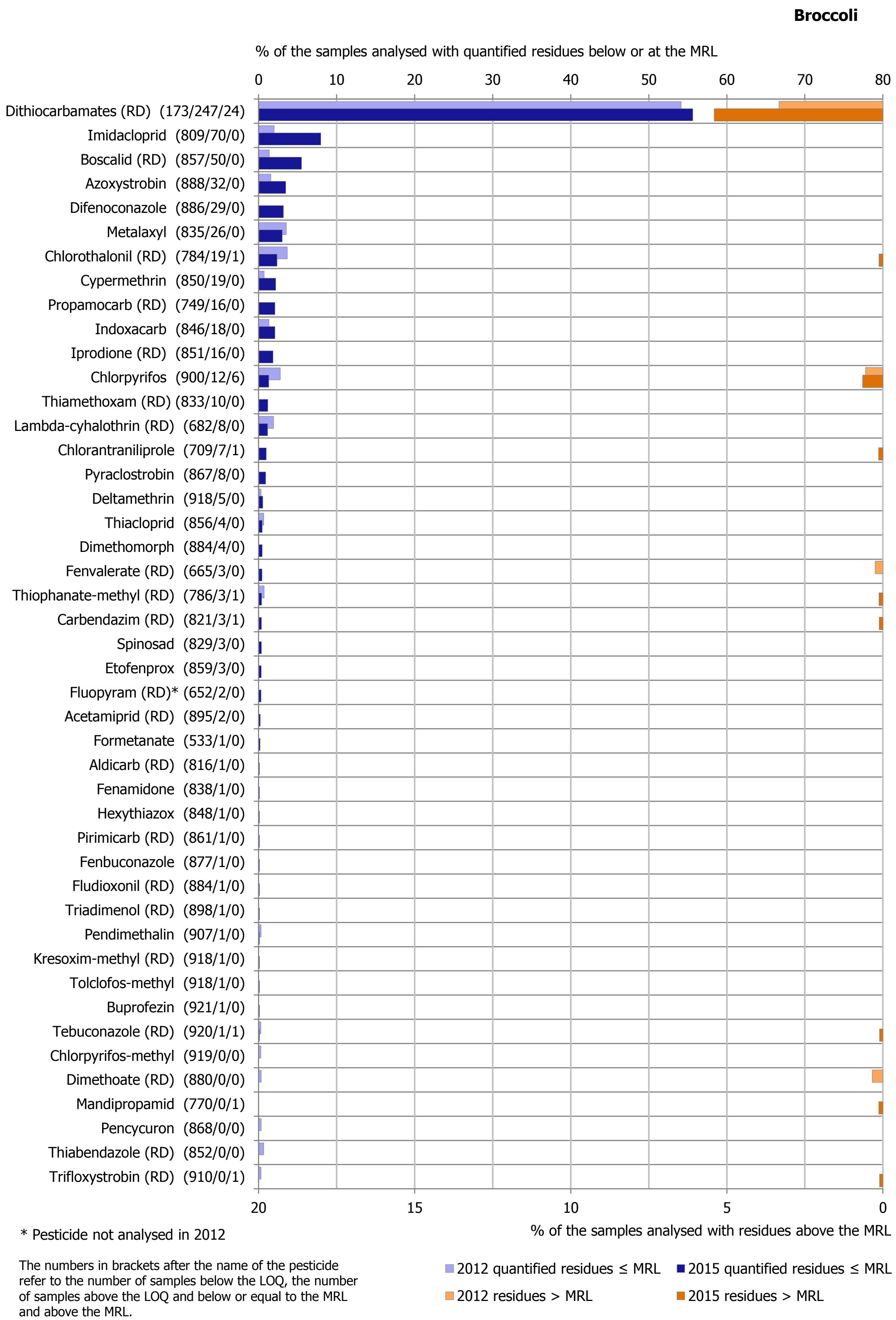


Figure 10: Percentage of broccoli samples with quantified residues below or equal to the MRL and with residues above the MRL

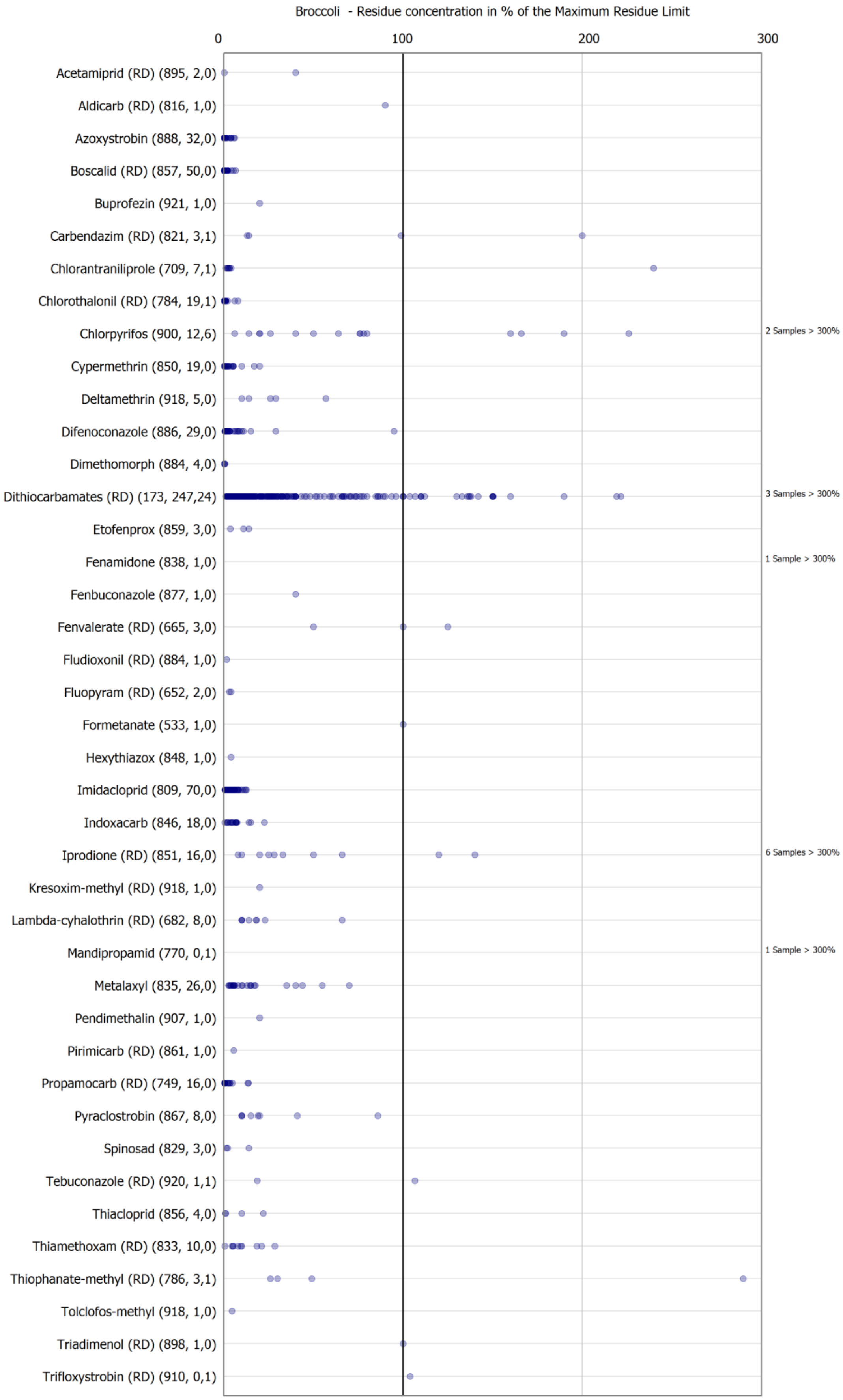


Figure 11: Residue concentrations measured in broccoli, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

Table 3: Pesticides most frequently quantified in broccoli in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009) and comments
Dithiocarbamates (CS_2)	61	Dithiocarbamates fungicides approved: maneb, mancozeb, metiram, propineb, thiram and ziram. Probably false positive results from naturally occurring substances in brassica vegetables mimicking the presence of dithiocarbamates.
Imidacloprid	8	Approved insecticide
Boscalid (RD)	5.5	Approved fungicide

3.3.4. Olive oil

In 2015, 1,045 samples of olive oil were analysed; in 883 samples (84.5%), no quantifiable pesticide residues were found, while 162 samples (15.5%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 44 samples (4.2%); up to 6 different pesticides were reported in an individual olive oil sample (Figure 12). Compared to 2012, the overall quantification rate slightly decreased (2012 samples: 22% contained pesticide residues).

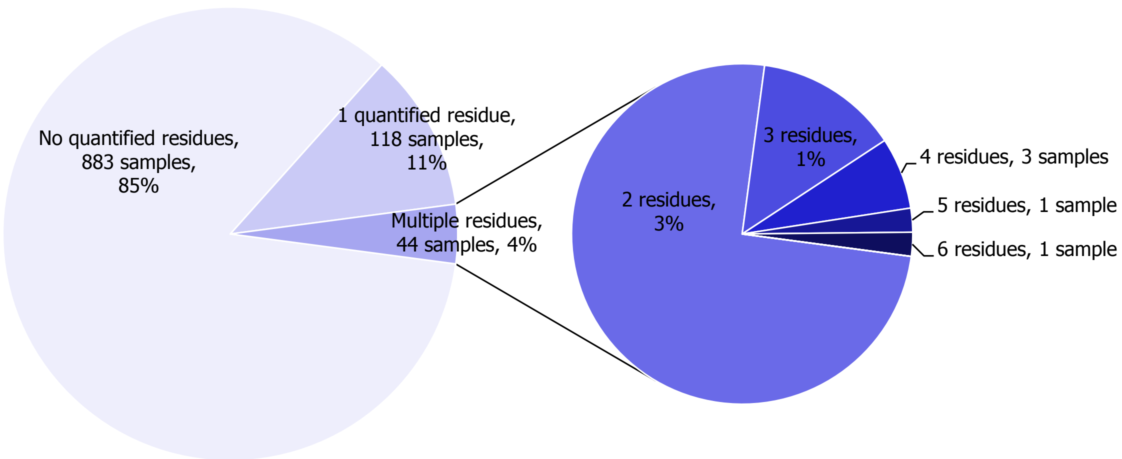


Figure 12: Number of quantified residues in individual olive oil samples

To compare the residue concentrations reported for olive oil, a default processing factor of 5[27] was used to recalculate the legal limits set for unprocessed olives to olive oil in Regulation (EC) No 396/2005. The residue concentrations exceeded the recalculated MRL for one sample from Greece (0.1%), also reported as non-compliant taking into account the measurement uncertainty.

In total, 29 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were chlorpyrifos (quantified in 7.3% of the tested samples), cypermethrin (5.3%), phosmet (4.5%) and dimethoate (1.7%).

Figure 13 depicts the results for all pesticides with MRL exceedances and the most frequently quantified pesticides with residues below or at the MRL. Compared to 2012, the same pesticides were found, but the quantification rates of chlorpyrifos and terbuthylazine decreased, particularly terbuthylazine (from 12% to 0.4% of the samples). The MRL was exceeded for fenthion (1 sample).

[27] This default processing factor of 5 implies that residues in oil are five times higher than the residues in unprocessed olives used for oil production, assuming that 5 kg of olives are used to produce 1 kg of oil and assuming a complete transfer of the residues to oil occurs.

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 olive oil in 2015 in at least 10% of the samples is compiled in Table 4.

Table 4: Pesticides most frequently quantified in olive oil in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Chlorpyrifos	7.3	Approved insecticide
Cypermethrin	5.3	Approved insecticide
Phosmet (RD)	4.5	Approved insecticide
Dimethoate (RD)	1.7	Approved insecticide

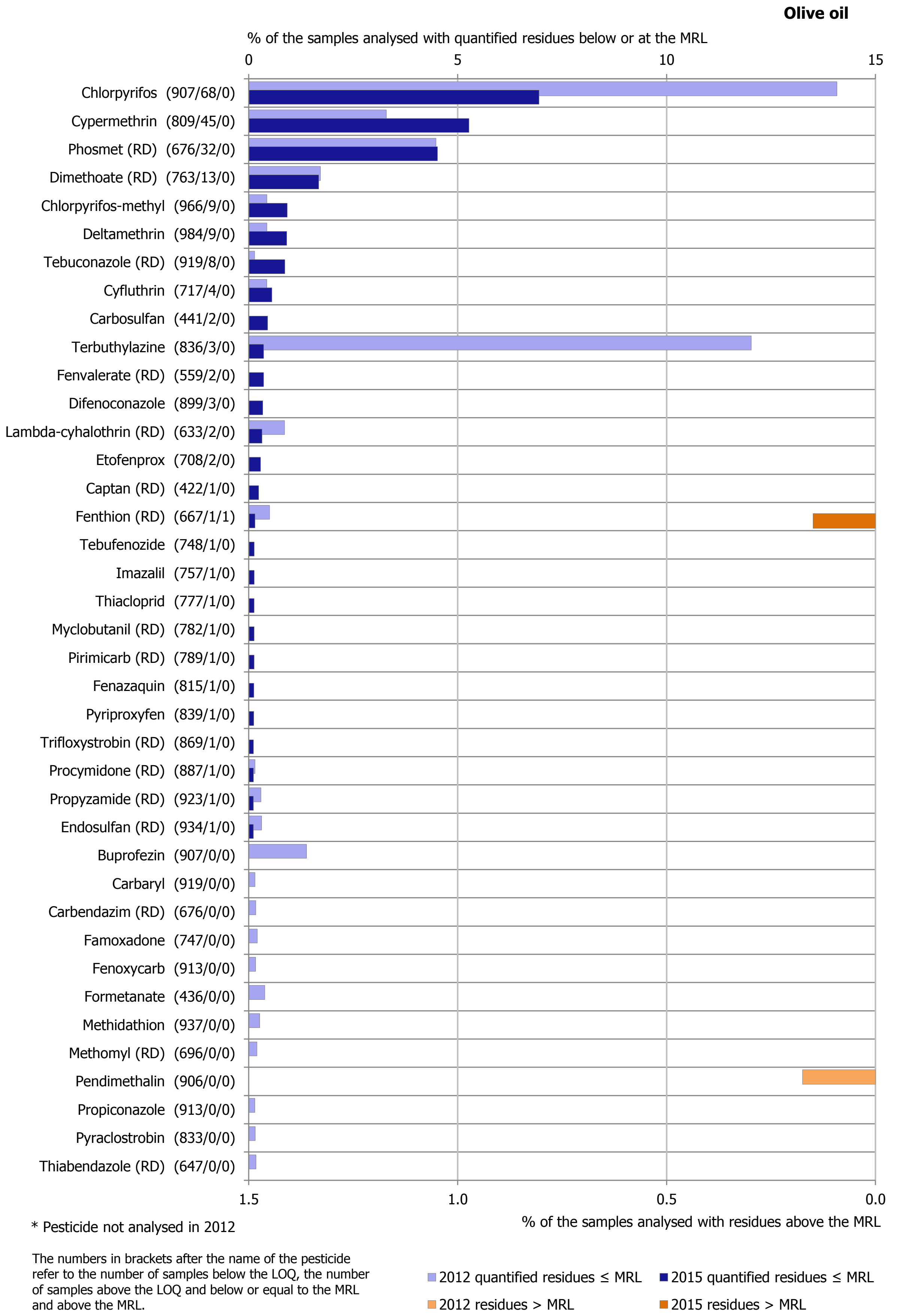


Figure 13: Percentage of olive oil samples with quantified residues below or equal to the MRL and with residues above the MRL

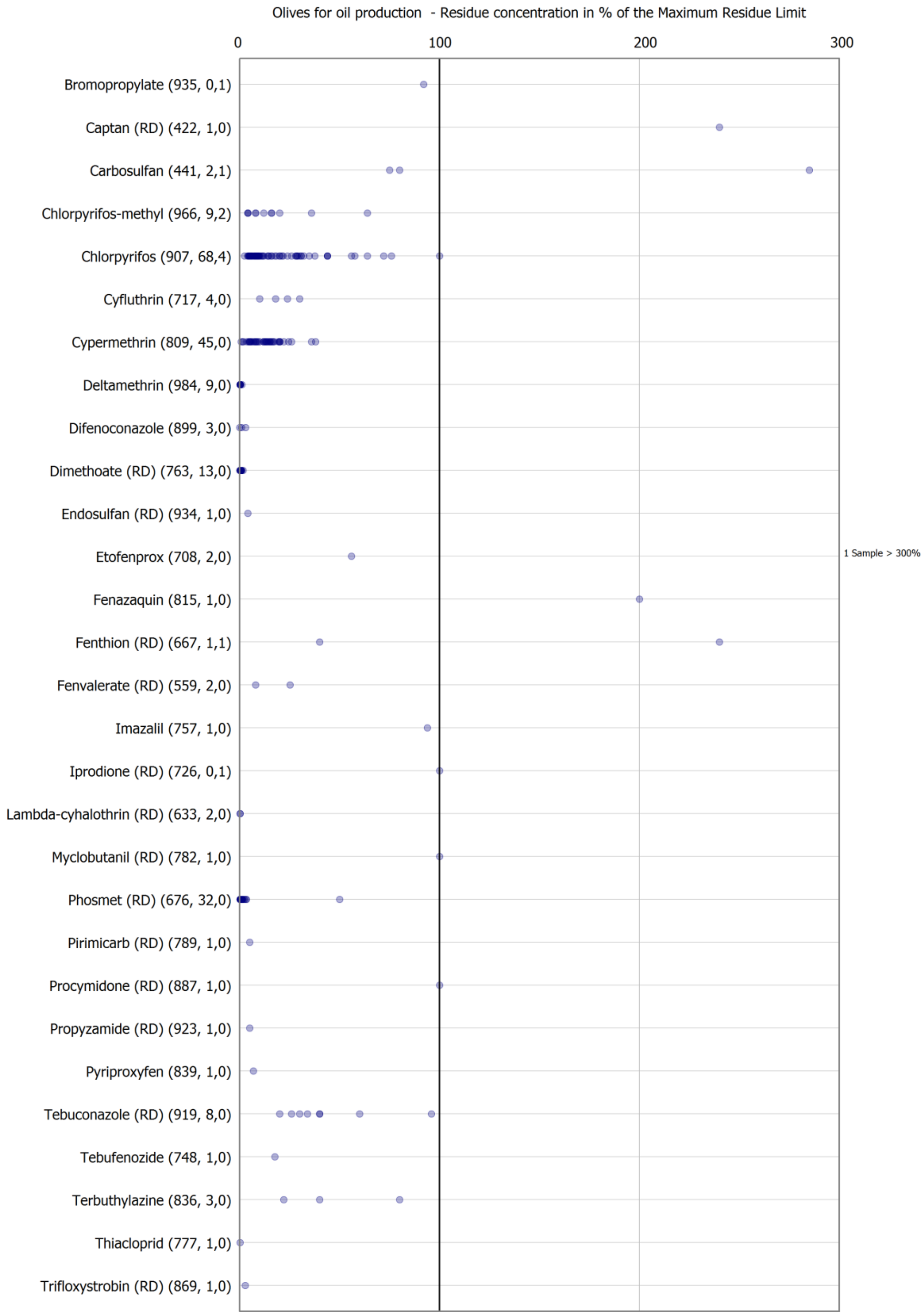


Figure 14: Residue concentrations measured in olive oil, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.3.5. Orange juice

In 2015, 756 samples of orange juice were analysed; in 641 samples (84.8%), no quantifiable pesticide residues were found, while 115 samples (15.2%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 42 samples (5.6%); up to 7 different pesticides were reported in an individual orange juice sample (Figure 15). Compared to 2012, the overall quantification rate decreased (2012 samples: 31.2% contained pesticide residues).

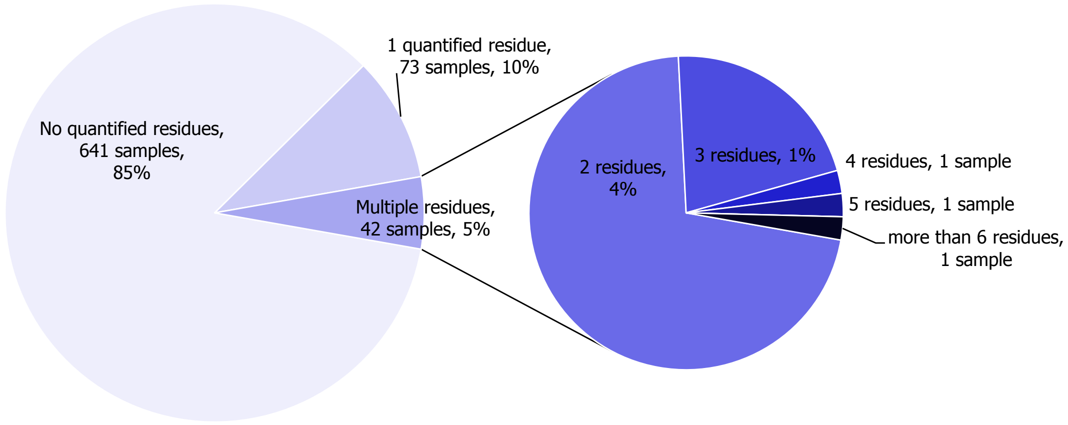


Figure 15: Number of quantified residues in individual orange juice samples

In total, 18 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were imazalil (quantified in 10.6% of the tested samples), thiabendazole (4.3%) and carbendazim (2.5%).

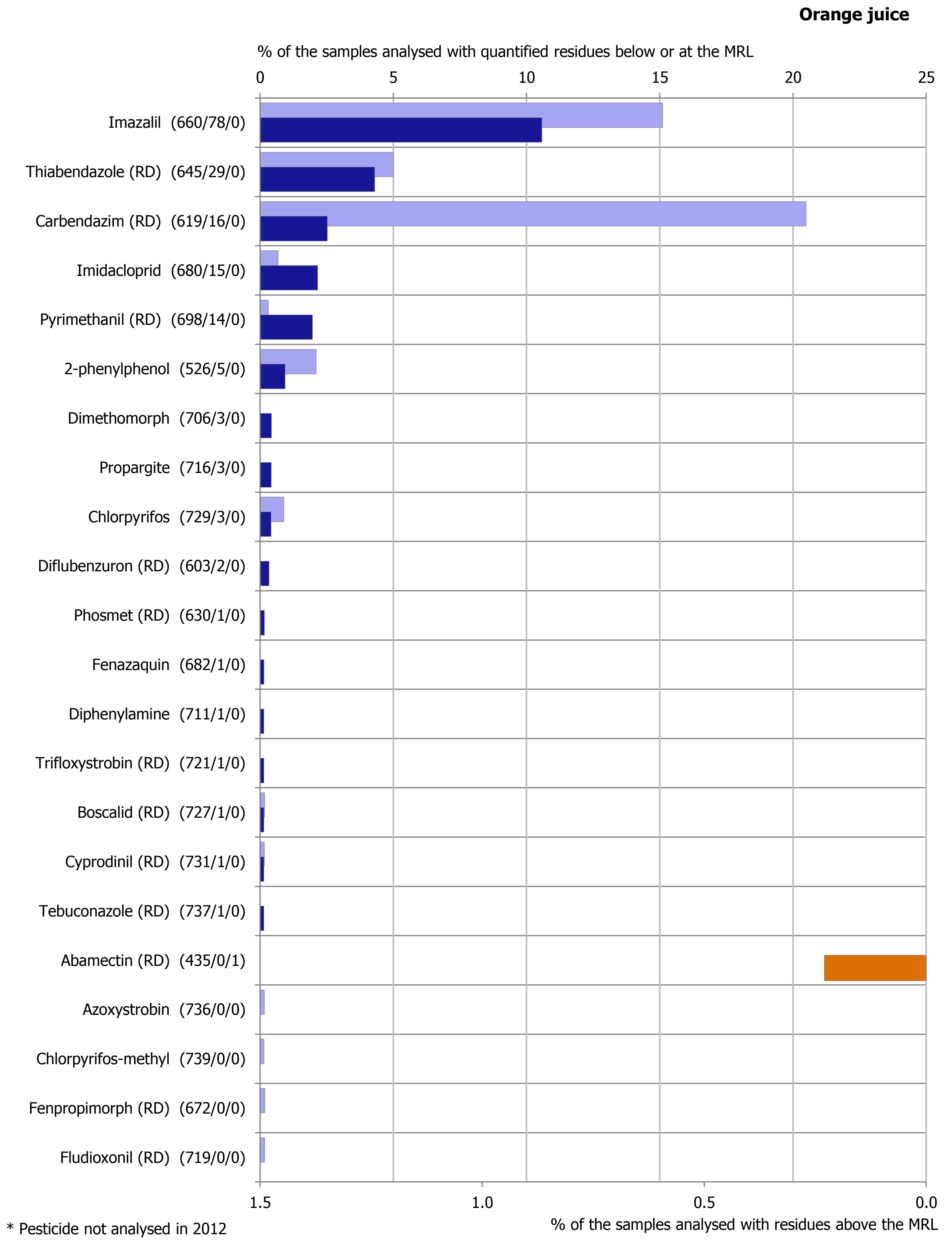
For one sample containing residues of abamectin, the reporting country (Belgium) identified an MRL exceedance (0.1%), by comparing the residue level measured in juice (0.012 mg/kg) with the MRL established for unprocessed oranges (0.01 mg/kg).

Figure 16 depicts the results for the most frequently quantified pesticides with residues below or at the MRL. Compared to 2012, the quantification rate was lower for carbendazim and imazalil, whereas imidacloprid and pyrimethanil were found slightly more frequently.

For orange juice, EFSA did not prepare a figure plotting the measured residue concentration as percentage of the respective MRLs. For this type of presentation of the results, individual processing factors would be required for all the pesticides measured which are currently not available to EFSA.

Table 5: Pesticides most frequently quantified in orange juice in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Imazalil	10.6	Approved fungicide
Thiabendazole (RD)	4.3	Approved fungicide
Carbendazim (RD)	2.5	Approved fungicide
Imidacloprid	2.2	Approved insecticide
Pyrimethanil (RD)	1.9	Approved fungicide



* Pesticide not analysed in 2012

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.

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

3.3.6. Peas (without pods)

In 2015, 832 samples of pears were analysed; in 625 samples (75.1%), no quantifiable pesticide residues were found, while 207 samples (24.9%) contained one or several pesticides in quantifiable concentrations. Multiple residues were reported in 79 samples (9.5%); up to 6 different pesticides were reported in an individual sample (Figure 17). The overall quantification rate is in a similar range compared to that of 2012 (21.5% of the samples with at least one residue).

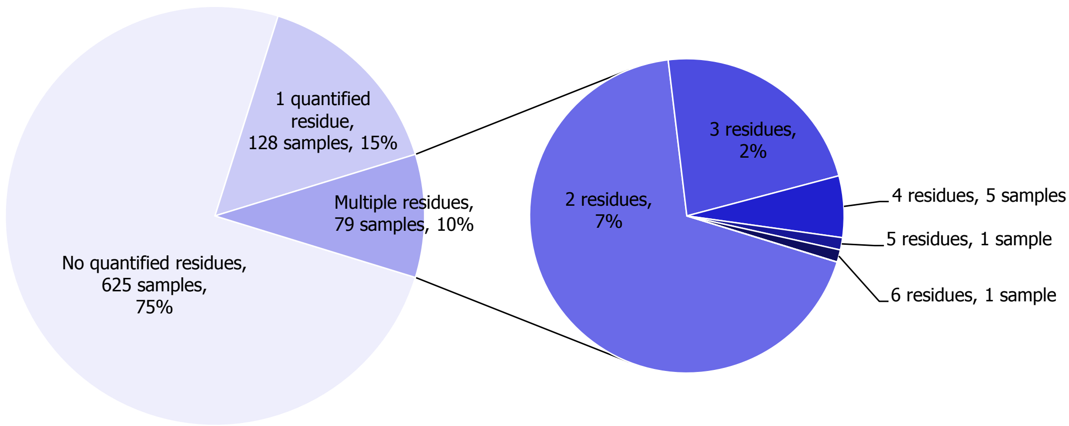


Figure 17: Number of quantified residues in individual samples of peas (without pods)

In 0.6% of the samples (5 samples), the residue concentrations exceeded the MRLs; 0.5% of the samples (4 samples) were reported as non-compliant, taking into account the measurement uncertainty. These MRL exceedances were related to products grown in the EU.

In total, 19 different pesticides were found in concentrations equal to or greater than the LOQ (Figure 18). The most frequently found pesticides were boscalid (quantified in 13.2% of the tested samples), carbendazim (6.8%), pyrimethanil (6.3%) and azoxystrobin (5.8%). The MRL was exceeded for 5 pesticides, most frequently for carbendazim (Belgium and unknown origin).

Figure 18 depicts the results for all pesticides with MRL exceedances and the most frequently quantified pesticides with residues below or at the MRL. Compared to 2012, the quantification rate was in the same range for most pesticides, except for boscalid, azoxystrobin and thiacloprid where an increased frequency of quantification was observed. The quantification rate for pyrimethanil and cyprodinil has decreased compared to 2012. For a number of pesticides MRL exceedances were noted only in 2015 (i.e. carbendazim, thiophanate-methyl, captan, propamocarb and spiromesifen).

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 peas (without pods) in 2015 in at least 10% of the samples is compiled in Table 6.

Table 6: Pesticides most frequently quantified in peas (without pods) in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Boscalid (RD)	13.2	Approved fungicide
Carbendazim (RD)	6.8	Fungicide approved until 11/2014. Carbendazim is also a metabolite of thiophanate-methyl (approved).
Pyrimethanil (RD)	6.3	Approved fungicide
Azoxystrobin	5.8	Approved fungicide

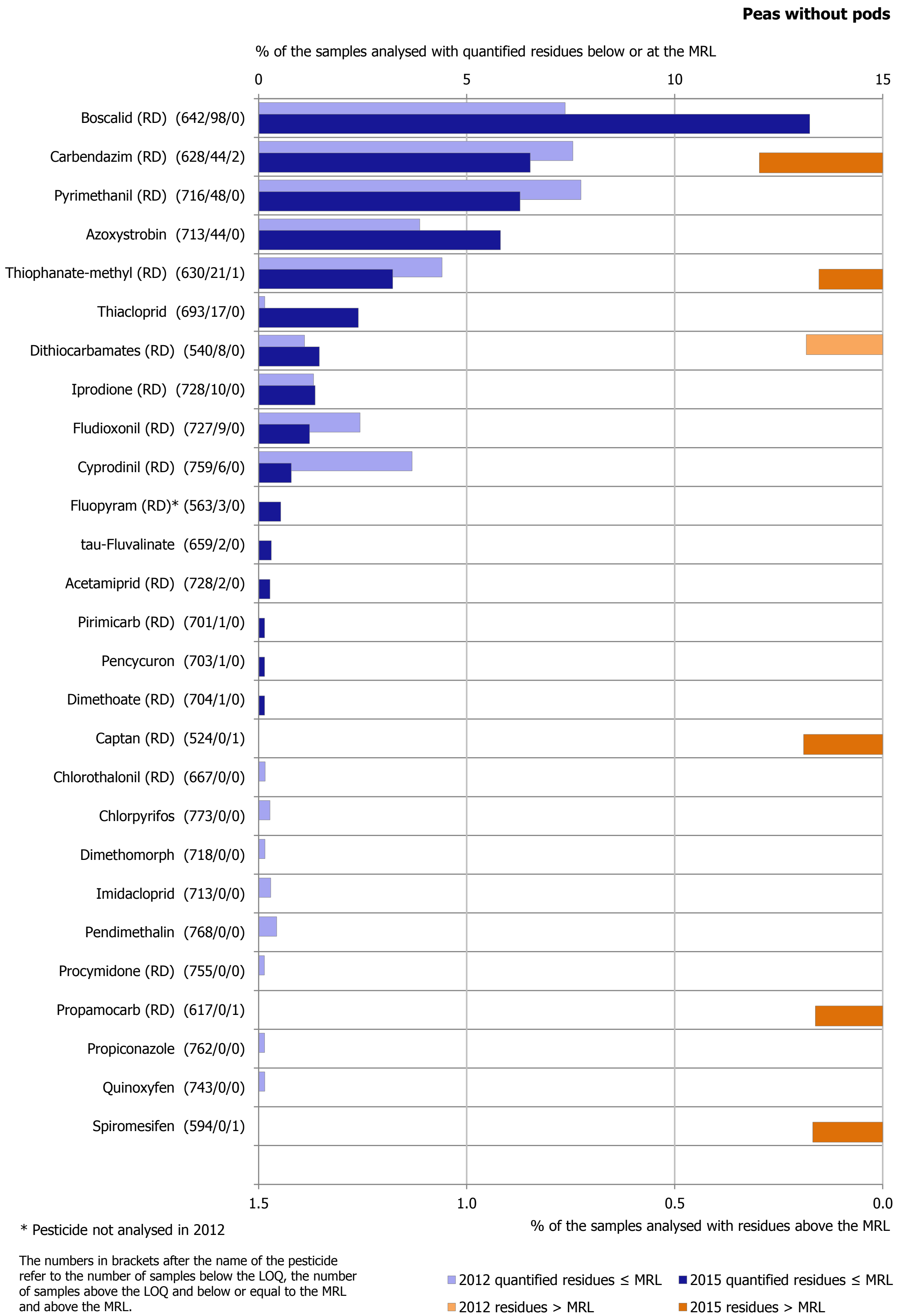


Figure 18: Percentage of samples of peas (without pods) with quantified residues below or equal to the MRL and with residues above the MRL

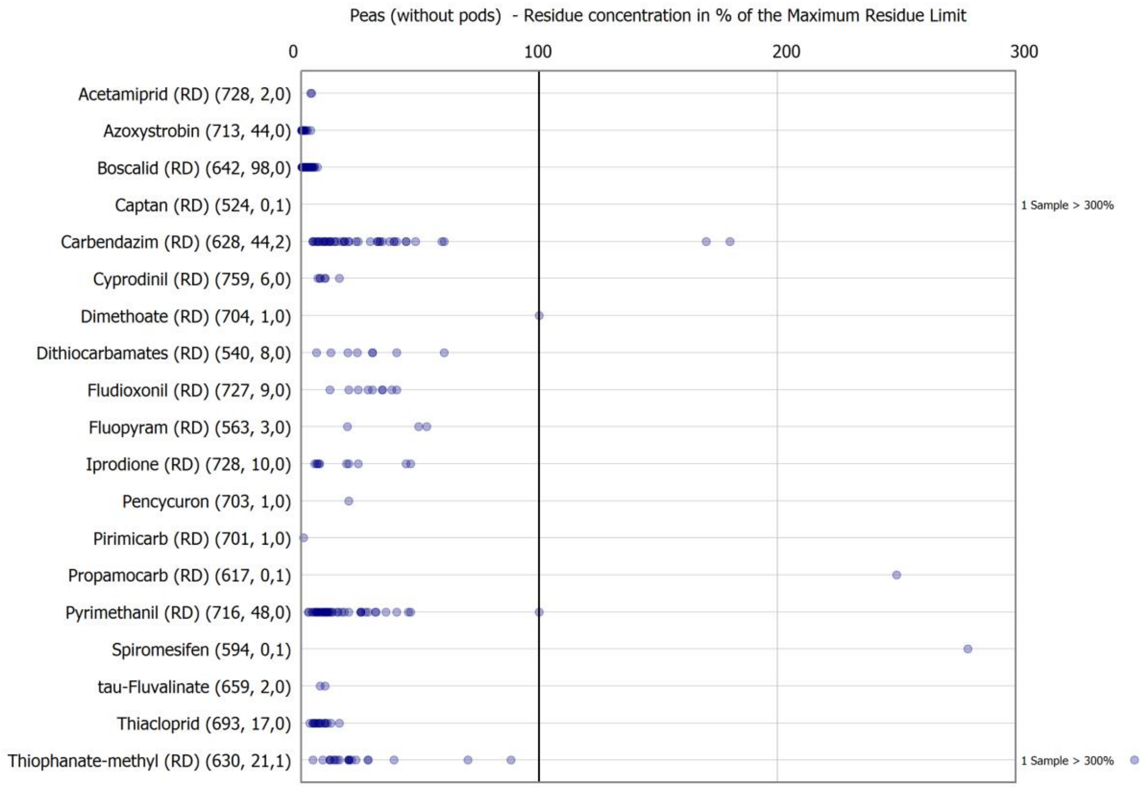


Figure 19: Residue concentrations measured in samples of peas (without pods), expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.3.7. Peppers (sweet)

In 2015, 1,386 samples of sweet peppers were analysed; in 723 samples (52.2%), no quantifiable pesticide residues were found, while 663 samples (47.8%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 338 samples (24.4%); up to 11 different pesticides were reported in an individual sweet pepper sample (Figure 20). The overall quantification rate is the same than in 2012 (47.4% of the samples contained pesticide residues).

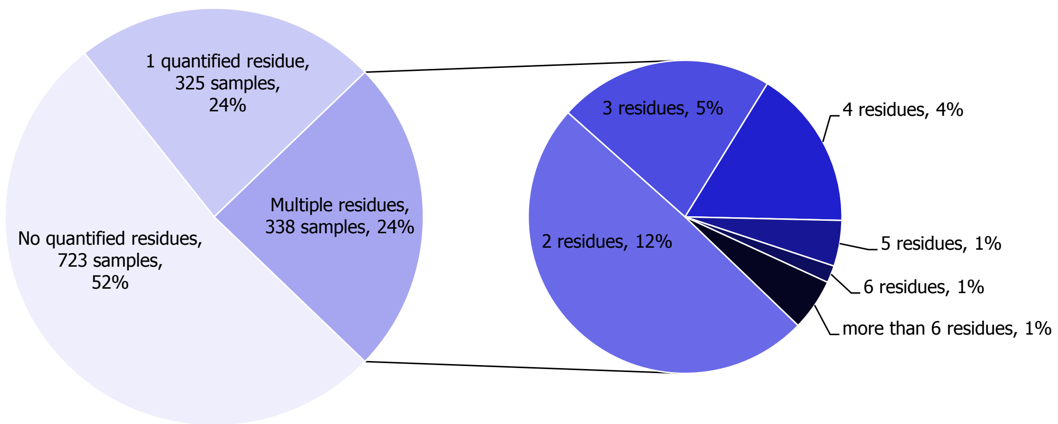


Figure 20: Number of quantified residues in individual peppers (sweet) samples

In 0.8% of the samples (11 samples), the residue concentrations exceeded the MRLs; 0.5% of the samples (7 samples) were reported as non-compliant, taking into account the measurement uncertainty. MRL exceedances were related to products grown in the EU (9 samples), in Turkey (one sample) and in Serbia (one sample).

In total, 71 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were bromide ion (quantified in 18.1% of the tested samples) and flutriafol (15.5%). It is noted that bromide ion also originates from natural sources and past uses. The MRL was exceeded for 9 different pesticides, most frequently for ethephon (2 samples from Poland) and lambda-cyhalothrin (2 samples from Malta and Romania). MRL exceedances were noted for the first time for diniconazole, propargite, azinphos-methyl and fenthion.

Figure 21 depicts the results for all pesticides with MRL exceedances and all quantified pesticides with residues below or at the MRL. Compared to 2012, the quantification rate was in the same range for most pesticides, except for propamocarb where a decreased quantification rate was observed.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 22. Further information on the most frequently quantified pesticides found in peppers (sweet) in 2015 in at least 5% of the samples is compiled in Table 7.

Table 7: Pesticides most frequently quantified in peppers (sweet) in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009) and comments
Bromide ion	18.1	Naturally occurring substance and metabolite of the pesticide methyl bromide. Since 2009, methyl bromide is no longer approved at EU level.
Flutriafol	15.5	Approved fungicide
Fludioxonil (RD)	7.1	Approved fungicide
Boscalid (RD)	5.9	Approved fungicide
Azoxystrobin	5.4	Approved fungicide

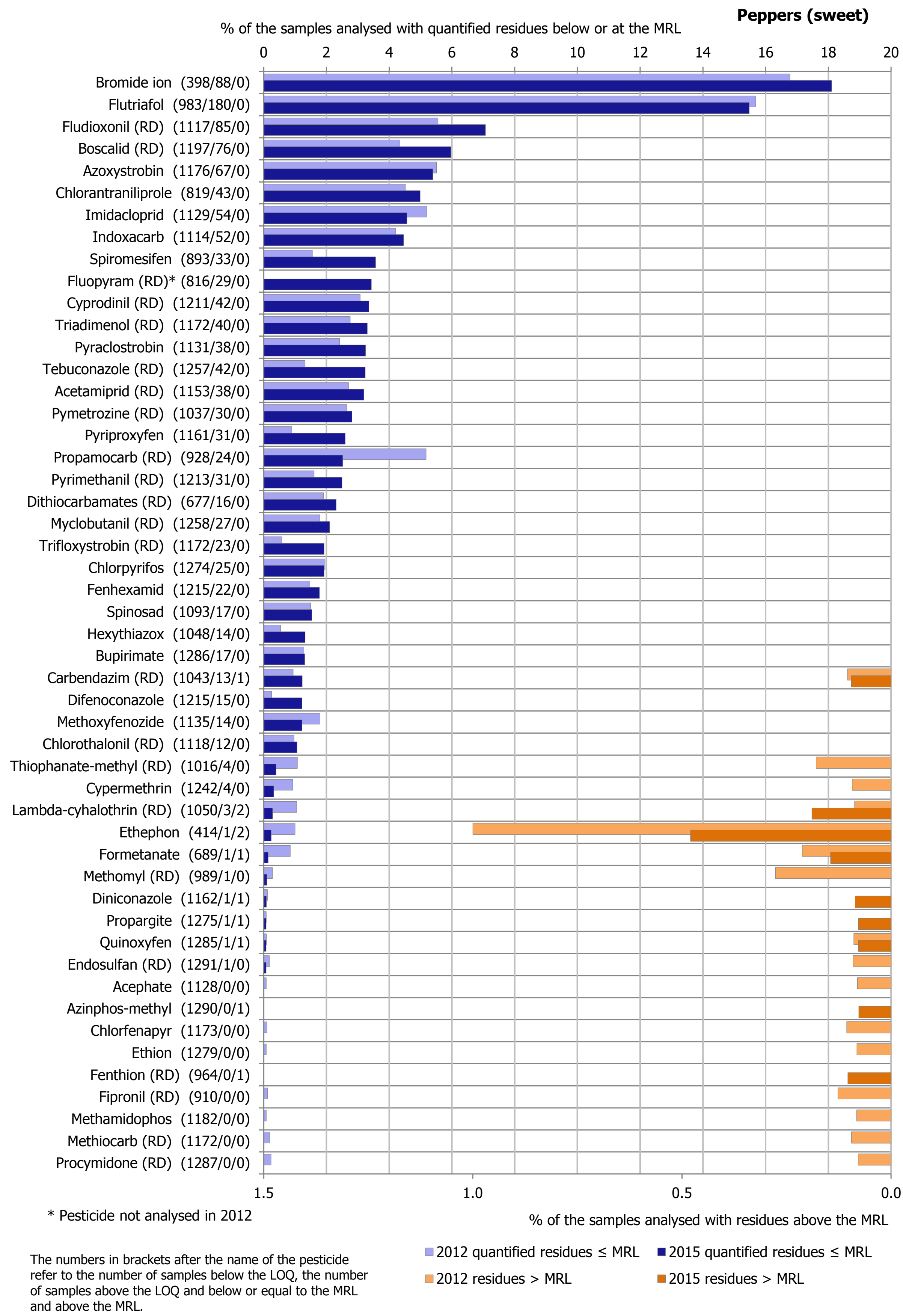


Figure 21: Percentage of peppers (sweet) samples with quantified residues below or equal to the MRL and with residues above the MRL

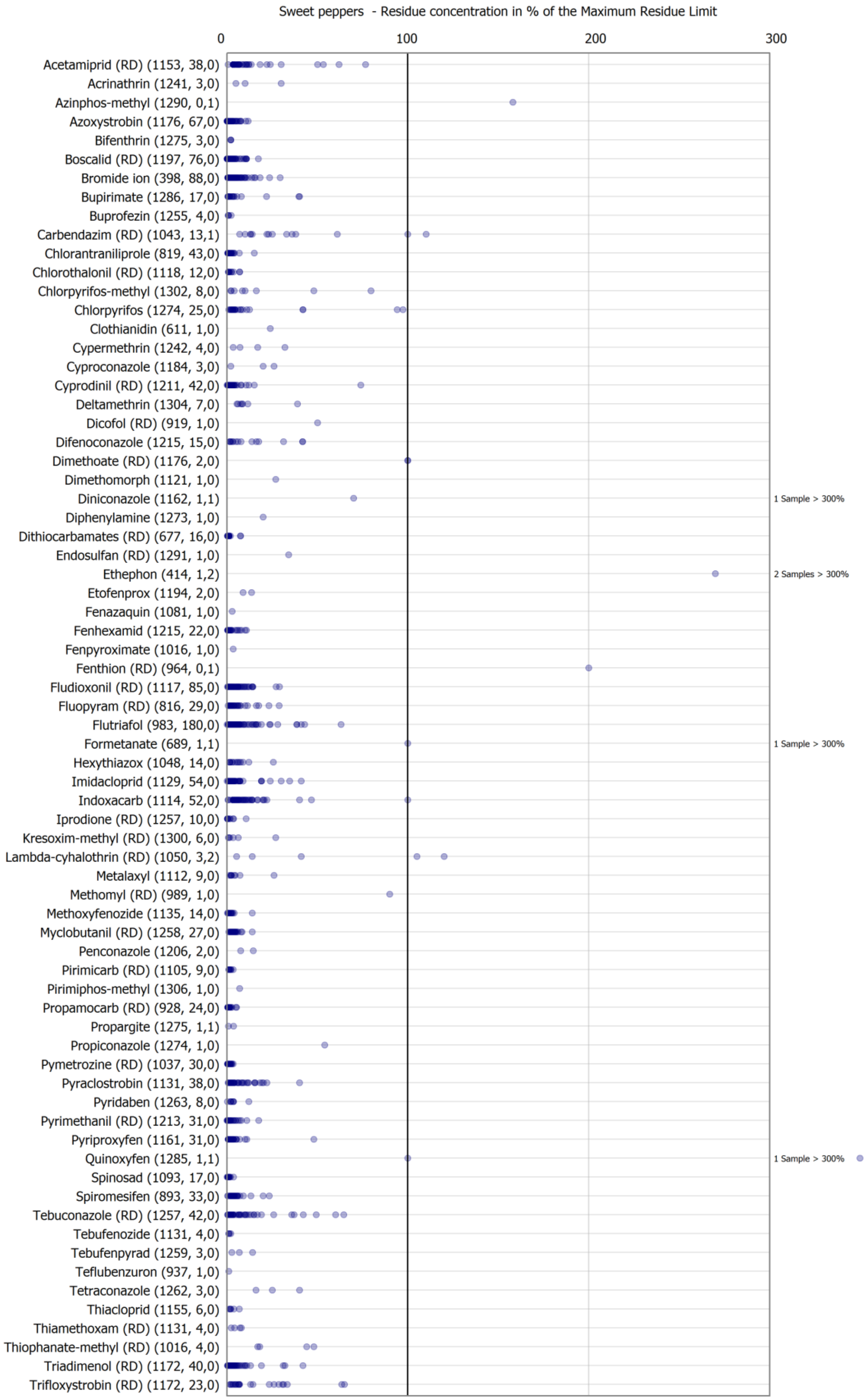


Figure 22: Residue concentrations measured in peppers (sweet), expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.3.8. Table grapes

In 2015, 1,287 samples of table grapes were analysed; in 292 samples (22.7%), no quantifiable pesticide residues were found, while 995 samples (77.3%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 750 samples (58.3%); up to 19 different pesticides were reported in an individual table grapes sample from Turkey (Figure 23). The overall quantification rate was similar in 2012 (77% of the samples contained pesticide residues).

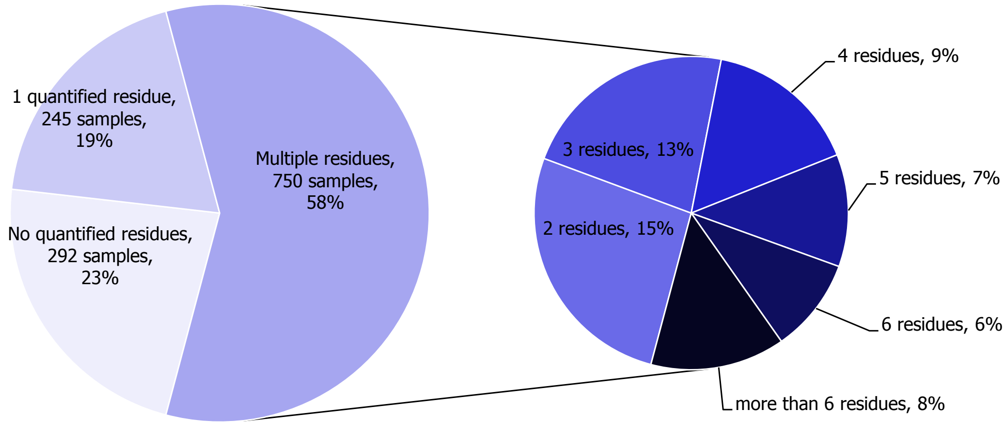


Figure 23: Number of quantified residues in individual table grapes samples

In 1.7% of the samples (22 samples), the residue concentrations exceeded the MRLs; 1.2% of the samples (15 samples) were reported as non-compliant, taking into account the measurement uncertainty. The MRL exceedances were mainly related to products grown in the EU (16 samples).

In total, 80 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides are fungicides, such as boscalid (quantified in 21.9% of the tested samples), dimethomorph (19.7%), dithiocarbamates (18.9%) and fenhexamid (18.2%), together with the plant growth regulator ethephon (19.8%) (Table 8). The MRL was exceeded for 11 different pesticides, most frequently for ethephon (6 samples: 2 from Cyprus, 1 from Egypt, 1 from Greece, 1 from Namibia, 1 from Peru) and tebuconazole (4 samples: 2 from Cyprus, 2 from Turkey).

Figure 24 depicts the results for all pesticides with MRL exceedances and the most frequently quantified pesticides with residues below or at the MRL. Compared to 2012, the quantification rate increased for several pesticides, such as dimethomorph, metalaxyl, dithiocarbamates, mandipropamid while a decline was noted for fenhexamid, imidacloprid and trifloxystrobin particularly. For a number of pesticides, MRL exceedances were observed in 2015 but not in 2012 (penconazole, pyrimethanil, tebuconazole, formetanate, methomyl, abamectin), while for some other pesticides, MRL exceedances were identified only in 2012 (dithiocarbamates, chlormequat, thiophanate-methyl, acrinathrin, azinphos-methyl, chlorfenapyr, diphenylamine, ethion, malathion, monocrotophos, procymidone).

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 25. Further information on the most frequently quantified pesticides found in table grapes in 2015 in at least 5% of the samples is compiled in Table 8.

Table 8: Pesticides most frequently quantified in table grapes in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Boscalid (RD)	21.9	Approved fungicide
Ethephon	19.8	Approved plant growth regulator
Dimethomorph	19.7	Approved fungicide
Dithiocarbamates (RD)	18.9	Approved fungicides
Fenhexamid	18.2	Approved fungicide

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Cyprodinil (RD)	18.0	Approved fungicide
Fludioxonil (RD)	16.1	Approved fungicide
Myclobutanil (RD)	14.0	Approved fungicide
Fluopyram (RD)	12.1	Approved fungicide
Penconazole	11.6	Approved fungicide
Pyrimethanil (RD)	10.1	Approved fungicide

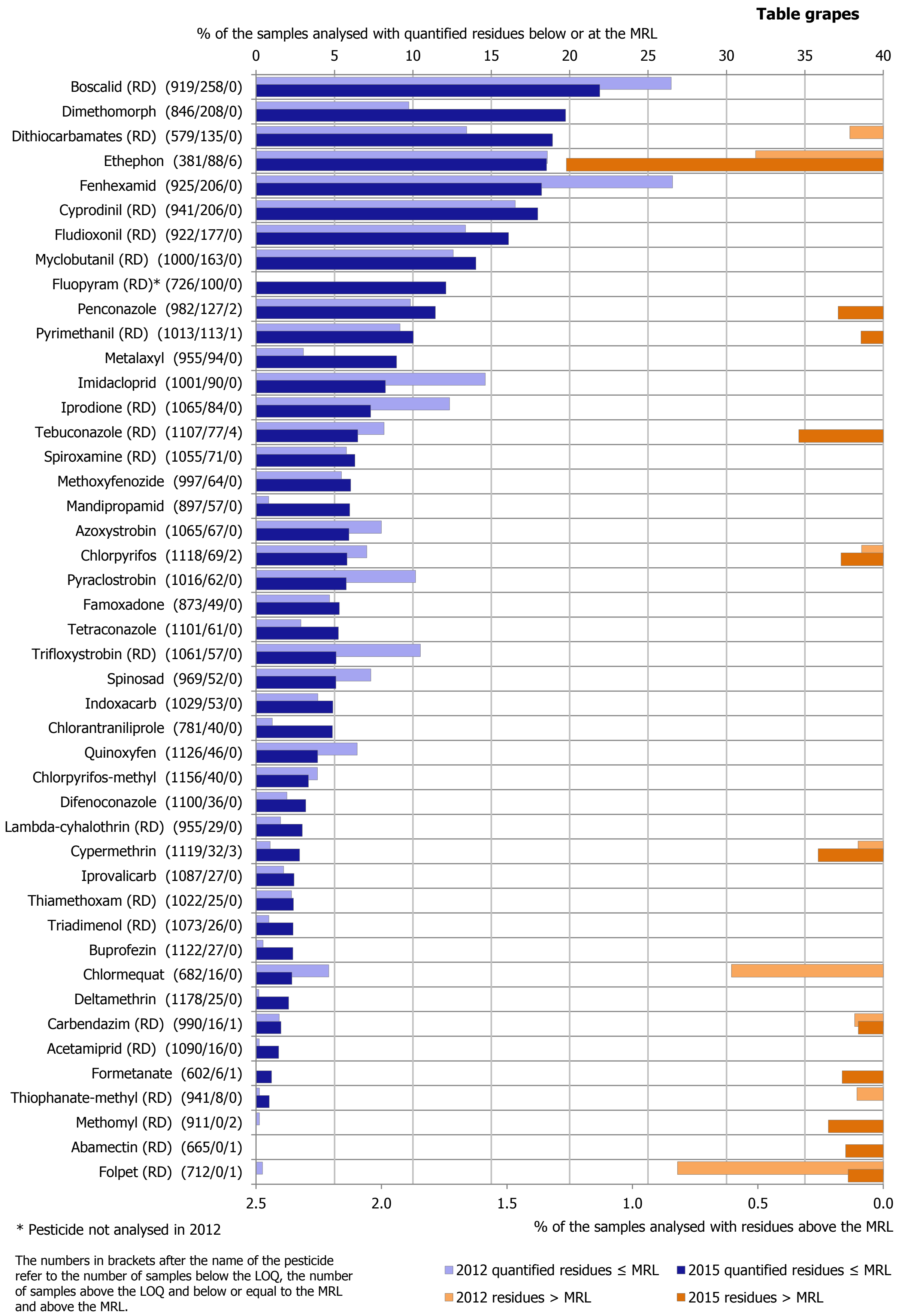


Figure 24: Percentage of table grapes samples with quantified residues below or equal to the MRL and with residues above the MRL

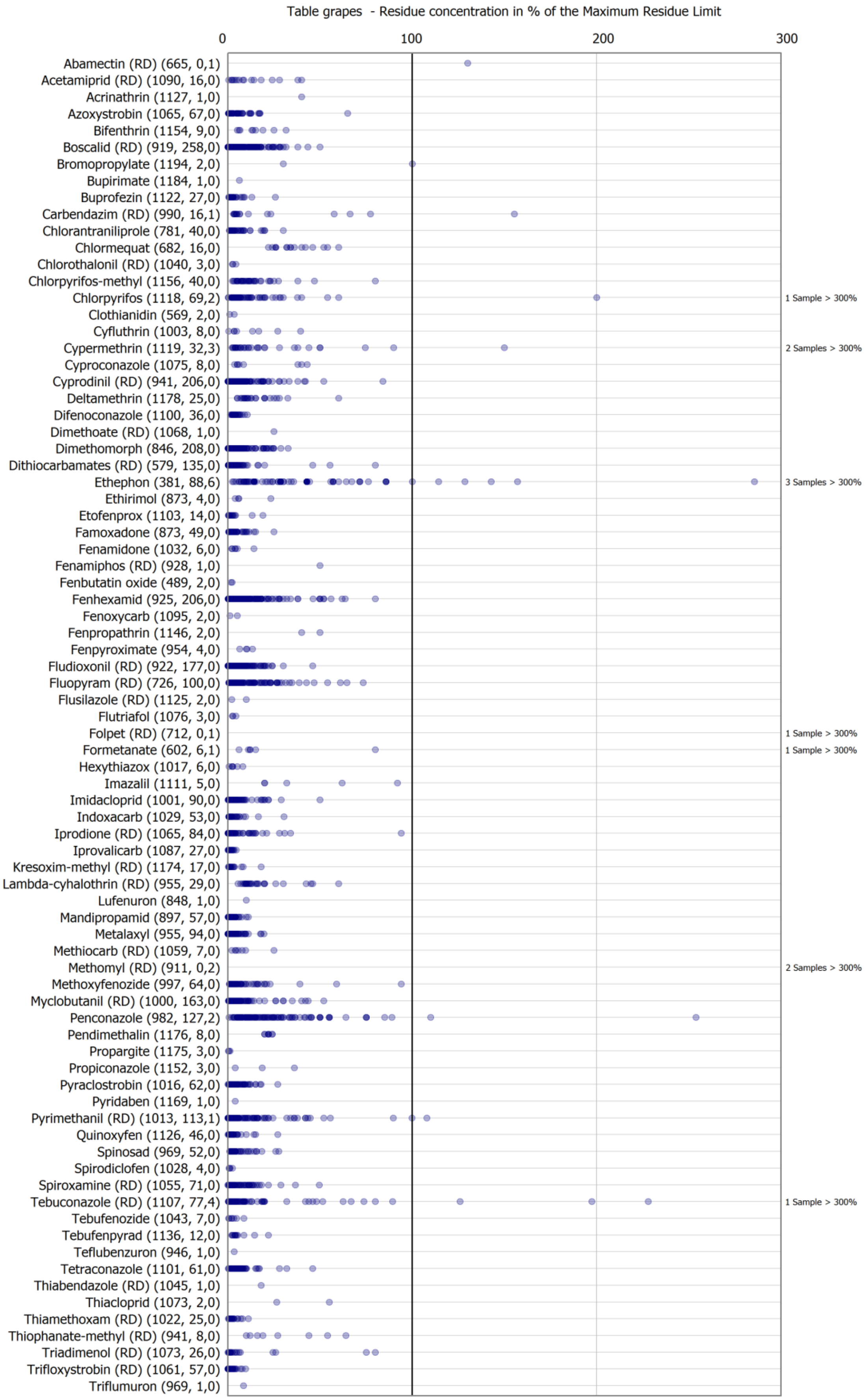


Figure 25: Residue concentrations measured in table grapes, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.3.9. Wheat

In total, 851 samples of unprocessed wheat were analysed in 2015; in 527 samples (61.9%) no quantifiable pesticide residues were found, while 324 samples (38.1%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 122 samples (14.3%); up to 5 different pesticides were reported in an individual wheat sample (Figure 26). The overall quantification rate is similar than the 2012 quantification rate (39.7%).

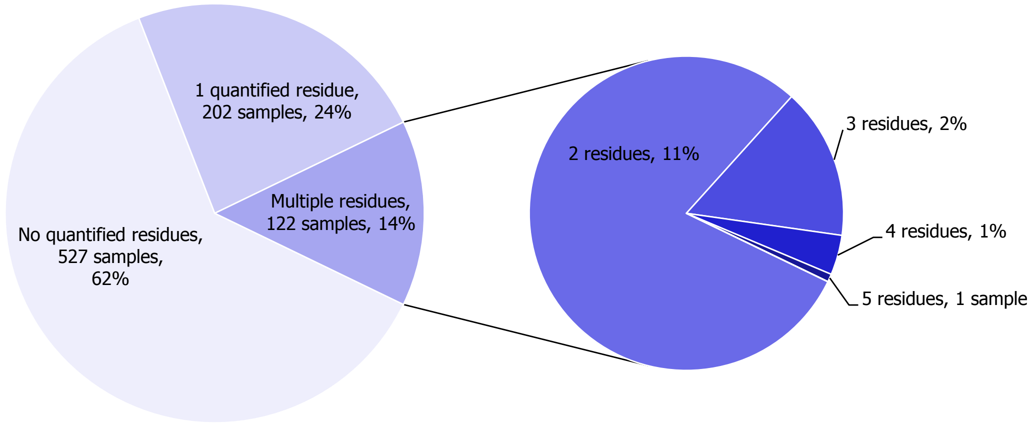


Figure 26: Number of quantified residues in individual wheat samples

In 0.6% of the samples (5 samples), the residue concentrations exceeded the MRLs. 0.2% of the samples (2 samples) were reported as non-compliant, taking into account the measurement uncertainty. The MRL exceedances were all related to EU products.

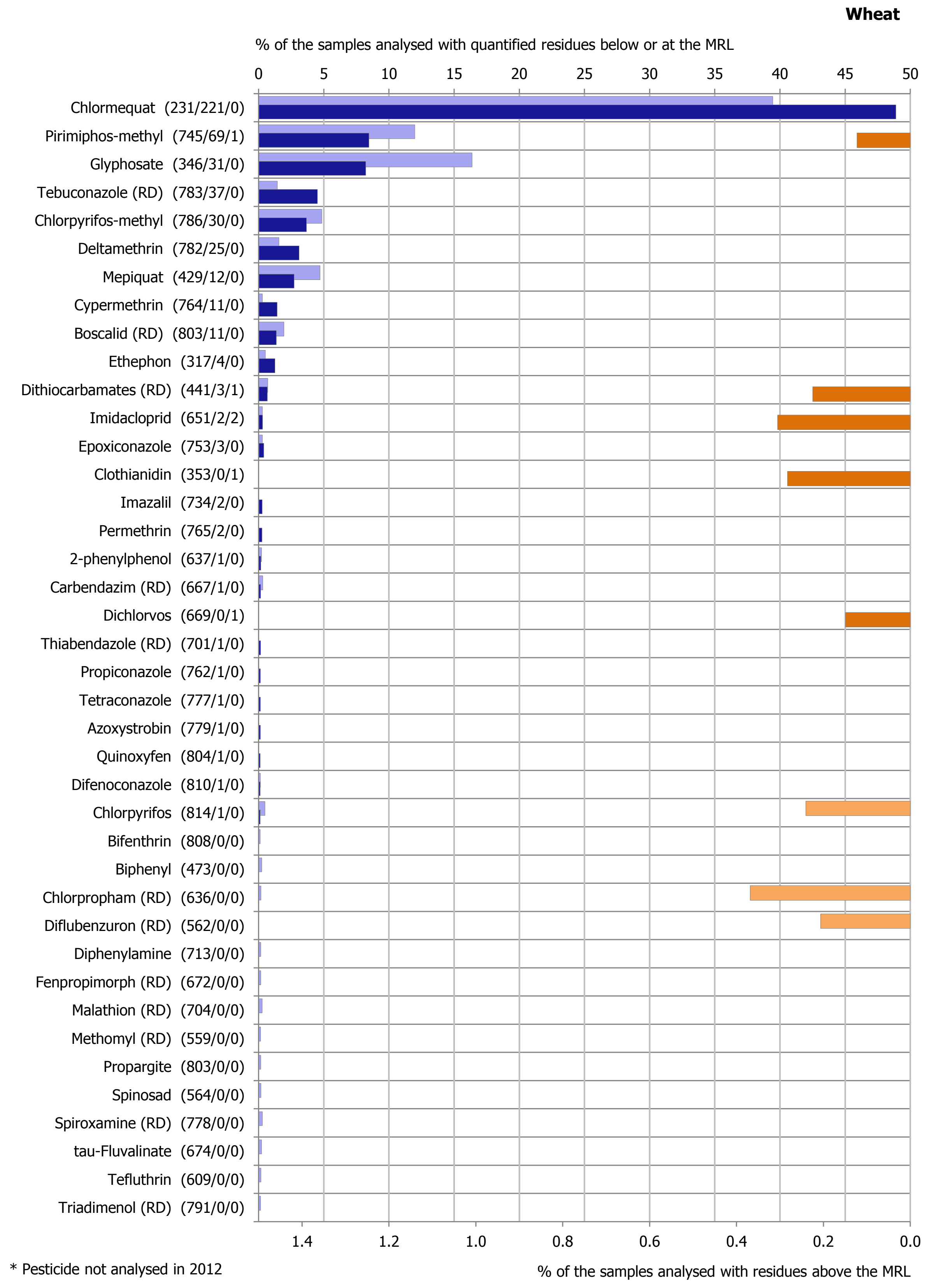
In total, 26 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were chlormequat (quantified in 48.9% of the tested samples), pirimiphos-methyl (8.6%) and glyphosate (8.2%). The MRL was exceeded for 5 different pesticides, most frequently for imidacloprid (2 samples from Romania). For one sample of these samples, MRL exceedances were observed both for imidacloprid and for clothianidin.

Figure 27 depicts the results for all pesticides with MRL exceedances and all quantified pesticides with residues below or at the MRL. Compared to 2012, the pesticide spectrum was comparable, with a higher quantification rate for chlormequat (+9.4%) in 2015, and a lower quantification rate for glyphosate (-8.2%) and pirimiphos-methyl (-3.4%). MRL exceedances identified in 2015 were not observed for the same pesticides in 2012.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 28. Further information on the most frequently quantified pesticides found in wheat in 2015 in at least 5% of the samples is compiled in Table 9.

Table 9: Pesticides most frequently quantified in wheat in 2015

Pesticide	% samples above LOQ	Approval status in 2015 (Reg. 1107/2009)
Chlormequat	48.9	Approved plant growth regulator
Pirimiphos-methyl	8.6	Approved insecticide
Glyphosate	8.2	Approved herbicide
Tebuconazole (RD)	4.5	Approved fungicide
Chlorpyrifos-methyl	3.7	Approved insecticide
Deltamethrin	3.1	Approved insecticide
Mepiquat	2.7	Approved plant growth regulator



* Pesticide not analysed in 2012

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.

Figure 27: Percentage of wheat samples with quantified residues below or equal to the MRL and with residues above the MRL

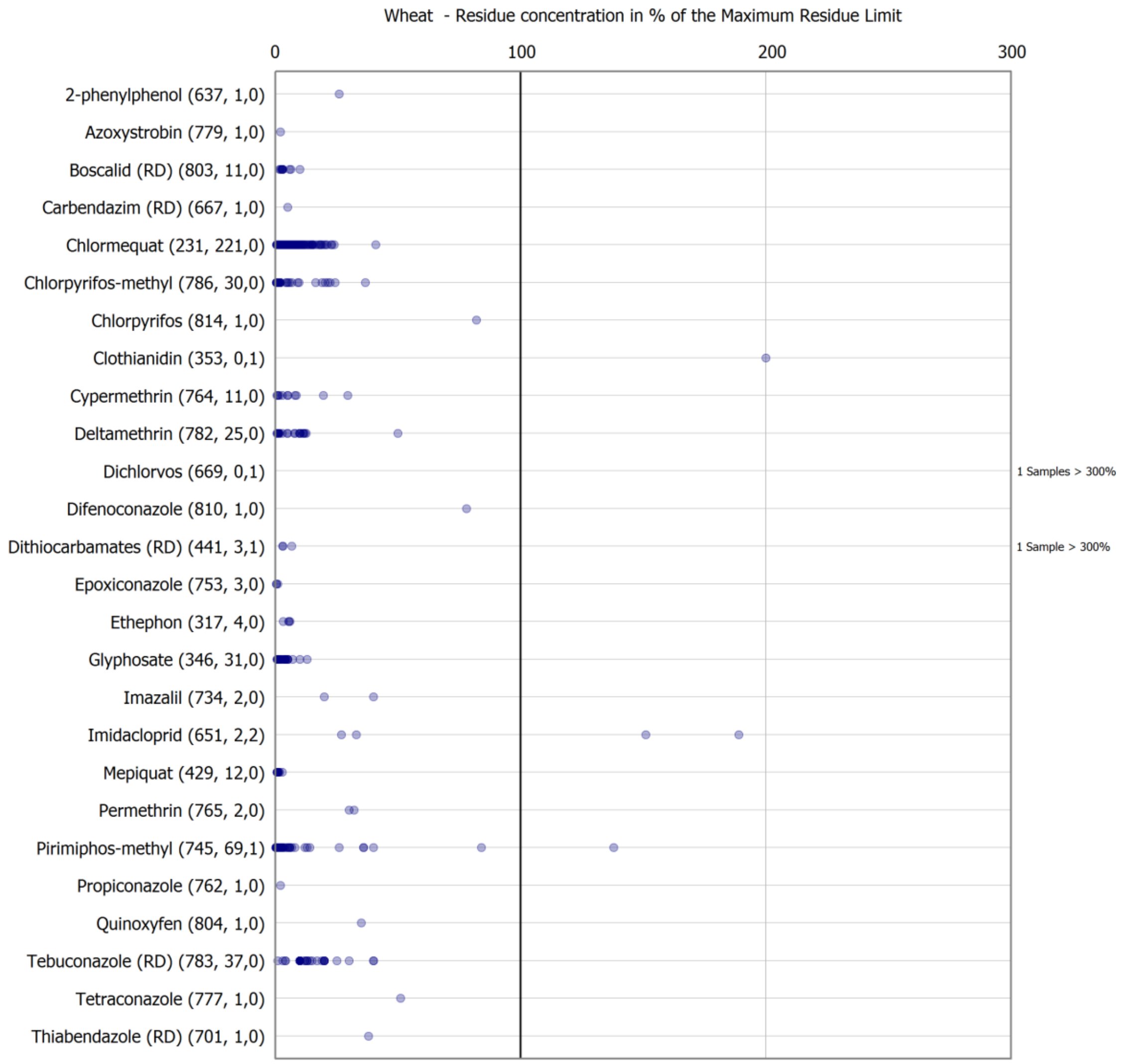


Figure 28: Residue concentrations measured in wheat, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.3.10. Butter

In 2015, 616 samples of butter were analysed. In 537 samples (87.2%), no quantifiable pesticide residues were found, while 79 samples (12.8%) contained one or several pesticides in quantified concentrations. Multiple residues were reported in 23 samples (3.7%); up to 3 different pesticides were found in an individual butter sample (Figure 29). Compared to 2012, the overall quantification rate slightly decreased (2012 samples: 16.6% contained pesticide residues).

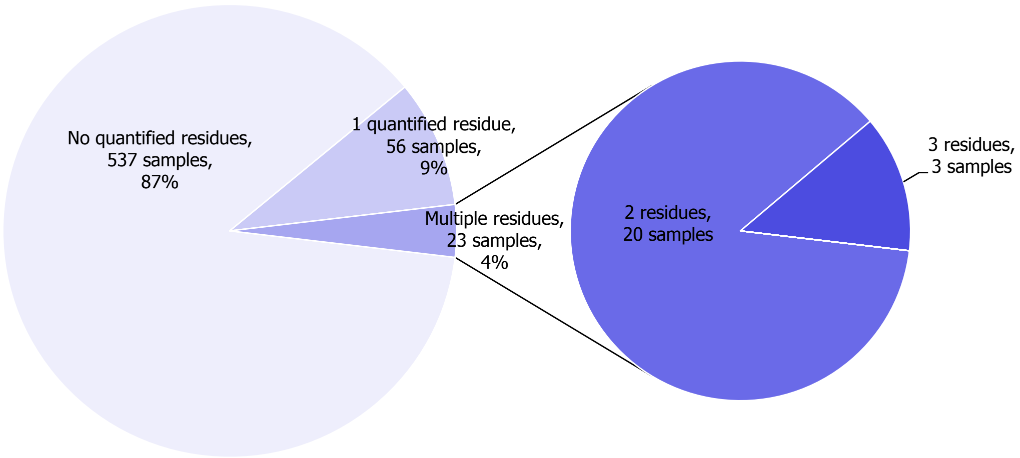


Figure 29: Number of quantified residues in individual butter samples

No MRL exceedance has been identified for these samples, using the most appropriate processing factor[28].

In total, 4 different pesticides were found in concentrations equal to or greater than the LOQ. Figure 30 depicts the results for all quantified pesticides. The most frequently found pesticides were DDT (quantified in 10.7% of the tested samples) and hexachlorobenzene (7.2%). The quantification rate decreased in 2015 compared to 2012. Moreover, 6 substances found in 2012 are no longer found in 2015.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 31.[29] Further information on the most frequently quantified pesticides found in butter in 2015 is compiled in Table 10.

Table 10: Pesticides most frequently quantified in butter in 2015

Pesticide	% samples above LOQ	Approval status and comments
DDT (RD)	10.7	Persistent organic pollutants, banned at international level (Stockholm Convention, (UNEP, 2001); Regulation (EC) No 850/2004).
Hexachlorobenzene	7.2	
Dieldrin (RD)	1.1	

[28] Since the quantified pesticides are all fat soluble, the inverse processing factor of 0.05 was applied for recalculation of the residue concentration measured in butter to milk assuming a fat content of 80 % in butter and 4 % in milk.

[29] For the recalculation of the milk MRLs for fat soluble pesticides to the legal limit applicable for butter, a default processing factor was used (PF 20).

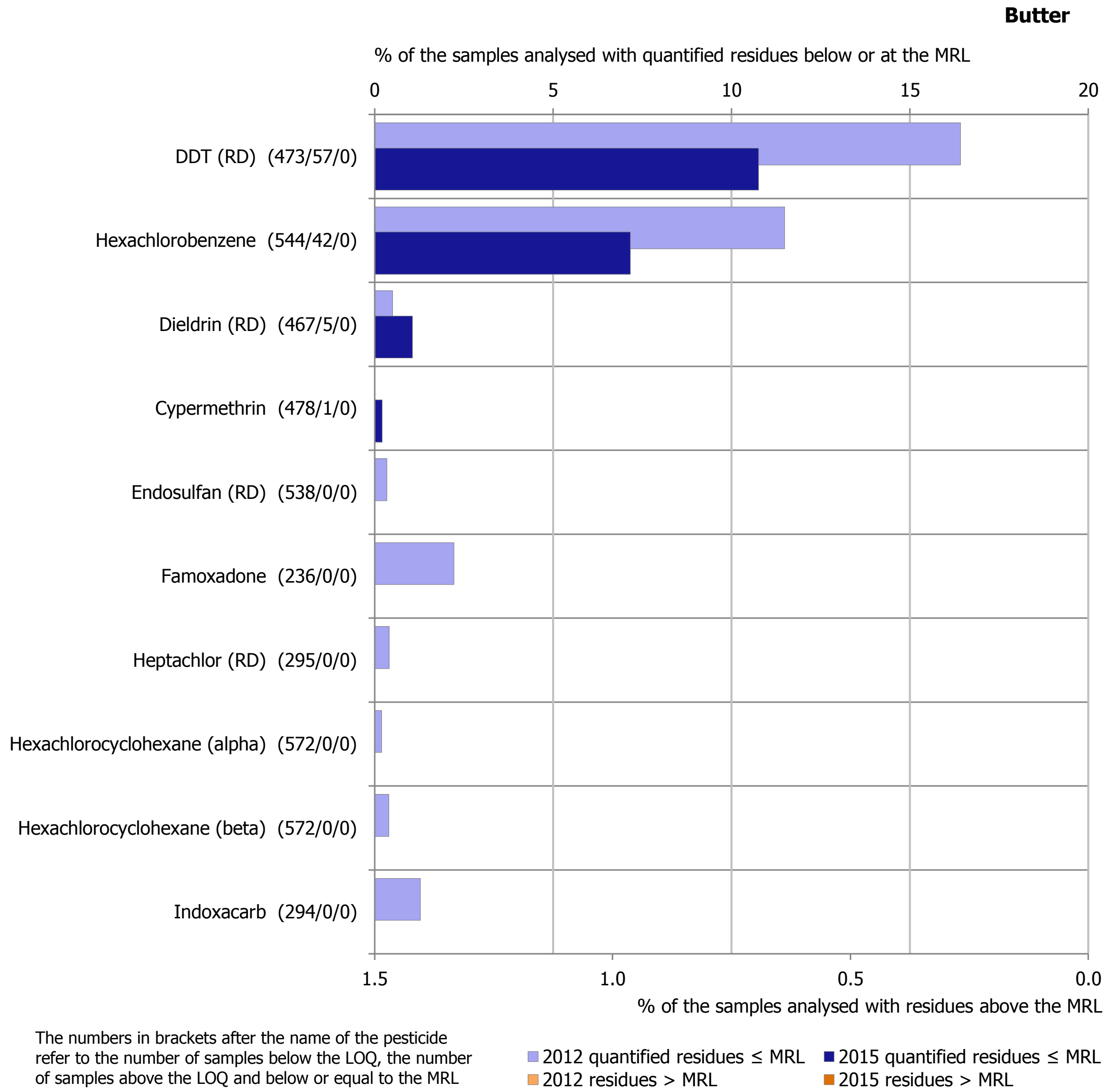


Figure 30: Percentage of butter samples with quantified residues below or equal to the MRL and with residues above the MRL

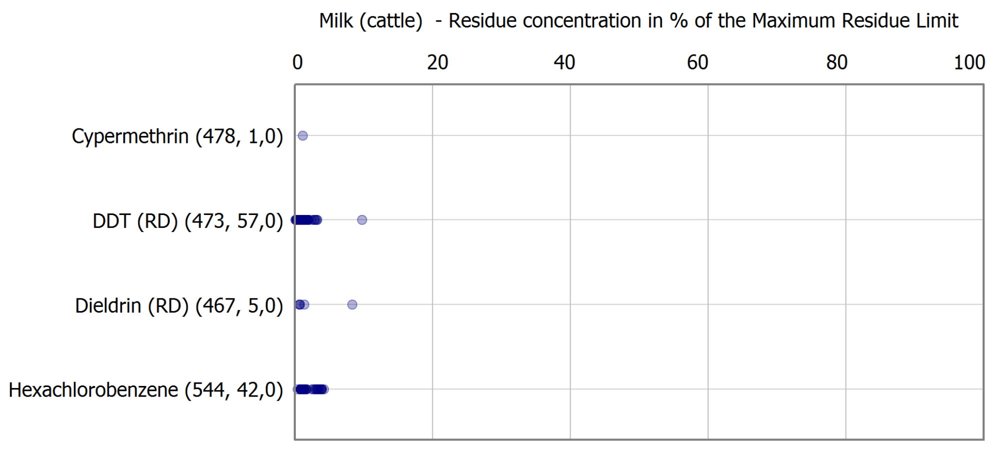


Figure 31: Residue concentrations measured in butter, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.3.11. Eggs (chicken)

In 2015, 842 chicken eggs were analysed. In 806 samples (95.7%), no quantifiable pesticide residues were found, while 36 samples (4.3%) contained one or several pesticides in quantified concentrations. Eighteen samples (2.1%) contained multiple residues; up to 5 different pesticides were reported in individual chicken egg samples (Figure 32). Compared to 2012, the overall quantification rate slightly decreased (2012: 5.4% of the samples contained pesticide residues).

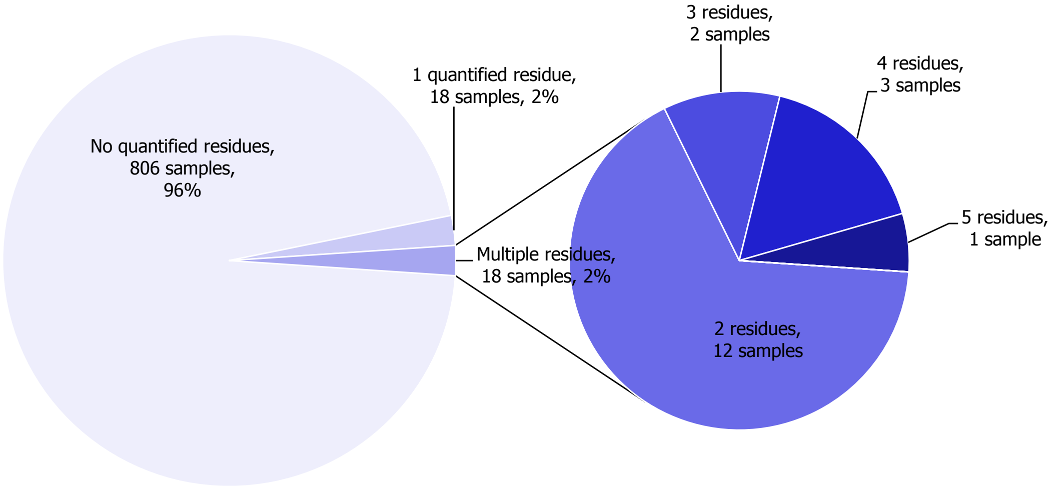


Figure 32: Number of quantified residues in individual chicken eggs samples

In 0.2% of the samples (2 samples), the residue concentrations exceeded the MRLs. No sample was reported as non-compliant. The MRL exceedances were related to eggs produced in the EU.

In total, 11 different pesticides were found in concentrations equal to or greater than the LOQ. The most frequently found pesticides were the persistent organic pollutants (POPs) DDT (3% of the tested samples), hexachlorobenzene (2.4%), lindane (1.2%), chlordane (1%); all these pesticides are no longer used as pesticides (prohibited at international level under the Stockholm convention (UNEP, 2001)) but are still present in the environment due to their environmental persistence. Chlorpyrifos and bifenthrin are the only approved pesticides quantified in eggs.

Figure 33 depicts the results for all the quantified pesticides with residues below or at the MRL. Compared to 2012, the pesticide profile did not change significantly.

The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide are plotted in Figure 34. Further information on the pesticides found in eggs in 2015 is compiled in Table 11.

Table 11: Pesticides most frequently quantified in chicken eggs in 2015

Pesticide	% samples above LOQ	Approval status and comments
DDT (RD)	3	Persistent organic pollutants, banned at international level (Stockholm Convention (UNEP, 2001); Regulation (EC) No 850/2004).
Hexachlorobenzene	2.4	
Lindane	1.2	
Chlordane (RD)	1.0	
Dieldrin (RD)	0.4	

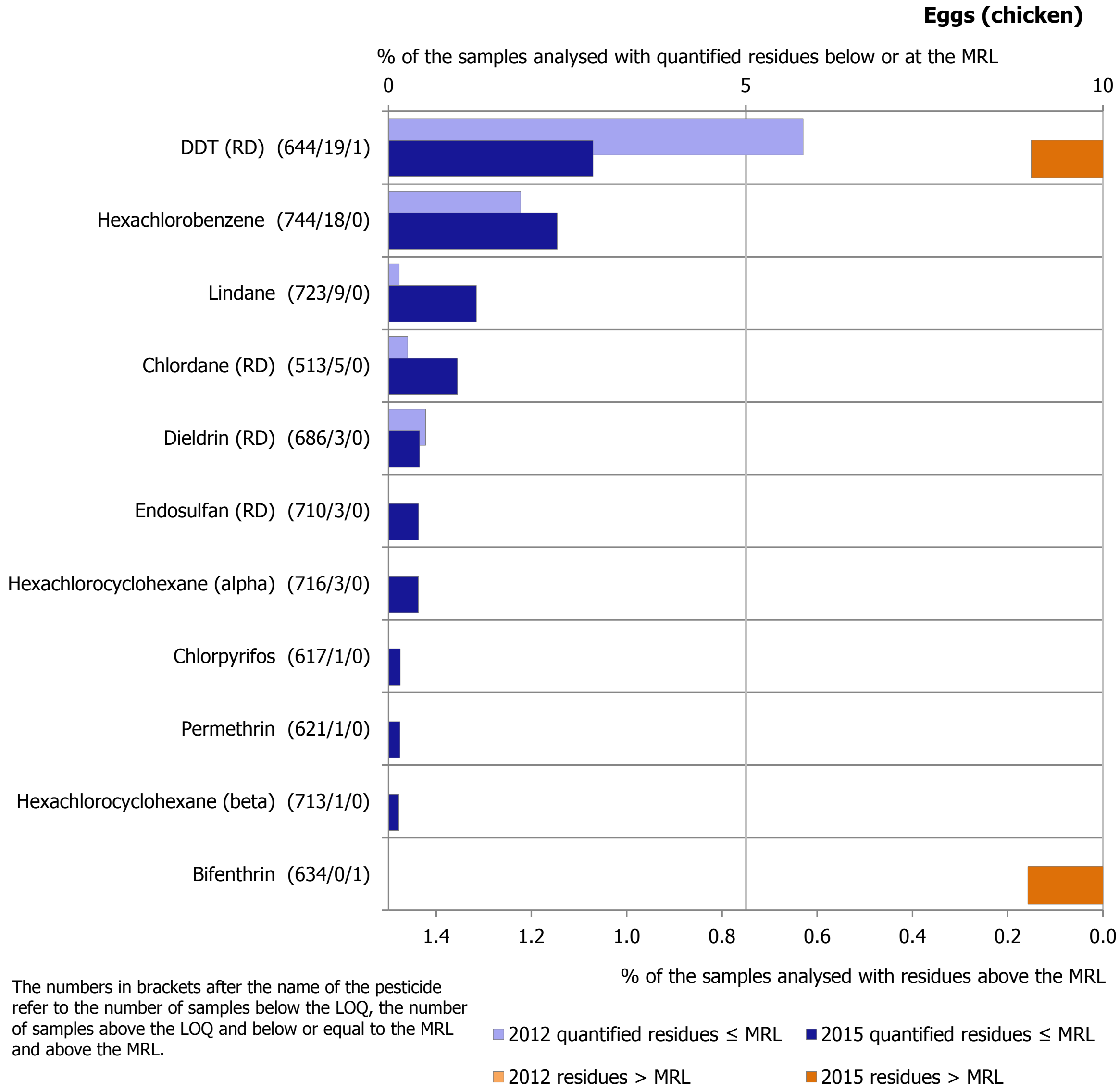


Figure 33: Percentage of chicken eggs samples with quantified residues below or equal to the MRL

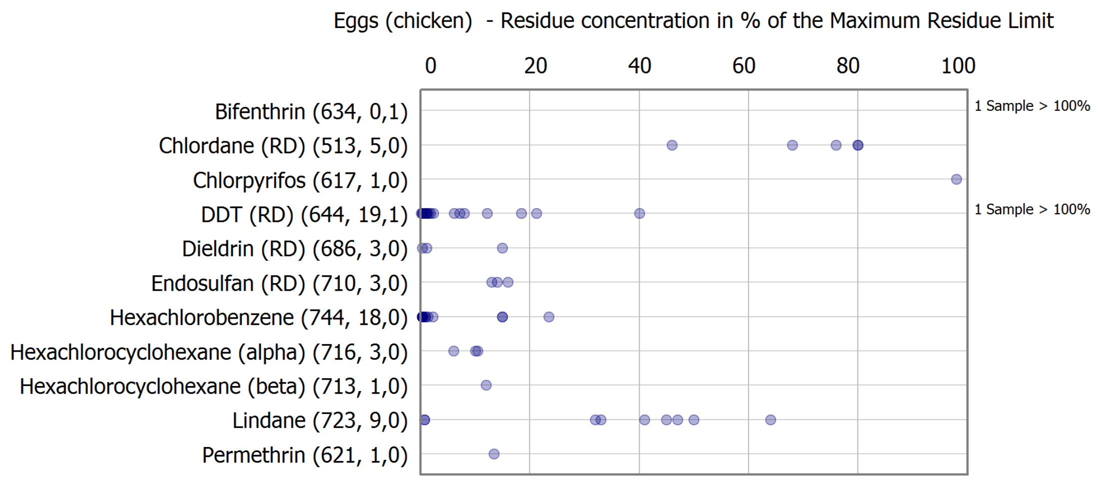


Figure 34: Residue concentrations measured in chicken eggs, expressed as a percentage of the MRL (only samples with residues ≥ LOQ) (see footnotes 25 and 26)

3.4. Overall results of EU-coordinated control programme

Overall, 0.8% of the 10,884 samples analysed in 2015 in the framework of the EU-coordinated monitoring programme exceeded the MRL (89 samples). In total, 0.4% of the samples (44 samples) were considered to be not compliant while the remaining samples exceeded the MRL numerically but did not lead to legal or administrative actions. The number of samples with quantified residues, but within the legally permitted level (at or above the LOQ but below the MRL) was 4,145 (38.1%) (Figure 35). The number of samples with no quantifiable residues (residues below the LOQ) was 6,650 (61.1%). Compared with 2012, the reference period where the same commodities as in 2015 were analysed, the MRL exceedance rate is similar (0.9%). The percentage of samples with quantified residues within the legal limits is slightly lower than in 2012 (39.2% in 2012 versus 38.1% in 2015).

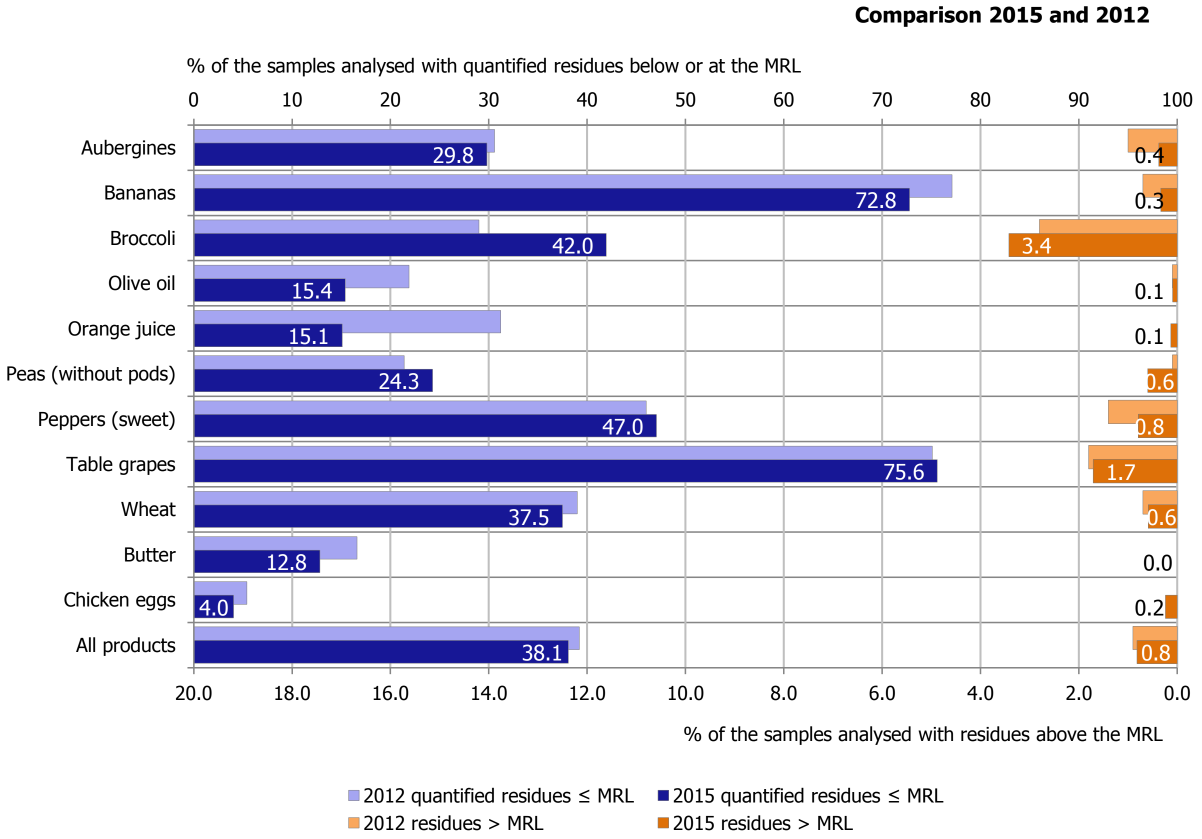


Figure 35: overall proportion of EUCP samples with residues exceeding the MRL and samples with quantified residues below the MRL

Among the unprocessed plant products analysed in the 2015 EU-coordinated control programme, the lowest MRL exceedance rate was identified in bananas, followed by aubergines and wheat. The ascending ranking of plant products exceeding the MRL is continued with peas (without pods), peppers (sweet), table grapes and broccoli. A low MRL exceedance rate was found in processed plant products (i.e. olive oil and orange juice) and chicken eggs. No MRL exceedance was identified in butter.

4. Overall monitoring programmes (EUCP and national programmes)

Compared with the EU-coordinated monitoring programme (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 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, based on previously observed high incidences of non-compliant products imported from certain countries 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 detail with regard to the main parameters describing the national programmes (food products/pesticides/countries of 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 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.

4.1. Description of the overall monitoring programmes

In 2015, in total 84,341 samples[30] 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 (+2%), where results for 82,649 samples were reported. The increased number of samples is resulting from an increased number of samples analysed by some of the reporting countries compared with 2014 (+56.9% samples analysed in Portugal, +40.4% in Luxembourg, +32.9% in Lithuania, +32.3% in Italy, +28.5% in Croatia, +22.2% in Austria, +17.7% in France and +16.8% in Estonia).

The majority of samples (79,943 samples, 94.8%) were classified as surveillance samples, meaning that the samples were taken without targeting specific growers/producers/importers or consignments likely to be non-compliant. Samples that were targeted towards products or countries where higher MRL non-compliance rates were identified in the past but without specific suspect also fall in the category of surveillance samples. In 5.2% of the cases, a suspect sampling strategy was applied, enforcing provisions of EU legislation on 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 Figure 36 and Figure 37.

No major changes were noticed in the national control programmes of 2014 and 2015 as regards the ratio of samples from domestic production, other EU/EEA countries and third countries (EFSA, 2016c); the information on the sample origin for the 2015 programme is presented in Figure 38. The countries with the highest rates of samples of imported products are Bulgaria (94.1%), the Netherlands (62.2%) and Sweden (48.7%); Greece, Spain, Italy, Portugal focussed their national control programmes mainly on domestic products (more than 70% of the samples analysed).

[30] In addition to these 84,341 samples, the results for 571 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 2015 EUCP.

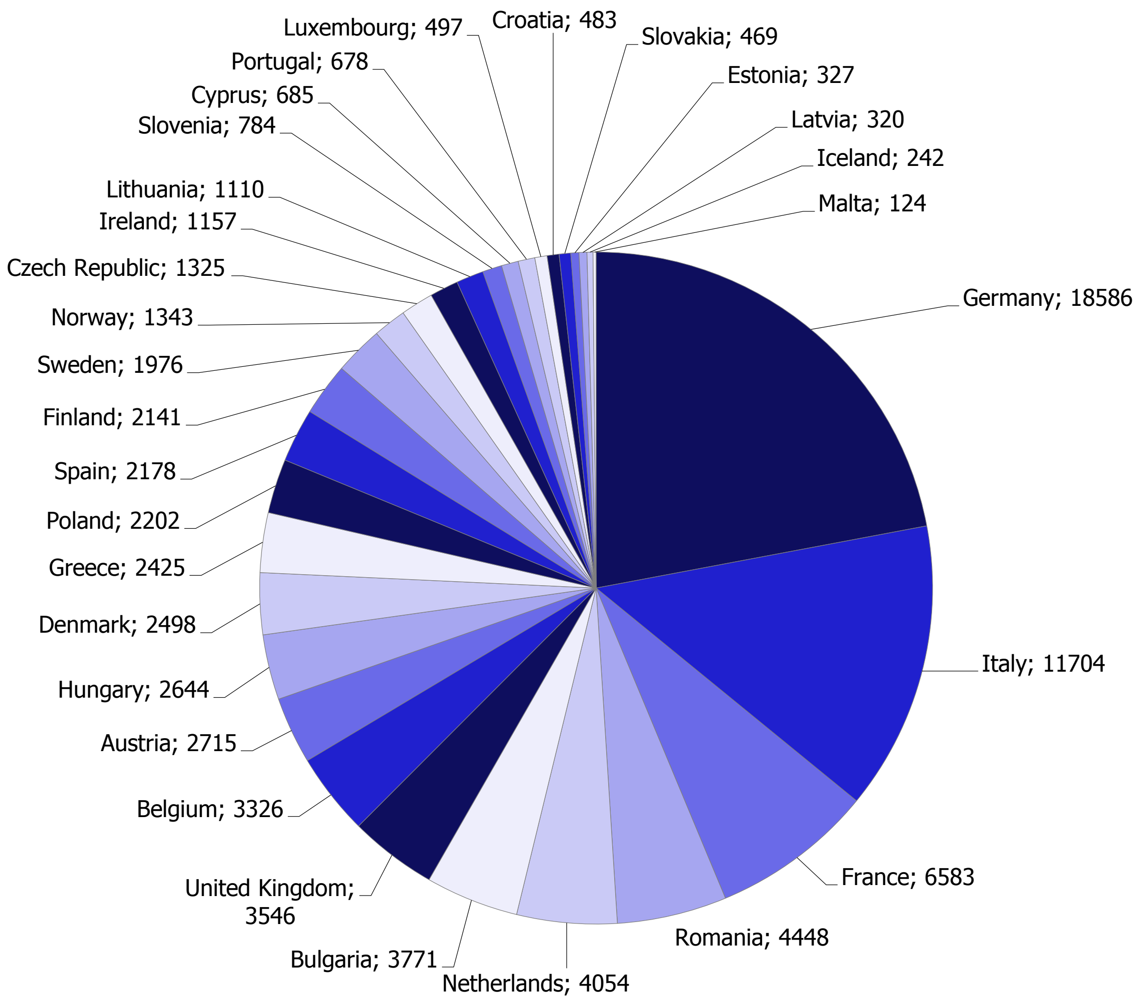
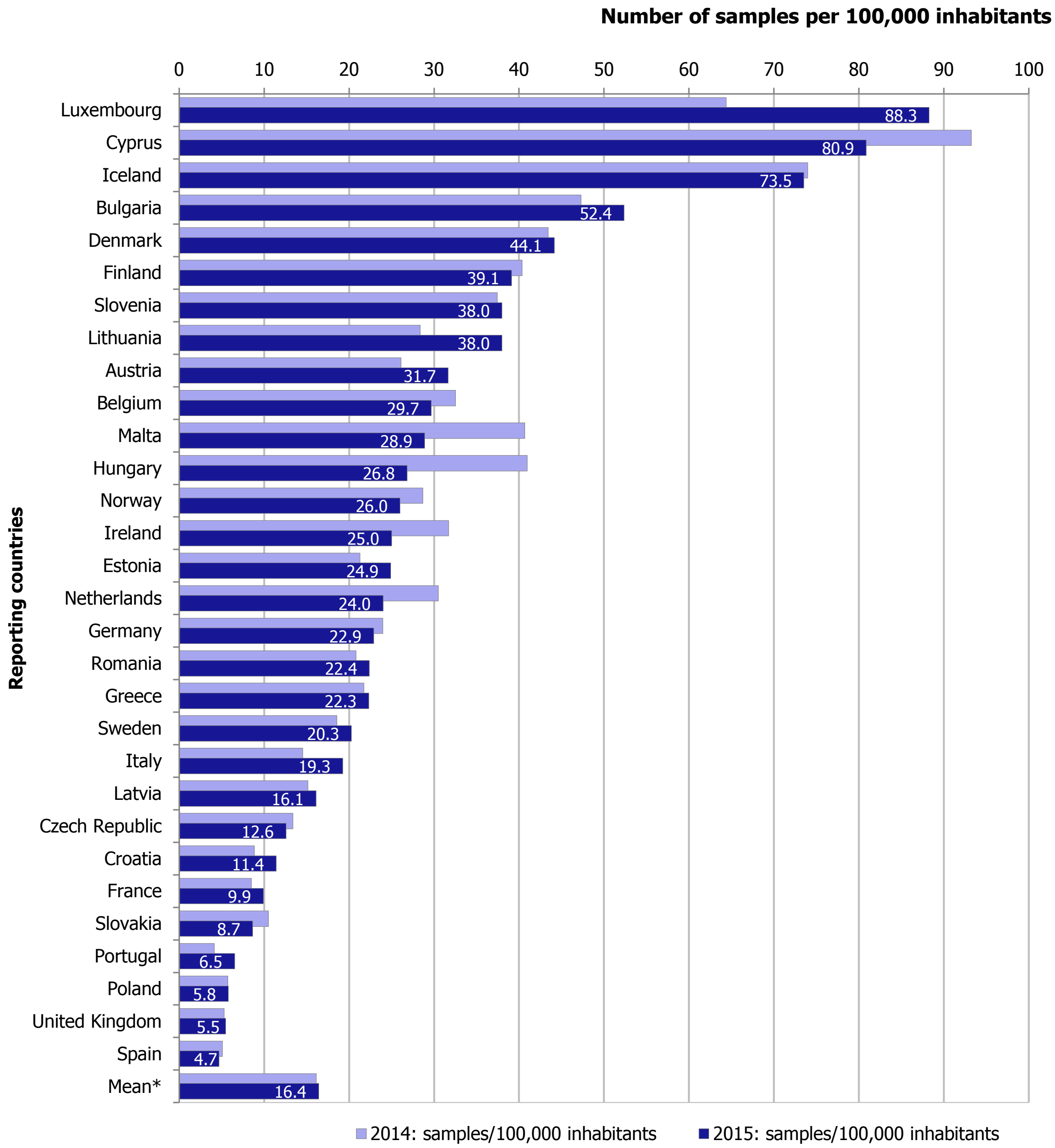


Figure 36: Number of samples analysed by each reporting country



* Overall mean of all reporting countries

Figure 37: Number of samples normalised by number of inhabitants

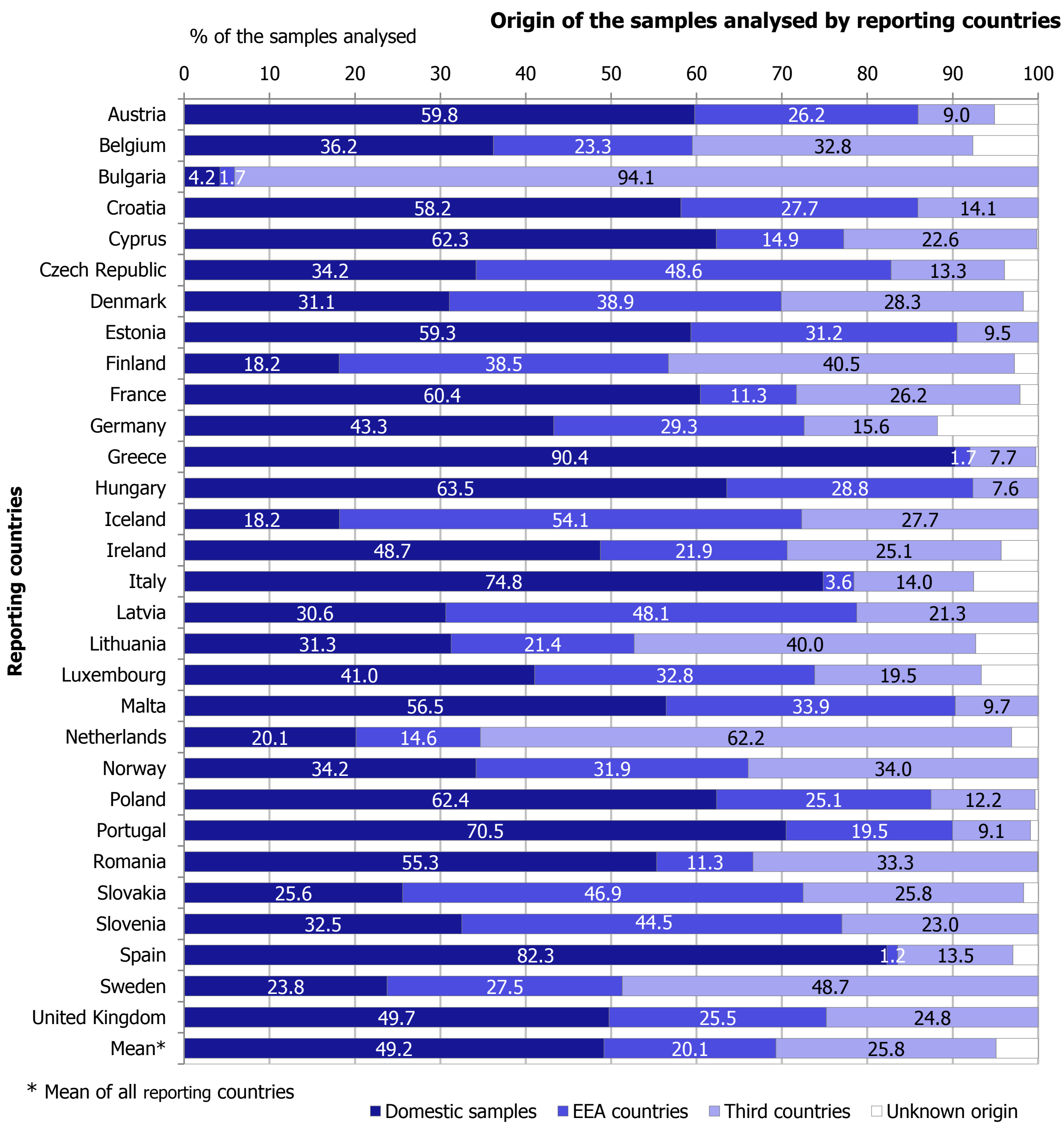
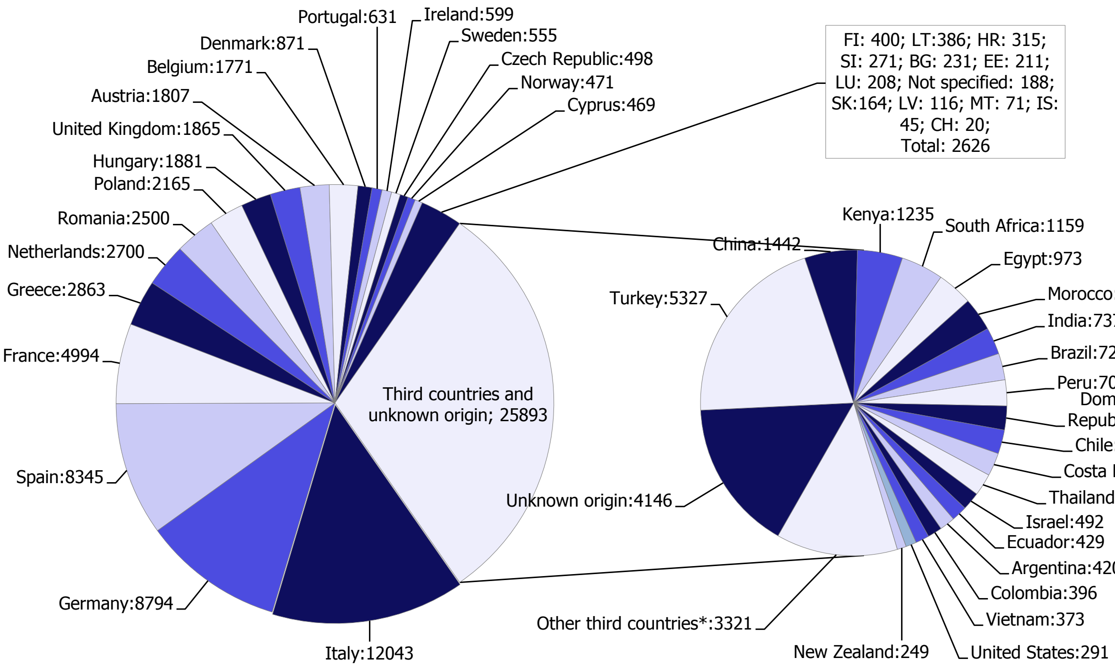


Figure 38: Origin of samples by reporting country

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

Overall, 58,448 samples analysed originated from EU countries, including EEA and EFTA states (69.3%). 21,747 samples (25.8%) concerned products imported from third countries; for 4,146 samples (4.9%) the origin of the products was not reported.



* 94 countries with less than 220 samples

Figure 39: Origin of samples (reporting countries and third countries)

Typically, national control programmes show a wide diversity regarding the number of pesticides analysed (analytical scope; see also Appendix C, Table 16) and the number of different food products analysed. Overall, the reporting countries analysed samples taken in the framework of the EUCP and national control programmes for 774 different pesticides. The broadest analytical scopes were noted for the German control laboratories which covered 684 pesticides, followed by Belgium (580 pesticides), Spain (575 pesticides), France (517 pesticides), Austria (512 pesticides), Luxembourg, the United Kingdom, the Netherlands and Sweden (all analysed for more than 400 distinct pesticides). On average, in the framework of the national control programmes, samples were analysed for 220 different pesticides, which is an increase by 4% compared to the previous year; Belgium, Sweden, Ireland, Germany, the Netherlands, France, Norway and Estonia analysed on average for more than 250 pesticides per sample. The complete picture regarding the number of pesticides analysed under the national control programmes can be found in Figure 40.

All reporting countries together covered a wide variety of unprocessed agricultural food products and processed products (e.g. cereal products such as flour, or polished rice, wine, vegetable oils, fruit and vegetable juices, canned fruits and vegetables, milk products, dried fruits such as raisins, dried herbs, etc.).

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 technical report that summarises the national results (EFSA, 2017).

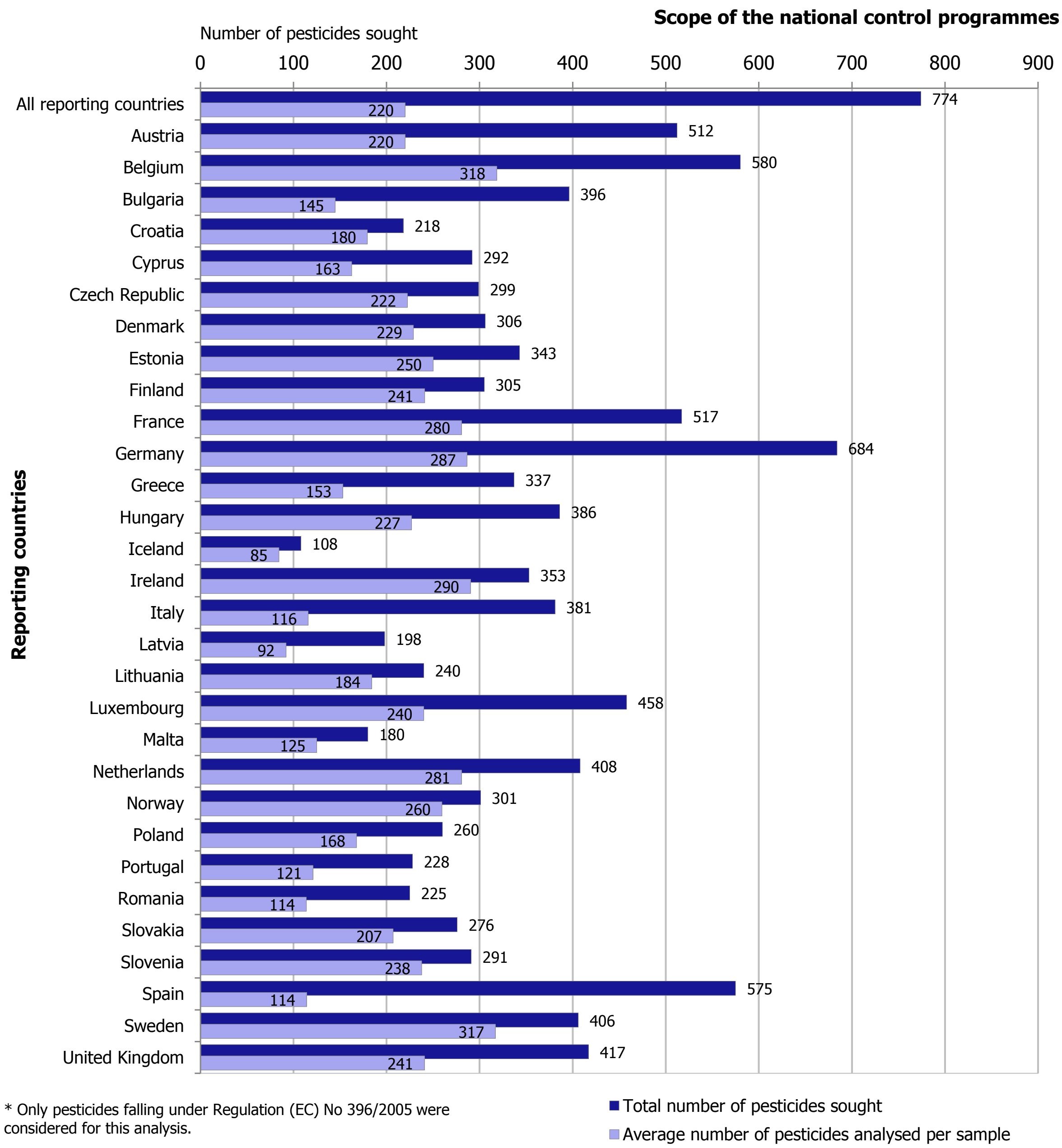


Figure 40: Analytical scope (number of pesticides analysed) by reporting countries

4.2. Results of the overall monitoring programmes

Overall, 97.2% of the 84,341 samples analysed in 2015 fell within the legal limits (81,975 samples); 44,918 of these samples (53.3% of the total number of samples tested) did not contain quantifiable residues (results for all pesticides analysed were below the LOQ) while 43.9% of the samples analysed contained quantified residues not exceeding the legal limits (37,057 samples). MRLs were exceeded for 2.8% of the samples analysed in 2015 (2,366 samples; Figure 41). Taking into account the measurement uncertainty, 1.6% of all samples analysed in 2015 (1,346 samples) clearly exceeded the legal limits, triggering legal sanctions or administrative actions; these samples are considered as non-compliant with the legal limits.

In Figure 41, the overall results for 2015 together with a separate presentation of the results for enforcement and surveillance samples are presented. In addition, a comparison with the results of 2014 was included. Considering only surveillance samples (samples taken without targeting towards samples which are expected to be non-compliant), 2.3% of the samples analysed in 2015 contained residues exceeding the limits set in the MRL legislation; for enforcement samples the MRL exceedance rate was 11.8%. The overall MRL exceedance and non-compliance rates in 2015 were similar to those of 2014, where 2.9% of the samples exceeded the legal limits numerically and 1.6% of the samples were non-compliant.

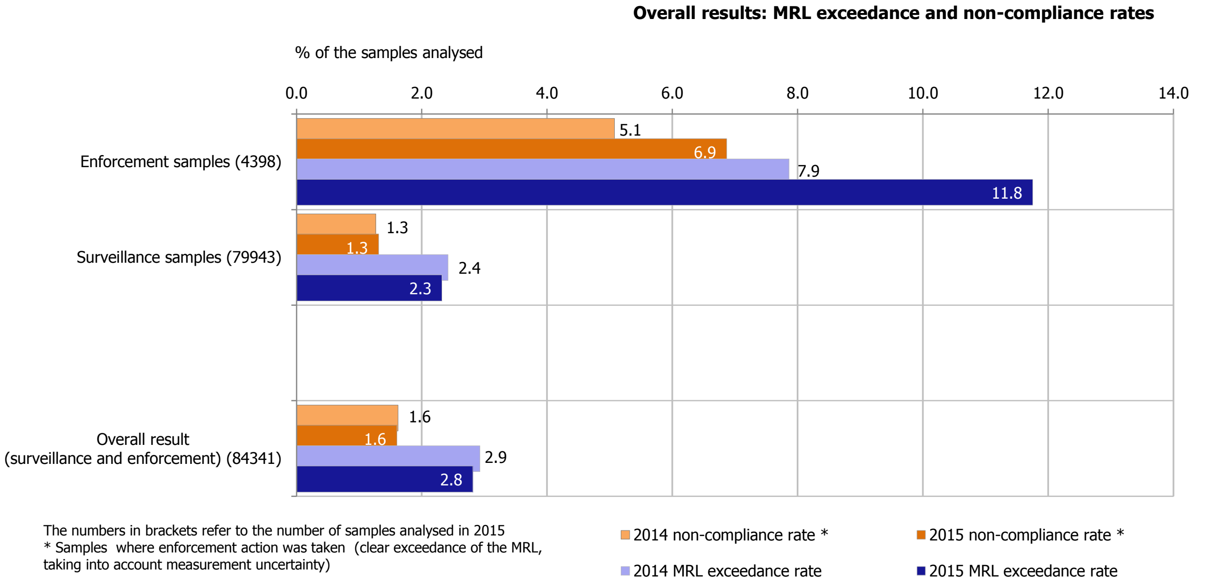


Figure 41: Percentage of samples compliant with the legal limit/exceeding the legal limit (MRL)

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, 56.2% of the samples originating from EU and EEA/EFTA countries were free of quantifiable residues; 42.1% of the samples contained residues at or above the LOQ but below the MRL, while 1.7% of the samples exceeded the legal limit. 0.9% of the samples were considered non-compliant with the legal limits, triggering legal or administrative sanctions for the responsible food business operators.

Samples from third countries were found to have a higher MRL exceedance rate and non-compliance rate compared to food produced in the EU and EEA countries (MRL exceedance rate for food produced in third countries: 5.6%; non-compliance rate: 3.4%) (Figure 42). The percentage of samples from third countries free of quantifiable residues (residues below the LOQ) amounted to 44.3% while 50.0% of the samples contained residues within the permitted limits.

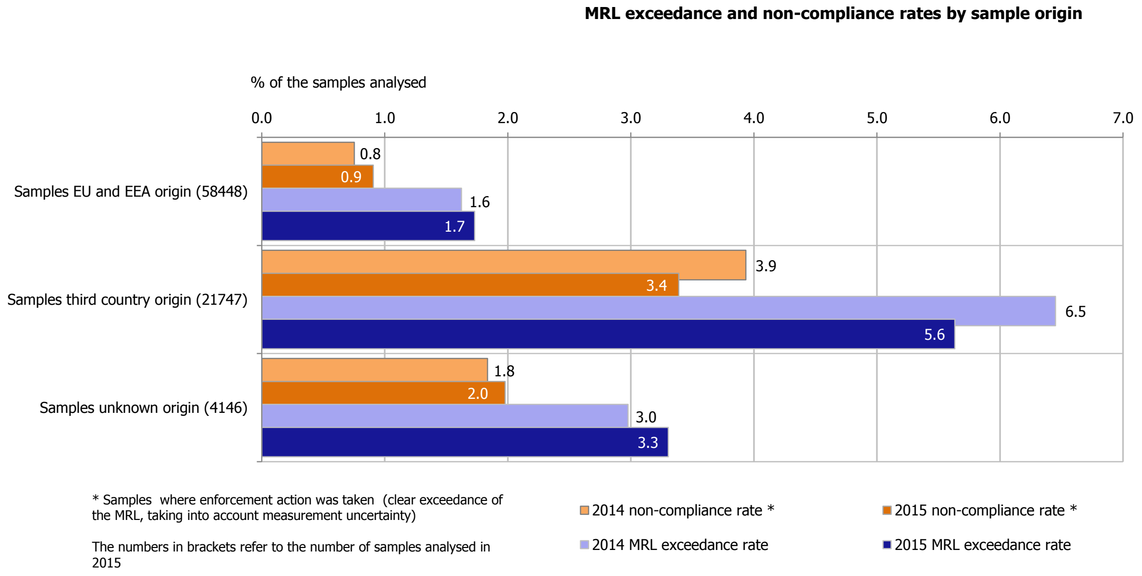
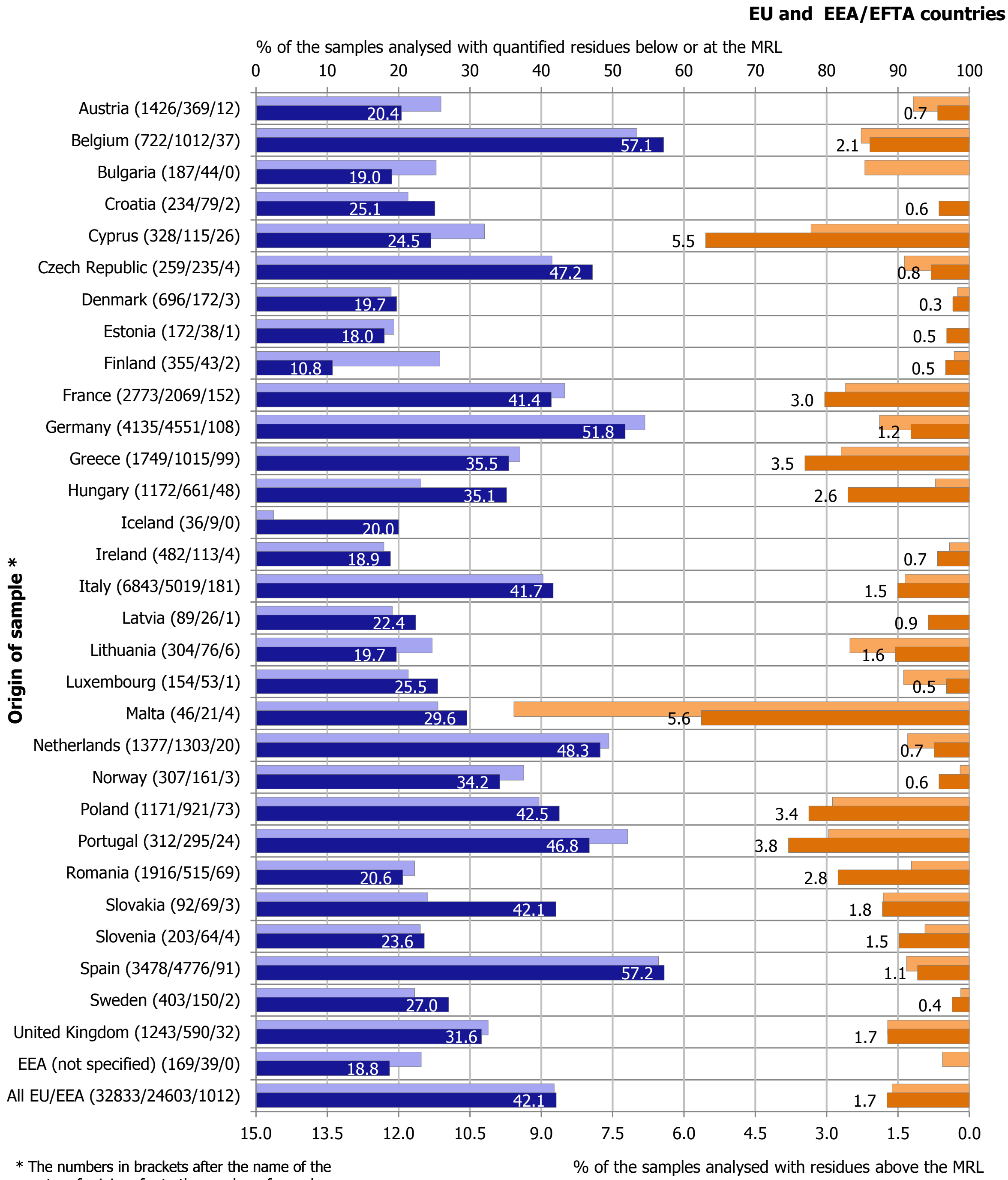


Figure 42: Percentage of samples compliant with the legal limit/exceeding the legal limit (MRL) by origin

The detailed MRL exceedance rates and the percentage of samples containing residues within the legal limits originating from reporting countries and from third countries are presented in Figure 43 and Figure 44; to allow a comparison with the previous reporting year these two charts contain also the results for 2014.

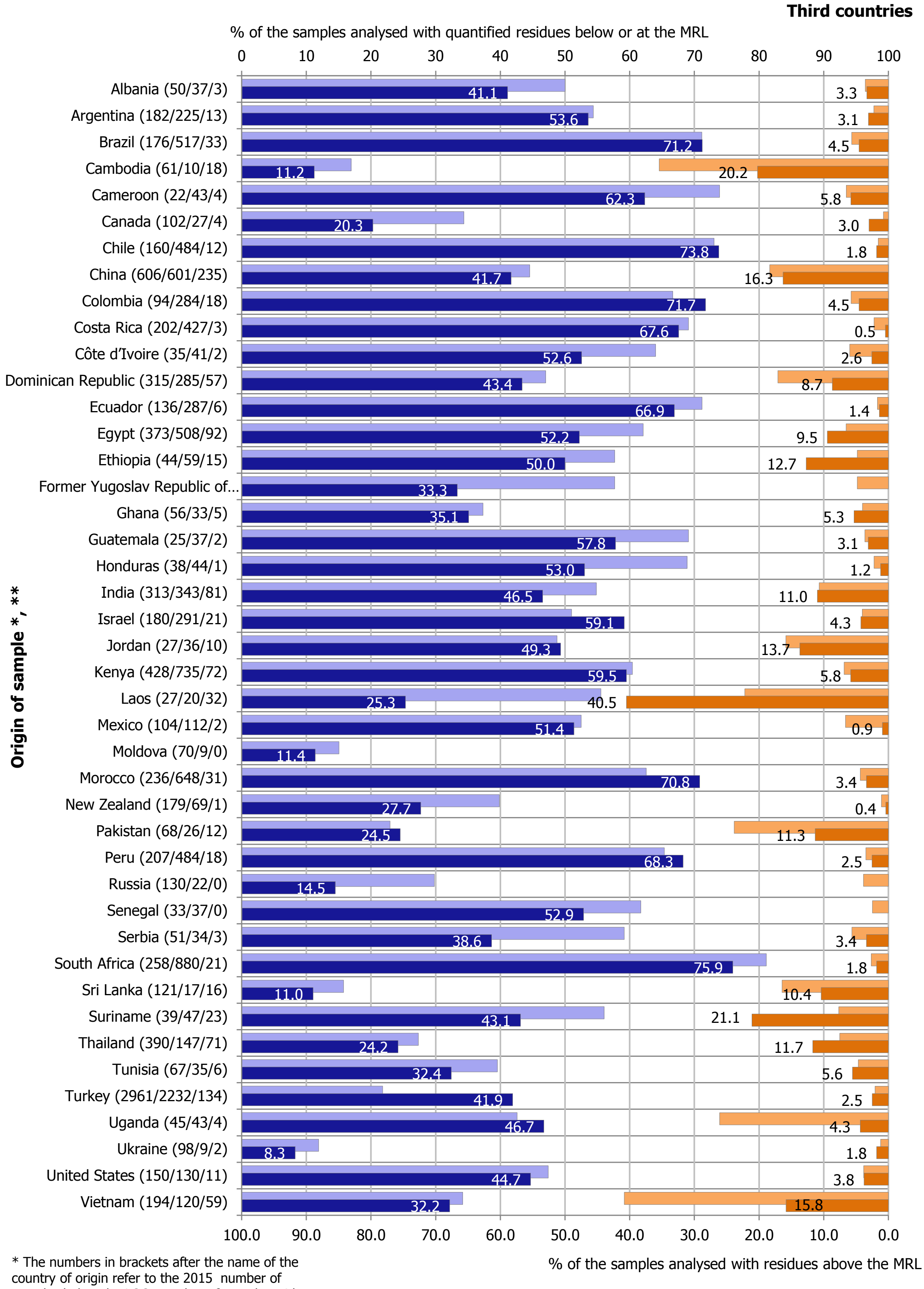
The highest MRL exceedance rates among the samples originating from the reporting countries were reported for products from Malta, Cyprus, Portugal, Greece, Poland and France (more than 3% of the samples exceeding the legal limit) while samples from Finland, Estonia, Bulgaria, Ireland, Iceland, Denmark, Austria, Lithuania, Latvia and Romania were most frequently free of quantifiable residues (more than 75% of the samples without quantified residues).

Among the third countries with at least 60 samples analysed, the highest MRL exceedance rate was found for Laos, Suriname, Cambodia, China, Vietnam, Jordan, Ethiopia, Thailand, Pakistan, India and Sri Lanka (more than 10% of the samples were found to exceed the legal limit for one or several pesticides). Other third countries with a substantial number of samples (more than 60 samples) and MRL exceedances above the average were Egypt, Dominican Republic, Cameroon and Kenya.



* The numbers in brackets after the name of the country of origin refer to the number of samples below the LOQ, number of samples with measurable residues below or at the MRL and number of samples exceeding the MRL taken in 2014.

Figure 43: MRL exceedance and residue quantification rates by country of origin (EU and EEA/EFTA countries)



* The numbers in brackets after the name of the country of origin refer to the 2015 number of samples below the LOQ, number of samples with measurable residues below or at the MRL and number of samples exceeding the MRL.
** Only countries with at least 60 samples were included

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

4.2.2. Results by food products

The MRL exceedance rate for unprocessed products[31] amounted to 3% of the samples analysed; 46.9% of the samples contained residues that were within the legal limits, and 50.1% of the unprocessed products were free of quantifiable residues (residues below the LOQ). Among the unprocessed products with at least 60 samples analysed, MRL exceedances were most frequently identified for table olives, passion fruits, celery leaves, teas, parsley, cresses and other sprouts and shoots, prickly pears, turnips, basil and edible flowers, wild fungi, okra and figs (MRL exceedance rate greater than 10%). More detailed information on the MRL exceedance rates and pesticide quantification rates for unprocessed food products is presented in Figure 45. 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). 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 beans (without pods), coffee beans, globe artichokes, peas (dry), rhubarbs, sunflower seeds, sweet corn, yams and a number of products of animal origin such as bovine, poultry and swine (liver, muscle and fat), sheep (fat) and goat milk.

The results for processed products are presented in Figure 46. It is noted that the overall MRL exceedance rate for processed products was lower (1.4%) compared with unprocessed products (3%). Processed wild fungi, grape leaves, bay leaves, sweet peppers, figs, vegetables (not specified), rice, table olives, apricots, tomatoes and table grapes were found most frequently exceeding the MRLs (more than 2% of the samples).

[31] 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.

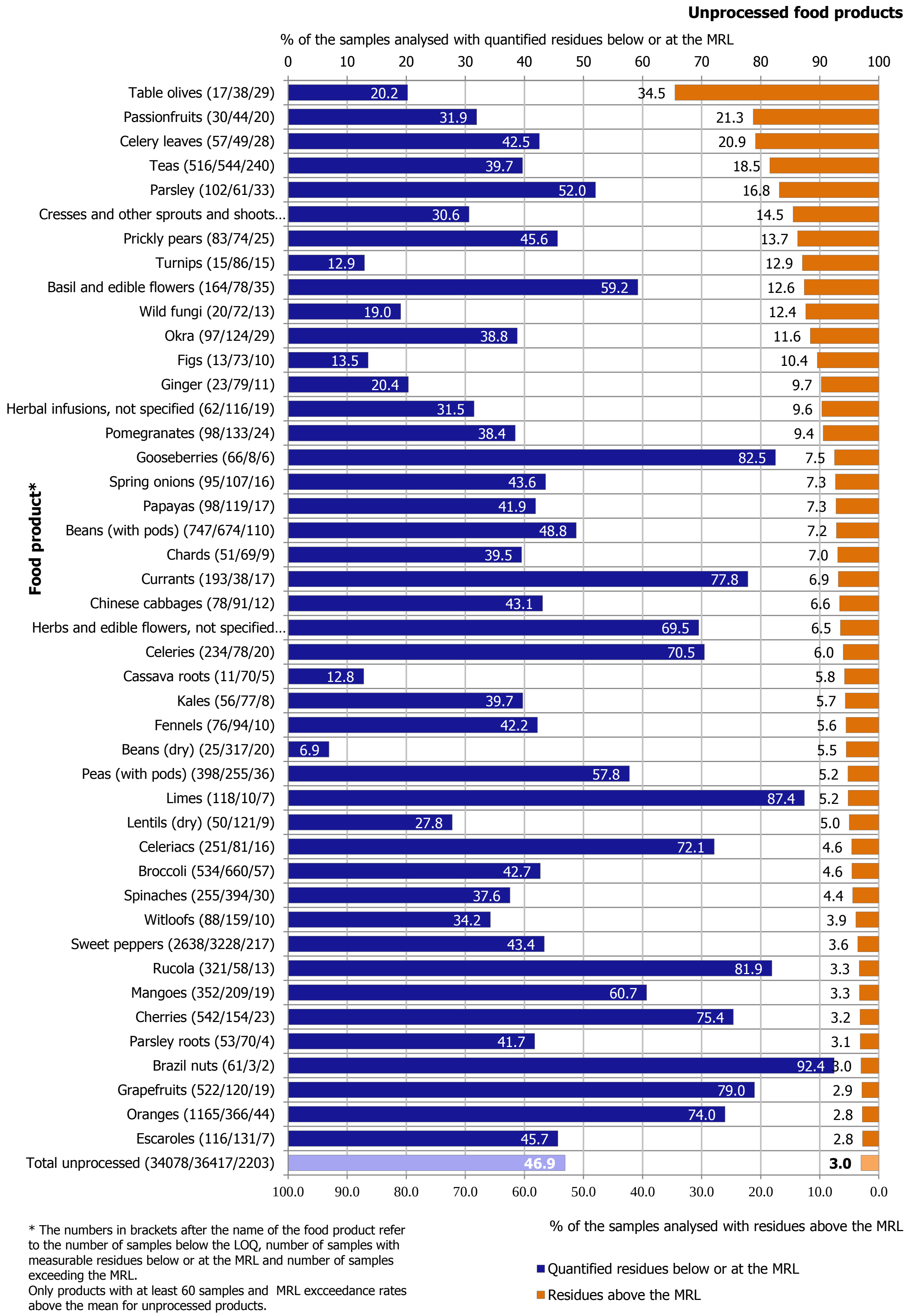


Figure 45: MRL exceedance rate and residue quantification rate for unprocessed food products, sorted by MRL exceedance rate

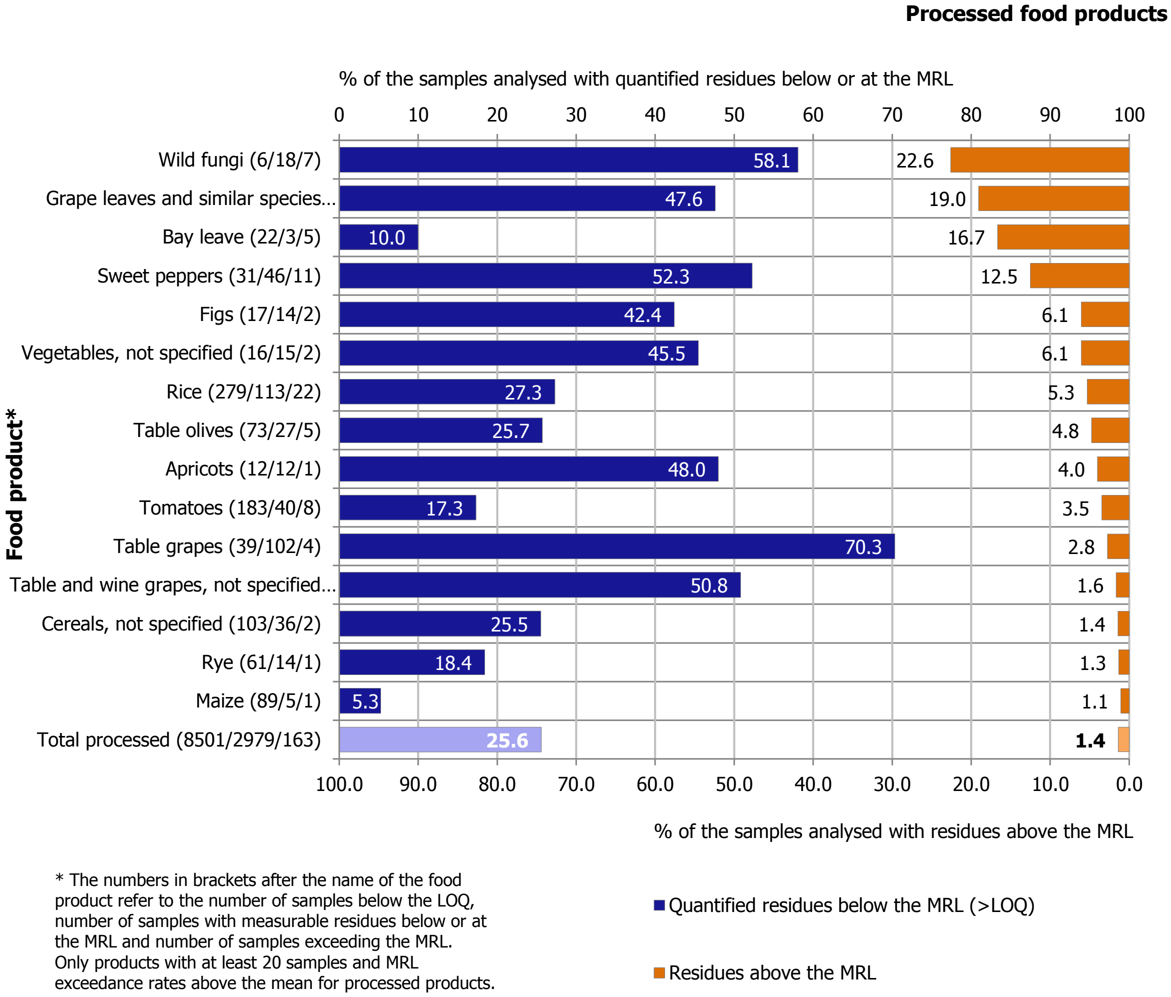


Figure 46: MRL exceedance rate and residue quantification rate for processed food products (excluding baby food), sorted by MRL exceedance rate

4.2.3. Results by pesticides

Overall, 18,543,440 analytical determinations (individual results) submitted to EFSA were identified as valid results[32] and were used as the basis of the data analysis presented in this report. 101,073 of these determinations (0.55% of the valid determinations) related to 39,423 samples and 349 different pesticides were reported to be at or above the LOQ; the pesticides most frequently found in concentrations at or above the LOQ were boscalid (6,704 determinations), chlorpyrifos (3,991 determinations), imazalil (3,860 determinations), azoxystrobin (3,655 determinations), fludioxonil (3,649 determinations) and cyprodinil (3,344 determinations).

The most frequently quantified pesticides (expressed as percentage of samples analysed for the pertinent pesticide) were copper (quantified in 68.4% of the samples analysed for copper), fosetyl-Al (29.9%), bromide ion (17.1%), mercury (15.6%), hydrogen phosphide (13.8%), dithiocarbamates (13.1%), phosphines and phosphides (9.7%) and boscalid (9.5%). However, it should be highlighted that some of these pesticides with high quantification rate have been analysed only in a limited number of samples (less than 100 samples for hydrogen phosphide and phosphines/phosphides) or only by a limited number of reporting countries (e.g. copper, fosetyl-Al, mercury).

[32] During the data cleaning step, EFSA identified the subset of records that described samples covered by the EU MRL legislation (i.e. food products covered by Annex I of Regulation (EC) No 396/2005 and residues covered by Annex II or III of the mentioned regulation) as valid results.

A comprehensive list of the number of analysis/determinations, the number of quantifications per pesticide, quantification rate and the number of food products analysed for the pesticide can be found in Appendix C, Table 16.

In 3,179 cases, the measured residue concentrations exceeded the legal limit (in total 2,374 samples[33]). The pesticides found most frequently violating EU MRLs are presented in Figure 47. In products produced in one of the reporting countries, at least 20 MRL violations were identified for the following pesticides: chlorpyrifos, carbendazim, dimethoate, cypermethrin, flonicamid, dithiocarbamates, BAC, tebuconazole, propargite, propamocarb, thiophanate-methyl, chlorpropham, folpet.

The top ranked pesticides on products from third countries (with at least 20 MRL exceedances) are chlorpyrifos, acetamiprid, carbendazim, dimethoate, imidacloprid, anthraquinone, cypermethrin, acephate, chlorfenapyr, hexaconazole, tebuconazole, profenofos, methomyl, permethrin, chlorothalonil, methamidophos, fipronil, buprofezin and carbofuran.

In total, 1,166 MRL exceedances (37% of the MRL exceedances) were reported for pesticides currently not approved in the EU (including active substances that were previously approved in the EU). In most cases, these MRL exceedances for non-approved pesticides were related to imported products (761 cases) while for products produced in the EU and EFTA countries, a minority of MRL exceedances was resulting from non-approved pesticides (366 results) and products with unknown origin (39 results); 2,013 cases of MRL exceedances were related to approved pesticides (1,074 from third country products, 811 cases on EU products and 128 cases in products with unknown origin).

[33] The number of 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 (481 samples).

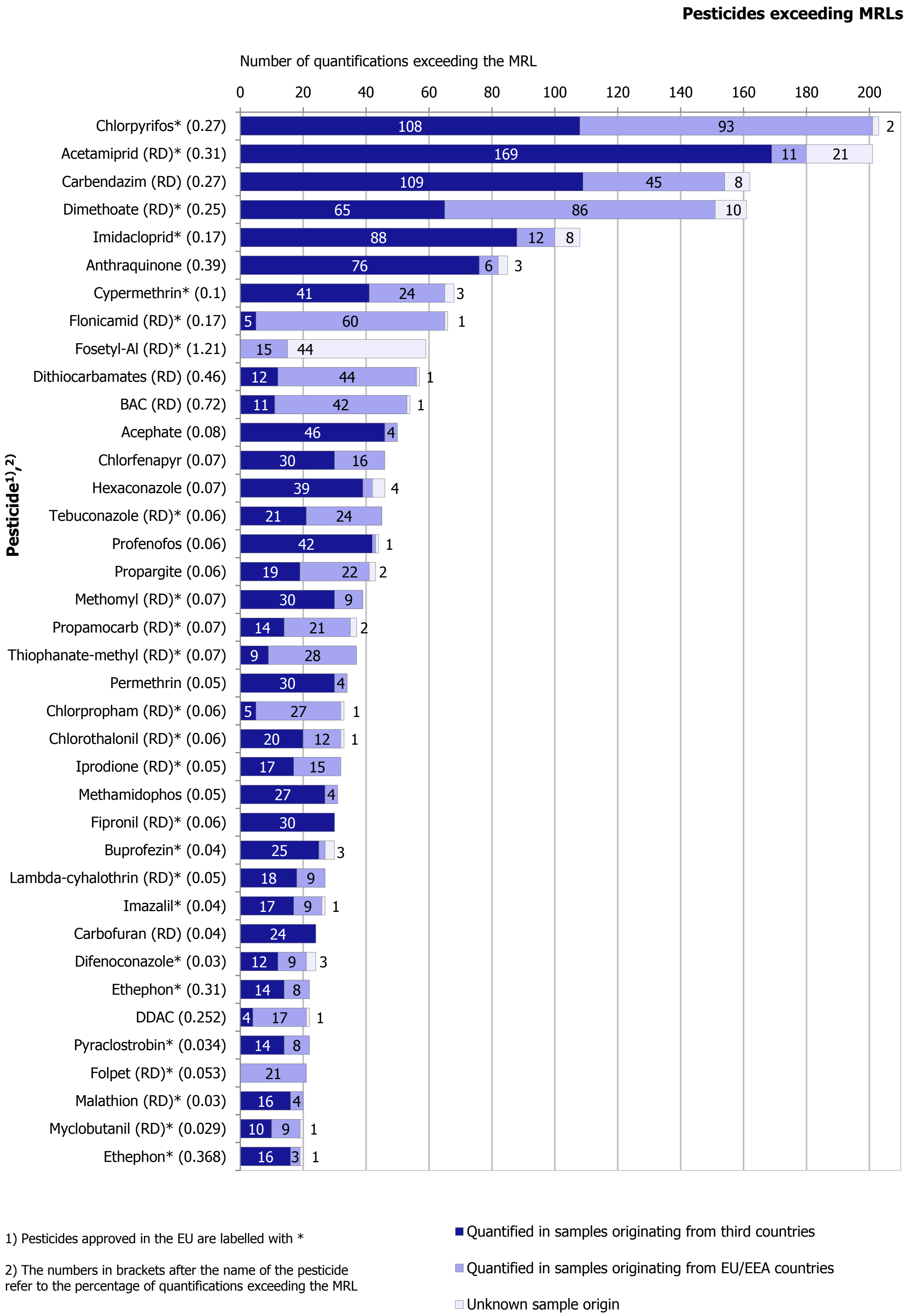


Figure 47: Number of MRL exceedances per pesticide (by sample origin)

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

According to the provisions of Regulation (EC) No 669/2009[34] on import controls, certain food products from Cambodia, China, the Dominican Republic, Egypt, Kenya, Morocco, Nigeria, Peru, 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 2015 can be found in Appendix C, Table 17.

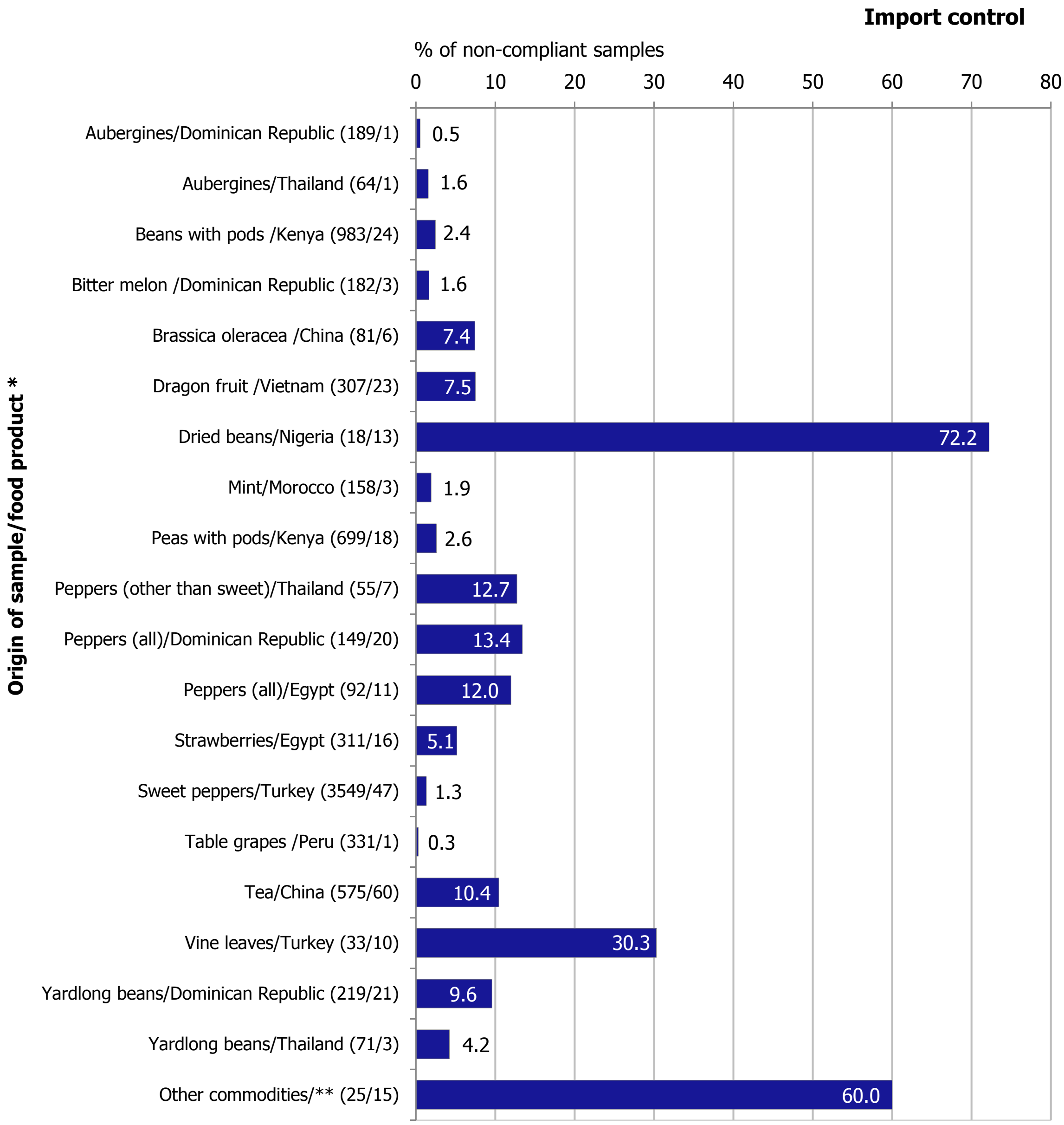
EFSA analysed the data provided by Member States for the food products covered by Regulation (EC) No 669/2009 on import controls. Comparing the information submitted to EFSA with the information shared by the European Commission services responsible for import controls, it became evident that a substantial number of results related to pesticide residues in food controlled under Regulation (EC) No 669/2009 has not been submitted to EFSA or Member States did not code the results according to the coding rules. Considering that the limited subset of data provided to EFSA does not give a statistically representative picture for the products concerned, EFSA decided to present in this chapter only the results provided by the European Commission. However, since no detailed information on the type of pesticides and the amount of residues was available to the European Commission, only basic summary statistics on the exceedance rate can be presented.

According to the data communicated by the European Commission, 8,091 consignments were selected in 2015 for laboratory analyses. Overall, 303 of these consignments (3.7%) were considered as non-compliant with regard to EU legislation on pesticide residues, taking into account the measurement uncertainty. It should be highlighted that non-compliant products identified in the framework of Regulation (EC) 669/2009 are rejected and are not placed on the EU market.

Among food commodities with more than 10 samples analysed in 2015, the highest non-compliance rates were reported for the following commodities: dried beans originating from Nigeria (72%), vine leaves originating from Turkey (30%), peppers originating from Dominican Republic and Thailand (both with rates of 13%), peppers originating from Egypt (12%), tea originating from China (10%) and yardlong beans from the Dominican Republic (10%).

The competent national authorities and EFSA should further investigate the reasons why EFSA did not receive the complete results for samples taken in the framework of import controls and discuss the possibility to harmonise the reporting of data.

[34] 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 numbers in brackets after the name of the country of orign/food product refer to the number of samples taken under Reg. 669/2009 and the number of non-compliant samples

** Other commodities analysed under Reg. 669/2009 with less than 10 samples analysed are grouped together

Figure 48: Frequency of non-compliant samples analysed in the framework of import controls under Regulation (EC) No 669/2009

4.2.5. Results on baby food

Reporting countries analysed 1,546 samples of baby foods (i.e. foods covered by Directives 2006/125/EC and 2006/141/EC), including infant formulae, follow-on formulae, processed cereal-based foods for infants and young children and other baby foods. The 640 processed cereal-based baby foods taken in the framework of the EUCP are included.

In 170 samples (11%), pesticide residues at or above the LOQ were found while the majority of samples were free of quantifiable residues (89%). In 20 samples, more than one pesticide was quantified (Figure 49). For 3.5% of the samples (54 samples), the residue concentrations were considered by the reporting countries exceeding the MRL[35] (details see below); 3.3% of the samples (51 samples) were considered non-compliant, taking into account the measurement uncertainty. Compared with the overall results of 2015 monitoring programmes, the quantification rate (residues between the LOQ and the MRL) is significantly lower in baby food samples (11% for baby foods versus 46.7% quantification rate considering all food groups). In 2014, the pesticide quantification rate in baby foods was slightly lower (8.2% samples with residues at or above the LOQ).

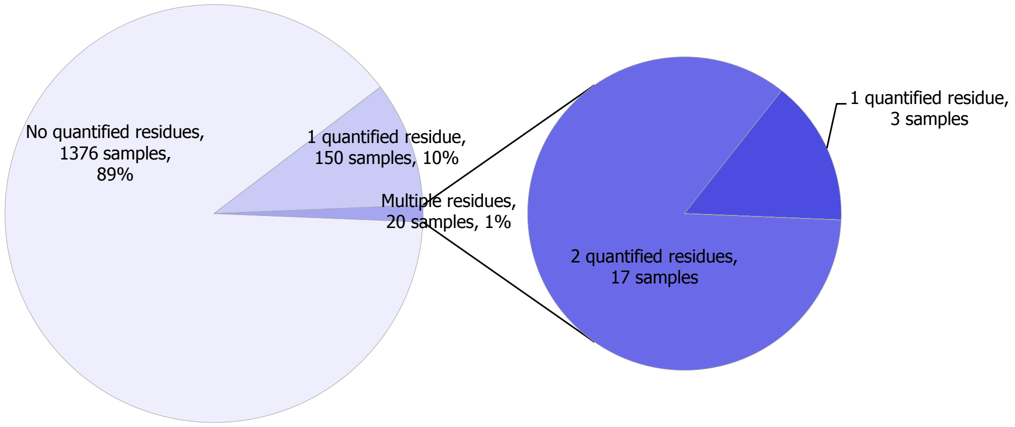


Figure 49: Number of quantified residues per individual baby food samples

In 2015 in total, 24 different pesticides were quantified in concentrations at or above the LOQ. Similar to the previous reporting years, the most frequent compound quantified in baby food was copper (89 quantifications, mainly in processed cereal-based foods for infants and young children). Fosetyl-Al and the biocidal products DDAC and BAC were among the most frequently quantified compounds in baby food (57, 4 and 4 determinations, respectively). Fosetyl-Al was predominantly found in baby foods other than infant formulae and follow-on formulae.

In Figure 50 the results for baby food are summarised, presenting the residue concentration measured for the 24 quantified pesticides as percentage of the MRL applicable to baby food. The orange dots refer to samples taken in the framework of the national control programmes, while the blue dots label the samples taken in the framework of the EU-coordinated monitoring programme. Overall, EFSA noted 76 determinations in 73 samples (4.8% of the baby food samples) where the residue concentration exceeded the default MRL of 0.01 mg/kg[36]; most frequently fosetyl-Al (56 determinations) was concerned.

The results for copper are not presented in Figure 50, because these results should be seen in the legal context: copper is a nutrient that has to be added to infant formula and follow-on formula and can 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). Thus, levels of copper residues above 0.01 mg/kg are most likely not the result of the use of copper compounds as active ingredient in plant protection products.

It should be also highlighted that the pesticides found in baby food were analysed only by a limited number of reporting countries (copper and fosetyl-Al (RD) were analysed only in Germany; DDAC and BAC (RD) are analysed by Austria, Germany, Belgium, Malta, Norway, Portugal, Spain and the United Kingdom). Hence, the results for these pesticides are biased and cannot be extrapolated to all samples for infants and young children.

[35] 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.

[36] These 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.

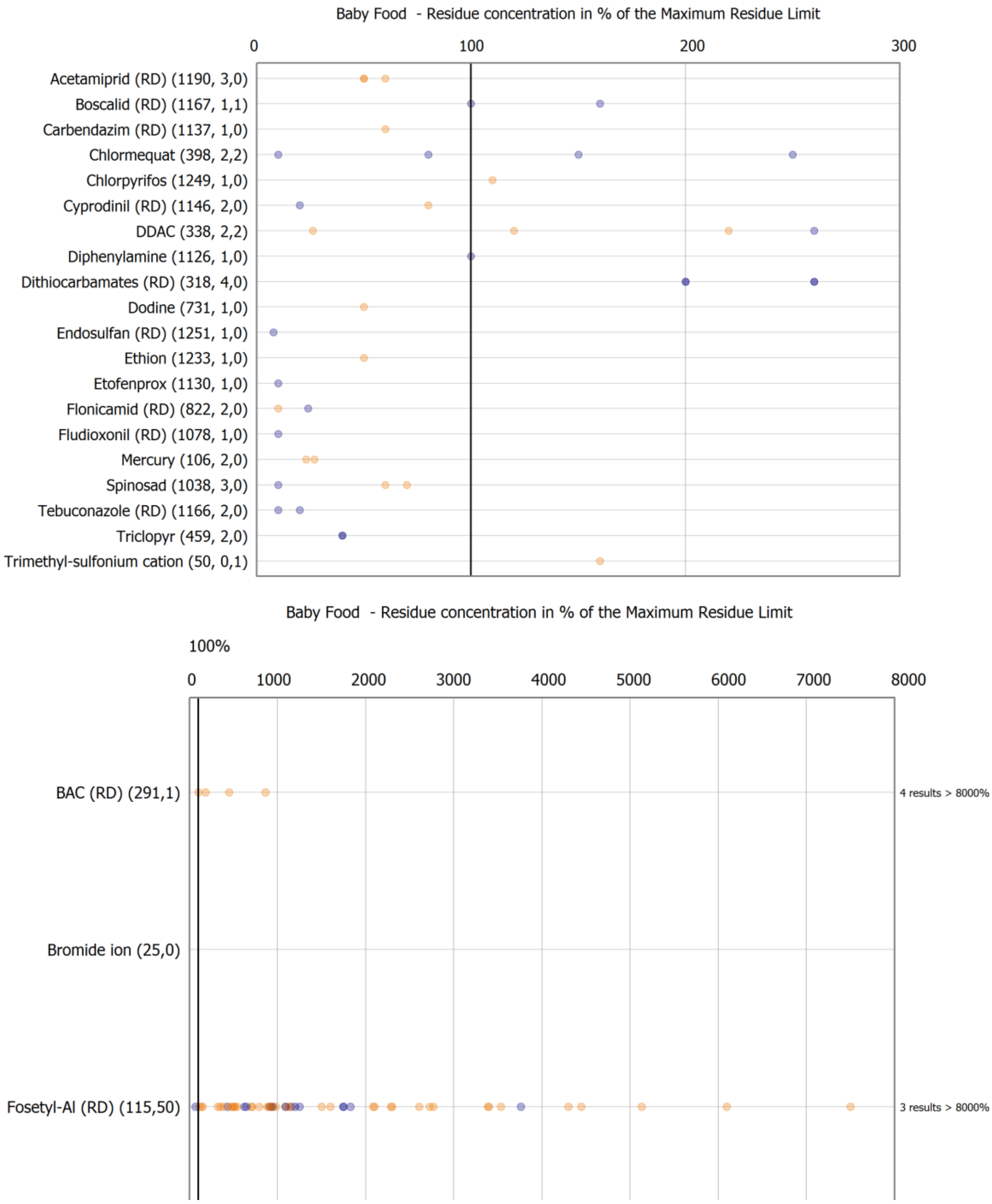


Figure 50: Residue concentrations measured in baby food, as percentage of the legal limit (only samples with residues >LOQ)

4.2.6. Results on organic food

In total, 5,331 samples of organic food (excluding baby foods)[37] were taken (6.4% of the total number of samples); the 1,054 samples of organic products taken in the framework of the EUCP are also included in this number of samples.

Overall, 4,574 samples did not contain quantifiable residues (85.8%). 720 samples of organic products contained residues within the legally permitted concentrations (13.5%); among these samples, 276 samples contained residues that do not necessarily come from the use of pesticides (e.g. samples

[37] 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.

containing naturally occurring substances like bromide ion or copper[38], samples with residues of CS_2 resulting from naturally occurring substances mimicking the presence of dithiocarbamates, or persistent organic pollutants present in the environment such as DDT, dieldrin and hexachlorobenzene) (Figure 52). After excluding the samples only containing these substances, the corrected pesticide quantification rate for organic samples accounts for approximately 8.3% (instead of 13.5% considering all the substances) (Figure 51). The MRL exceedance rate however, is not affected by this refined analysis. MRL exceedances were identified in 37 samples (0.7% of the organic samples analysed); multiple MRL exceedances were found in three samples.

Compared with the overall results for other products, the MRL exceedance rate and the quantification rate (samples with quantified residues below the MRL) were significantly lower in organic food samples (MRL exceedance rate: 0.7% in organic food versus 2.9% for conventional food; quantification rate: 13.5%[39] in organic food versus 46.8% in conventional food). In Figure 51 the individual food groups are analysed separately, showing the major difference mainly for fruits and nuts, vegetables and cereals.

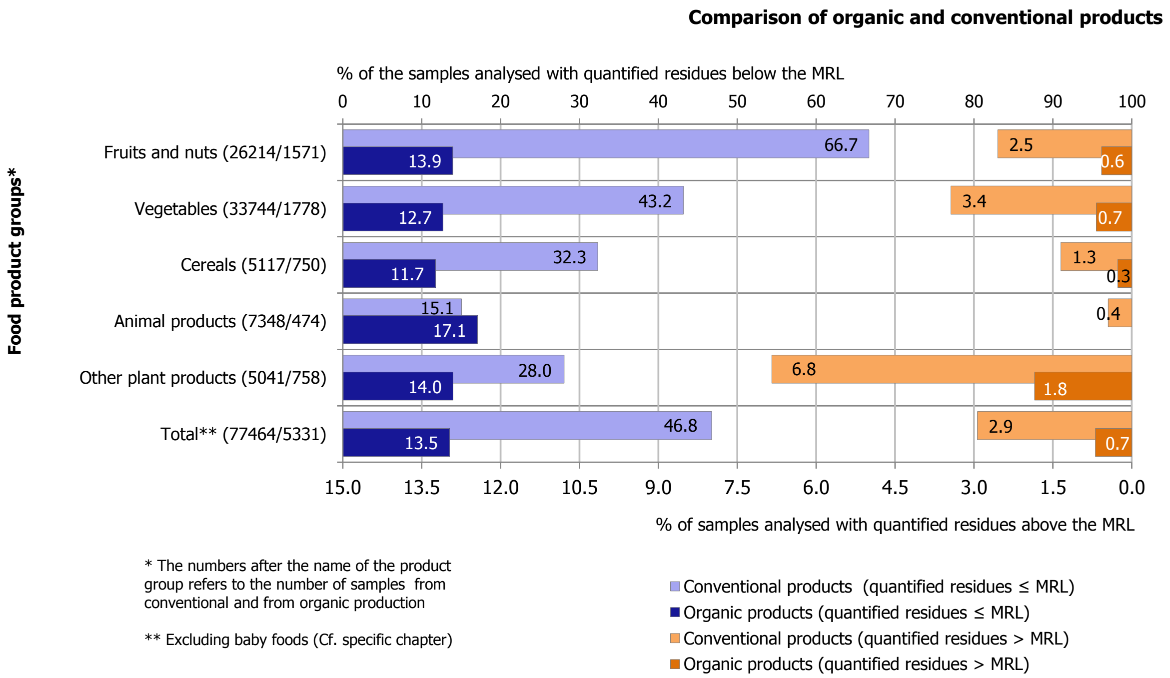


Figure 51: Comparison of organic and conventional foods: quantification and MRL exceedance rates for main food product groups (including all pesticides)

In products produced organically, 140 different pesticides were quantified (residues in concentrations at or above the LOQ). The pesticides reported most frequently (quantified in at least five samples) are presented in Figure 52. The pesticides permitted in organic farming, compounds occurring naturally or substances resulting from environmental contamination (persistent pesticides no longer used in the EU) are specifically labelled. The most frequently quantified pesticide residues were copper in 22 food commodities (mostly in wheat), bromide ion in 34 commodities (mainly in vegetables), hexachlorobenzene in 7 commodities (particularly in milk), fosetyl-Al in 23 commodities (mostly table grapes), chlorpyrifos in 21 commodities (mainly fruits), spinosad in 14 commodities (mainly in table grapes and tomatoes), DDT in 9 commodities (mostly in milk and meat), dithiocarbamates in 8 commodities (mainly in Brassica vegetables) and boscalid in 14 commodities (mostly in grapes and wine) (Figure 52). Copper, spinosad, azadirachtin as well as pyrethrins are allowed in organic farming; thus, the presence of residues of these compounds is linked to agricultural practices permitted in organic farming. Residues of hexachlorobenzene, DDT and dieldrin are resulting from environmental

[38] Copper compounds are permitted to be used in organic farming.

[39] For this comparison, all pesticides were included; 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.

contaminations in soil, due to the use of these persistent compounds in the past. Quantifications of copper, bromide ion and dithiocarbamates in certain commodities may result from naturally occurring plant products and are not necessarily related to the use of pesticides. The compound BAC belongs to the group of quaternary ammonium compounds that nowadays are widely used as disinfectants, but since BAC has been used as pesticides in the past, it falls under the remit of the pesticide MRL regulation.

The occurrence of the remaining pesticides reported in Figure 52 gives an indication that pesticides not permitted for use in organic farming were found. However, the presence of the pesticide residues in organic food could also –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 be linked to wrong labelling of conventionally produced food as organic food.

MRL exceedances[40] in organic products were reported mainly for anthraquinone (6 samples) and additional 20 determinations for 15 other pesticides. The details on samples of organic products exceeding a legal limit can be also found from the Excel file published as supplement to this report.

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

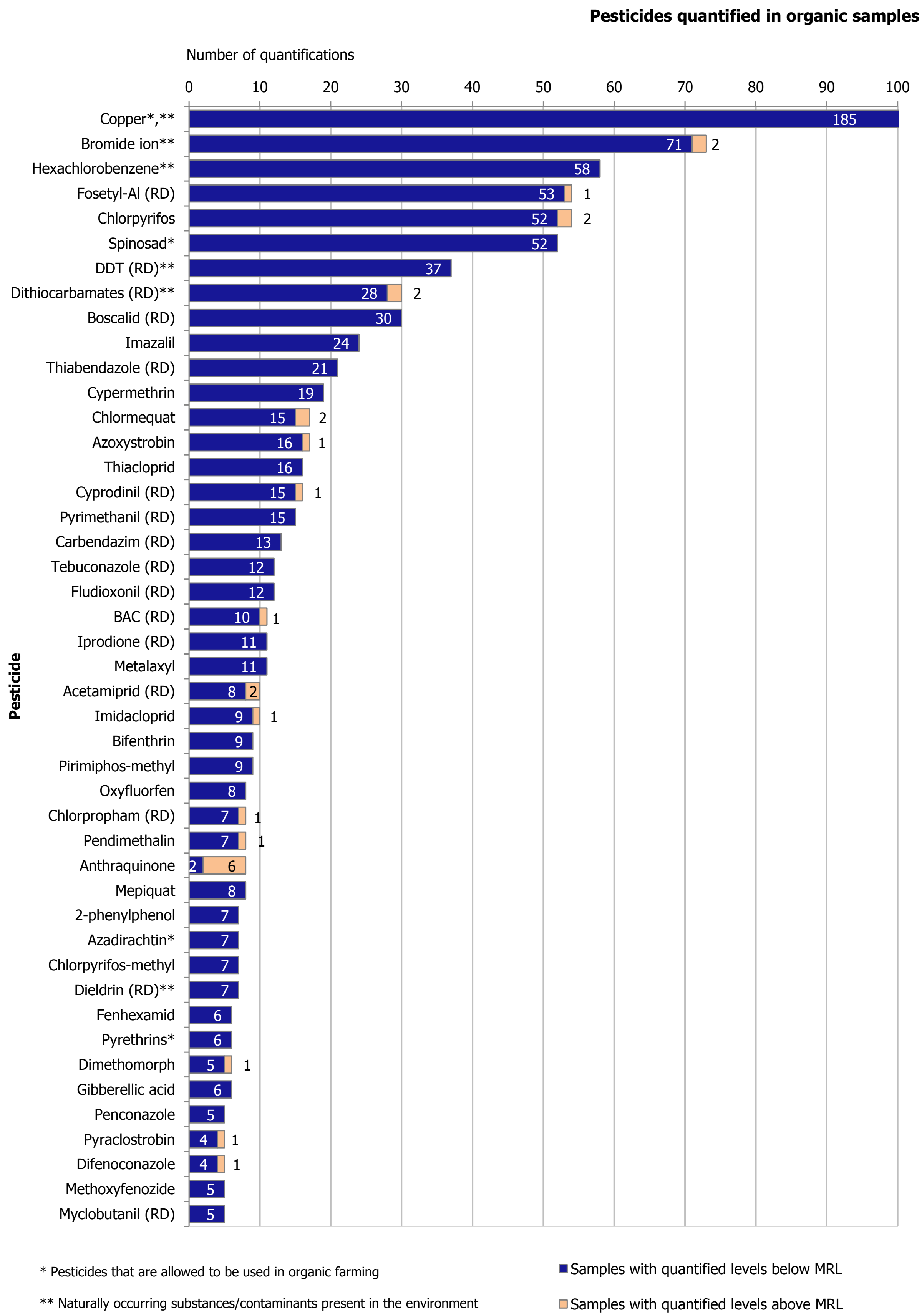


Figure 52: Pesticides most frequently quantified in organic samples (at least five quantifications)

4.2.7. Results on animal products

In total, 7,822 samples of animal products covered by Regulation (EC) No 396/2005 were analysed. In Figure 53 the number of samples is detailed by food product/product group. The majority of these samples (84.4%, 6,602 samples) was free of quantifiable residues; in 487 samples more than one pesticide was reported (Figure 54). Compared with the overall results for other products the quantification rate was significantly lower in samples of animal products (46.7% quantification rate for all food groups versus 15.6% in food of animal origin). For 33 samples (0.4%), an MRL exceedance was identified.

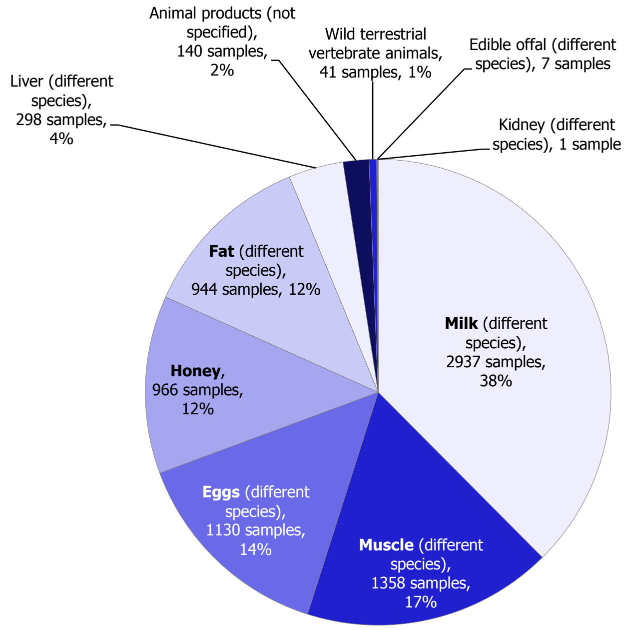


Figure 53: Number of samples of animal products

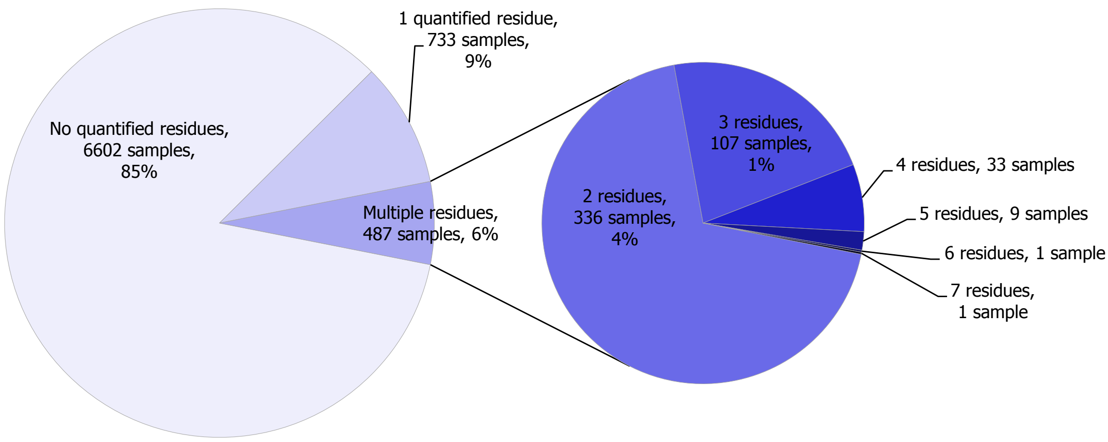


Figure 54: Number of samples of animal products

Among the 629 pesticides that were analysed in food of animal origin, 39 different pesticides were quantified (residue levels at or above the LOQ); the most frequent pesticide residues quantified were DDT, hexachlorobenzene, copper, chlordane, thiacloprid, BAC, hexachlorocyclohexane (beta, alpha), lindane, mercury and dieldrin, DDAC and heptachlor (Figure 55). Most of these compounds are 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 pesticide but may result from the use of feed supplements, which contain copper compounds.

In total, 966 samples of honey were analysed. Among the 600 different pesticides sought in honey, 26 were quantified, mostly thiacloprid (quantified in 25% of the samples, 112 of 444 samples), chlordane (18%, 49/282 samples), DDT (7%, 34/494 samples) and amitraz (4%, 14/366 samples). The following pesticides were quantified in more than one sample of honey (in decreasing order of quantifications rate): carbendazim, dimoxystrobin, methoxychlor, HCH (alpha, beta), lindane, heptachlor, acetamiprid, azoxystrobin, boscalid, tebuconazole, dieldrin, coumaphos and chlorfenvinphos. Some of the substances are environmental contaminants resulting from previous use as pesticides (e.g. chlordane, DDT, methoxychlor, heptachlor, HCH (alpha, beta), lindane and dieldrin), other compounds, such as thiacloprid are due to the use of pesticides in crops that are foraged by bees. Thiacloprid was also frequently quantified in 2014 (EFSA, 2016c). Coumaphos (2 quantifications) and amitraz (14 quantifications) residues in honey more likely originate 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 the EU.

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.

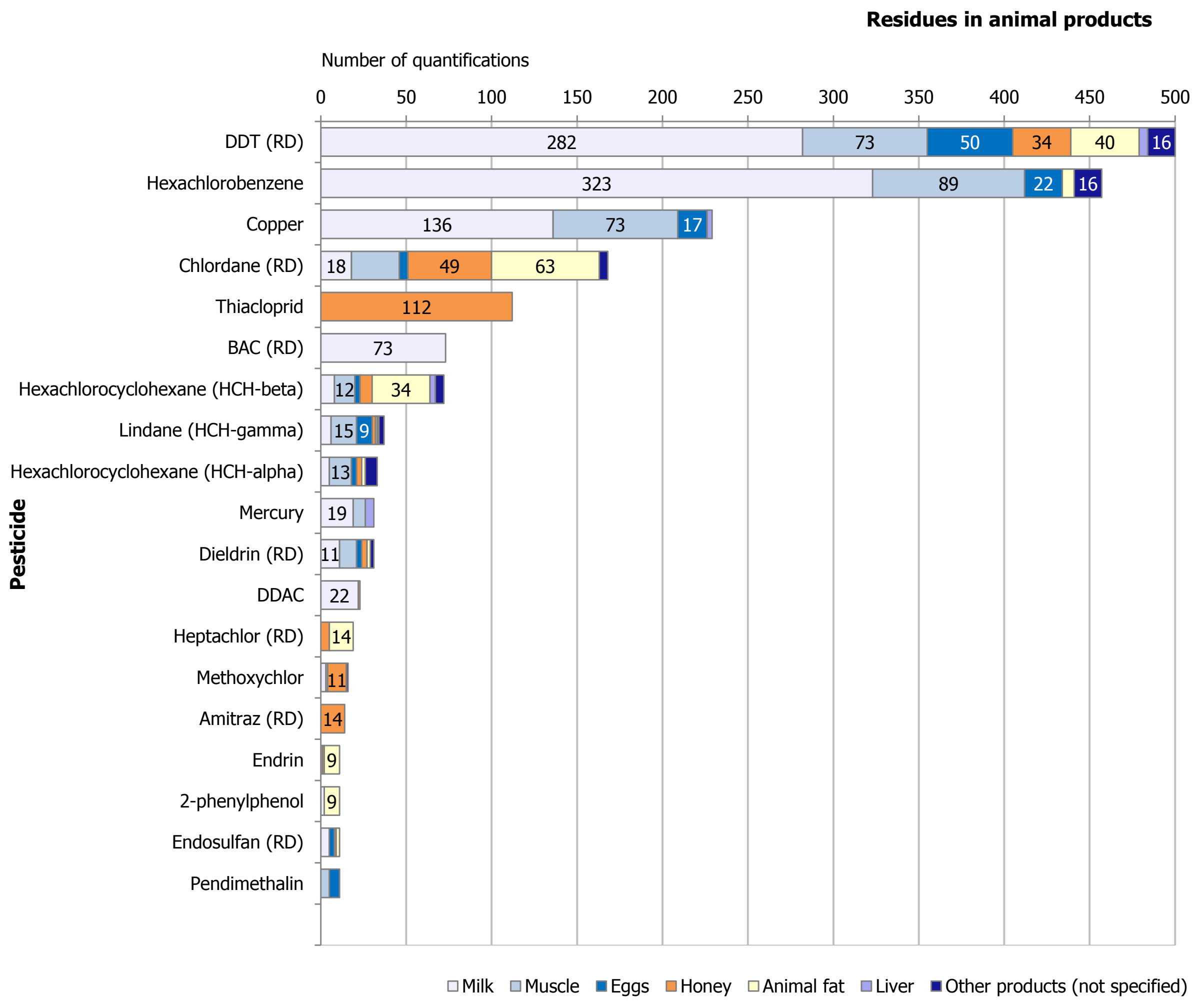


Figure 55: Pesticides quantified most frequently in animal products

4.2.8. Results on glyphosate residues in food

Glyphosate, an herbicide that attracted a high level of public interest, was analysed by 22 reporting countries. Overall, 5,329 samples of different products (including processed products) were analysed for glyphosate residues, mainly vegetables (1,853 samples), fruits and nuts (1,684 samples) and cereals (1,407 samples). In addition, food for infants and young children (260 samples), some animal products (26 samples) and other plant products (99 samples) were analysed for glyphosate residues.

Considering the individual food products analysed, glyphosate was mainly analysed in wheat (1,079 samples), table grapes, strawberries, cereal-based food for infants and young children, peppers, asparagus, tomatoes, herbs, lettuces, cucumbers, barley and pears. For the other food products, results for less than 100 samples were reported. Thus, the results for the individual products are statistically not very robust. It is noted that the number of soybeans samples was very limited (11 samples mainly from the EU). Since soyabeans are an important globally traded commodity on which glyphosate is frequently used, more detailed information on the occurrence of glyphosate residues would be desirable.

Compared with 2014, the number of samples analysed for glyphosate increased in 2015 by 13% (2014: 4,721 samples analysed). Overall, 76.7% of the samples originated from the EU, 14.6% from third countries and 8.7 % were not identified (unknown origin).

The majority of the samples (68.3%) were analysed by Germany, followed by the United Kingdom (7.2%) and France (6.4%).

Overall, 3.1% 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 (71.4% of the samples containing quantified levels of glyphosate, i.e. 15 samples of 21 samples analysed), followed by mustard and sunflower seeds (30.4%: 14 of 46 samples). In cereals, glyphosate was mainly found in wheat (10.1% of the samples: 109/1,079 samples), followed by oats (9.1% samples: 2/22), barley (8.4%: 9/107), rye (2.3%: 2/86) and rice (1.8%: 1/55 samples).

Among the 5,329 samples analysed, 5 samples (0.09%) exceeded the MRL for glyphosate:

- 2 samples of lentils from Canada containing 12.2 and 12.4 mg/kg glyphosate (MRL=10 mg/kg);
- 1 sample of limes from Brazil with a glyphosate residues of 0.2 mg/kg (MRL=0.1 mg/kg);
- 1 sample of peaches from Spain with a residues of 0.12 mg/kg (MRL=0.1 mg/kg);
- 1 sample of mangoes from Brazil containing 0.11 mg/kg glyphosate (MRL=0.1 mg/kg).

In addition, one sample of buckwheat flour containing 1.9 mg/kg glyphosate was, according to the evaluation of the reporting country, considered as exceeding the legal limit[41].

Glyphosate was not quantified neither in food for infants and young children (260 samples, including 211 samples of processed cereal-based foods for infants and young children), nor in maize (33 samples analysed), nor in soybeans (11 samples). The limited number of samples analysed in maize and soybeans do not allow any conclusion for these food commodities.

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. In addition, it should be highlighted that depending on the type of crop, glyphosate metabolites may be formed in treated crops such as AMPA (aminomethylphosphonic acid). In some genetically modified (GM) crops tolerant to glyphosate, additional metabolites such as N-acetyl-glyphosate and N-acetyl-AMPA could be formed (EFSA, 2015c). Although these metabolites are currently not included in the residue definitions[42] and there is no legal obligation for Member States to analyse these metabolites, EFSA investigated whether results for these compounds have been sent to EFSA in the framework of voluntary analysis beyond the scope of Regulation (EC) No 396/2005. While Member States have submitted some information on

[41] Default MRL of 0.01 mg/kg used by the Member State for this sample of buckwheat flour.

[42] In the framework of the renewal of the approval of glyphosate, a provisional residue definition for monitoring was proposed as the "sum of glyphosate and N-acetyl-glyphosate, expressed as glyphosate", considering that glyphosate alone is not an appropriate marker for genetically modified crops containing the GAT-modification (EFSA, 2015c). In the framework of the on-going revision of the MRLs of glyphosate according to Article 12 of Regulation (EC) No 396/2005, the residue definitions of glyphosate will be reconsidered. Pending the publication of the EFSA reasoned opinion on the review of glyphosate MRLs, the legal residue definition for the monitoring of glyphosate is parent glyphosate alone.

trimethyl-sulfonium cation and AMPA residues (see the results below), no data on N-acetyl-glyphosate and N-acetyl-AMPA were reported to EFSA.

The following results for glyphosate related residues have been reported:

- Trimethyl-sulfonium cation was analysed in 2,570 samples (97 food products, mainly table grapes, tomatoes, lettuce, herbs, peppers; other products with less than 100 samples). Trimethyl-sulfonium cation was quantified in 2.4% of these samples, mostly in cultivated fungi (29% of the samples: 23 out of 80 samples analysed), citrus fruits (24% of the oranges analysed (11 of 45 samples), 11% of mandarins (4 of 36 samples), 10% of grapefruits (3 of 30 samples)), wild fungi (5.6% of the samples (2 of 36 samples) and table grapes (3.8% of the samples: 6 of 156 samples). In addition, some positive results were reported for beetroots, kales, rice, asparagus, apricots, mangoes, raspberries and beans with pods. The compound was also quantified in one sample out of 51 samples of food for infants and young children. One MRL exceedance was identified for this substance in a baby food sample (other than processed cereal-based foods) containing 0.016 mg/kg (MRL=0.01 mg/kg);
- AMPA (aminomethylphosphonic acid) was sought in 3,370 samples (mainly table grapes, strawberries, wheat, peppers, herbs, tomatoes, lettuces, and apples; less than 100 samples for other food products); overall, AMPA was quantified in 0.15% of these samples. Positive results were reported only for cultivated fungi (4 out of 88 samples) and wild fungi (1 sample of 36 samples). This metabolite was not quantified neither in fruits (1345 samples analysed), nor in cereals (244 samples), nor in food for infants and young children (72 samples) nor in other plant products (48 samples).

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 be due to mixing or blending of lots with different treatment histories, contaminations during food processing, uptake of persistent residues via soil, or spray drift on the field. According to current EU legislation, the presence of multiple residues in a sample is not considered as an infringement of the MRL legislation as long as the individual residues do not exceed the individual MRLs.

Quantified residues of more than one pesticide (multiple residues) were found in 28% of the samples analysed (23,652 samples) (Figure 56). In unprocessed products, the frequency of multiple residues was higher (30.8%) compared with processed products (10.7% of the samples analysed contained more than 1 pesticide in concentrations greater than the LOQ). Notably, 341 samples contained 10 or more pesticides (54 samples of processed and 287 samples of unprocessed products such as table grapes (42 samples), tea (38 samples), strawberries (25 samples), herbs and edible flowers (19 samples), sweet peppers (17 samples) and pears (16 samples) and apples (11 samples).

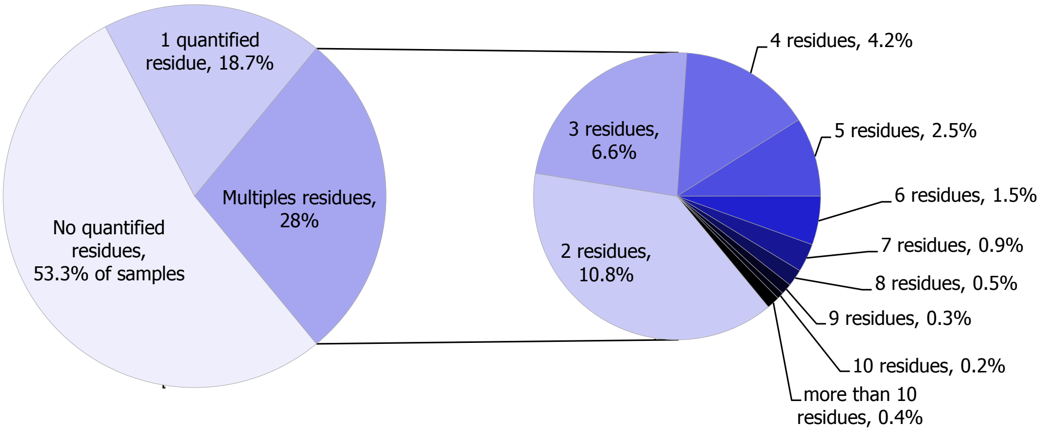
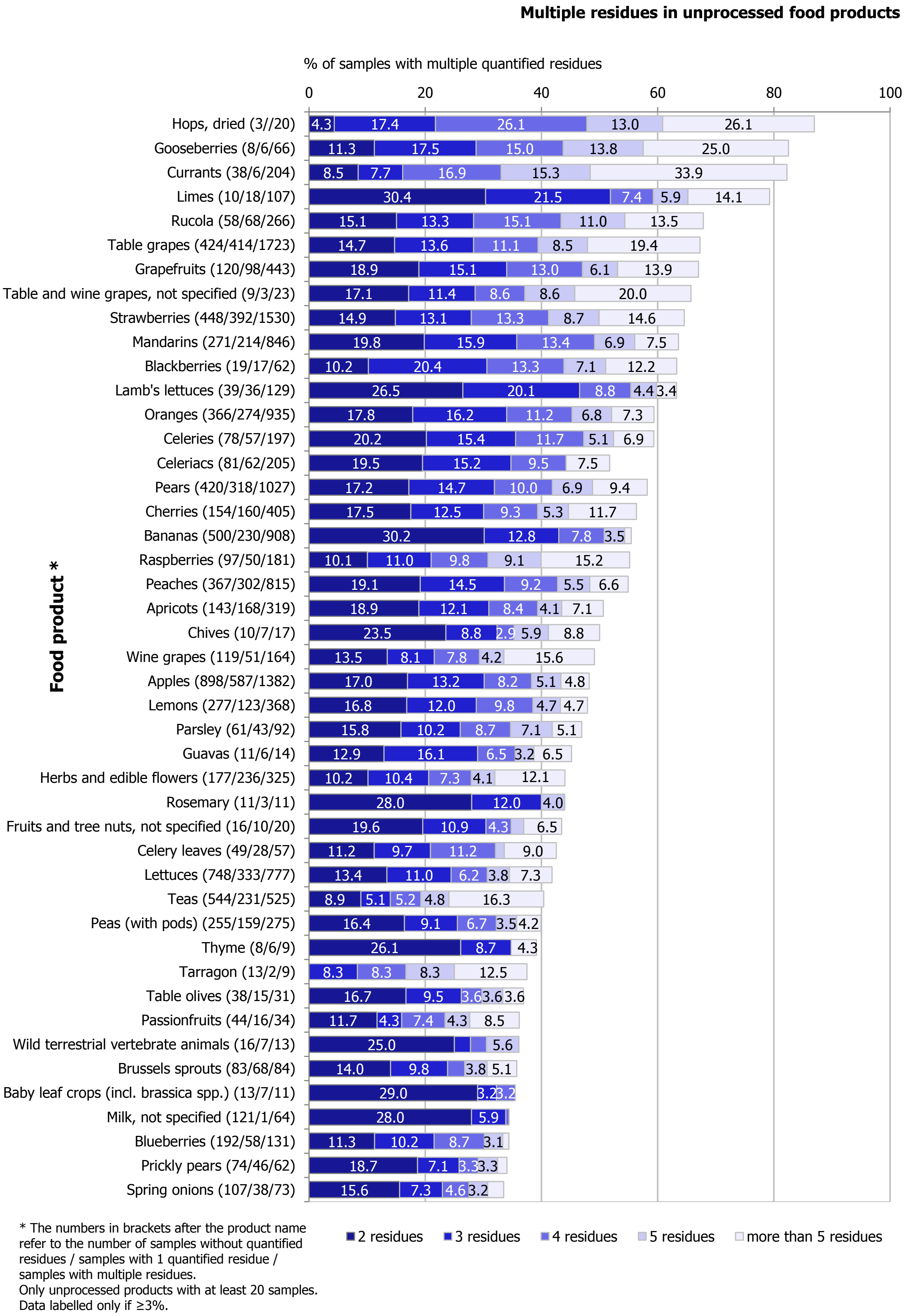


Figure 56: Single and multiple residues quantified in processed and unprocessed products (% of samples with quantified residues)

Focussing on unprocessed food products with a substantial number of samples (more than 20 samples analysed), the highest frequency of multiple residues was found in dried hops (87% of the samples analysed contained multiple pesticide residues), followed by gooseberries (82.5%), currants (82.3%), limes (79.3%), rucola (67.9%), table grapes (67.3%), grapefruits (67%), strawberries (64.6%), mandarins (63.6%), blackberries (63.3%) and lamb's lettuces (63.2%). These commodities were also identified in the 2014 monitoring programmes as products with a high occurrence of multiple residues. In addition, oranges, celeries, celeriac, pears, cherries, bananas, raspberries, peaches and apricots 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; products which were analysed only seldom (less than 20 samples) were not 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 wild and cultivated fungi (e.g. dried fungi), processed grapes (e.g. raisins), peppers (e.g. paprika powder), wine grape, grape leaves, processed apricots and potatoes (e.g. chips).

The presence of multiple residues is not considered as a non-compliance with MRL legislation as long the individual pesticide does not exceed the respective legal limits.



* The numbers in brackets after the product name refer to the number of samples without quantified residues / samples with 1 quantified residue / samples with multiple residues.
Only unprocessed products with at least 20 samples.
Data labelled only if ≥3%.

Figure 57: Food products most frequently containing quantified multiple residues (unprocessed food)

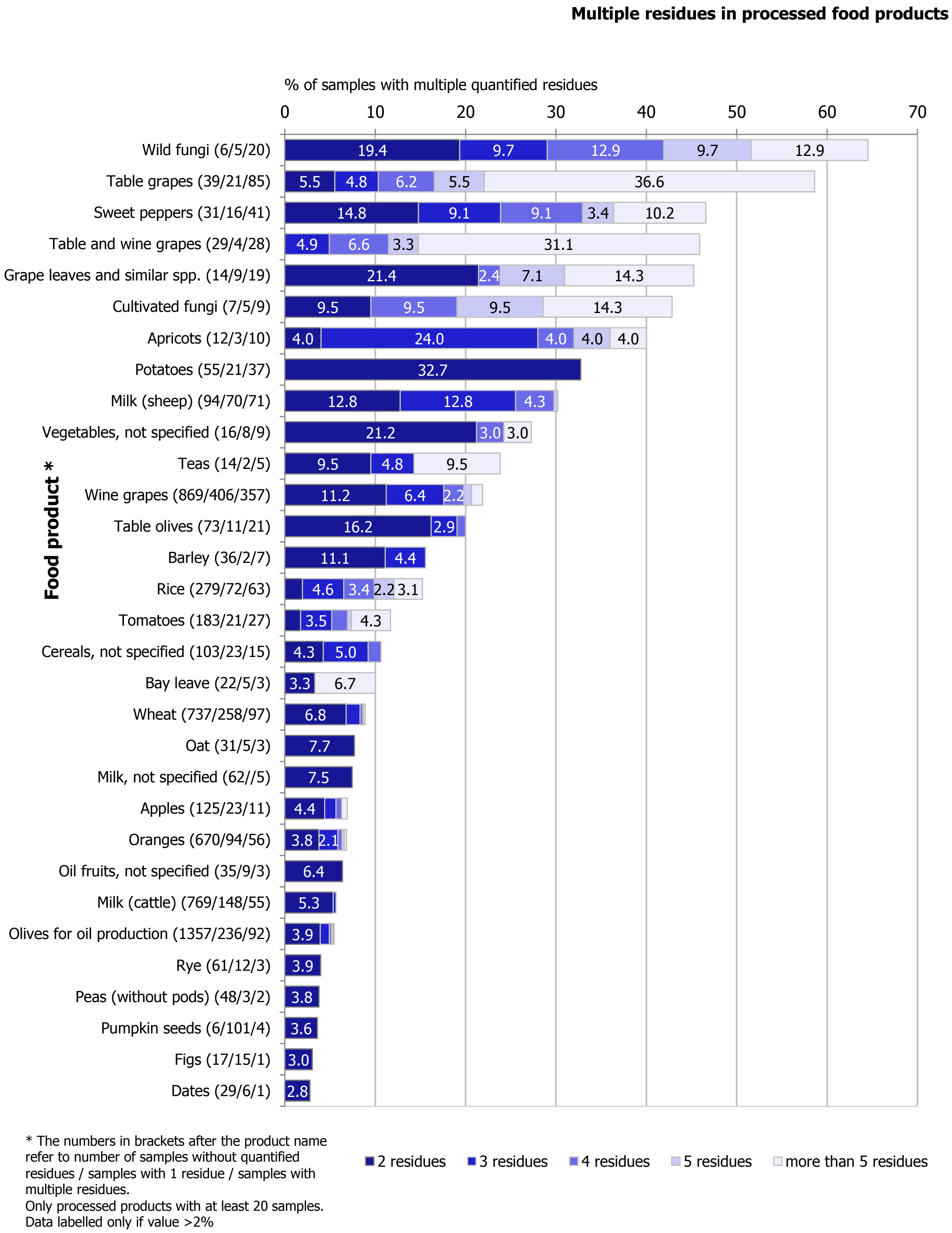


Figure 58: Food products most frequently containing quantified multiple residues (processed food)

4.3. Reasons for MRL exceedances

It needs to be borne in mind that MRLs are established based on supervised residue trials that should reflect the residue behaviour under conditions expected to occur in practice. The level of the MRL is calculated using statistical methodologies. The MRL usually is established to cover at least the upper confidence interval of the 95th percentile of the expected residue distribution. Thus, a low percentage of approximately 1% MRL exceedances is expected to occur even if the approved Good Agricultural Practices are fully respected. However, in such a case, the residue concentrations would be expected to exceed the legal limits only marginally.

In total, 2,366 samples exceeded the legal limit (2.8% of samples analysed); for 480 samples multiple MRL exceedances were reported (116 EU/EEA origin, 342 samples from third countries, 22 samples with unknown origin). Overall, 3,170 individual determinations were reported to violate the EU legal limits.

To identify possible reasons for MRL exceedances that go beyond the expected exceedance rate, EFSA analysed separately the results referring to samples originating from the EU/EEA countries and from third countries.

Among the samples breaching MRLs, 1,225 samples originated from third countries. In these products, a total of 1,835 individual determinations exceeded the legal limits; 700 determinations were resulting from targeted sampling (enforcement samples). A high proportion of these determinations with MRL exceedances in products from third countries were related to products that were in focus of import controls under Regulation (EC) No 669/2009 (see Section 4.2.4). Exceedances of the MRL were most frequently identified in tea from China, sweet peppers from Turkey, the Dominican Republic, Egypt and India, and beans with pods (including yardlong beans) from Kenya, the Dominican Republic and India (more than 100 samples). 41.4% of the MRL exceedances noted in imported products were related to pesticides that are no longer or have never been approved in the EU.

The possible reasons for MRL exceedances in products imported from third countries are summarised as follows:

- 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);
- MRL exceedance due to natural background levels (e.g. dithiocarbamates in Brassica vegetables);
- Presence of biocides that also fall under the pesticide legislation (e.g. BAC and DDAC in plant and animal products, including processed foods such as baby foods).

Among the samples originating from the EU or EEA, overall 1,004 samples exceeded one or several legal limits, with 116 samples with multiple MRL exceedances, resulting in 1,168 individual MRL breaches. Among these cases, 322 MRL exceedances were caused by non-approved substances (27.5%), most frequently carbendazim[43] (45 determinations) followed by the biocidal active substances BAC (42 determinations) and DDAC (17 determinations), propargite (22 determinations), chlorfenapyr (16 determinations) and dieldrin (10 determinations). Among the approved pesticides, chlorpyrifos was the substance found most frequently in concentrations exceeding the legal limits (93 cases, mainly in peaches, parsley, celery leaves, broccoli, carrots, cucumbers and apricots), followed by dimethoate (86 cases, mainly in cherries, peaches, apples and tomatoes).

The product groups with EU/EEA origin most frequently exceeding the legal limits were grape leaves and similar species, celery leaves, unspecified fruits and tree nuts, parsley, teas, wild fungi, turnips and basil and edible flowers.

[43] The approval for carbendazim expired in November 2014. Carbendazim is also a metabolite of the approved active substance thiophanate-methyl. For this analysis, carbendazim is considered as a non-approved active substance.

Possible reasons for MRL exceedances in products produced in the EU and EEA countries are summarised as follows:

- 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 pre-harvest interval, the number of applications, or the method of application, e.g.
    - Chlorpyrifos in 31 different foods of plant origin (fruits and vegetables, cereals such as wheat and rice),
    - Dimethoate in 37 various fruits and vegetables,
    - Flonicamid, particularly in sweet peppers (47 samples with MRL exceedances),
    - Thiophanate-methyl, mainly in lettuces (6 samples), but also in 20 other vegetables,
    - Chlorpropham, used as a plant growth regulator for the conservation of potatoes (2 samples exceeding MRL), but also in 15 other vegetables and fruits such as pears (6 samples).
- Residues of fosetyl-Al (15 MRLs exceedances in EU products), possibly resulting from the use of foliar phosphorous fertilizers, which could mimic the treatment with fosetyl-Al.
- Certain substances falling under the pesticide legislation are also used for other purposes (e.g. as biocides/disinfectants, feed additives), but the MRLs set under Regulation (EC) No 396/2005 do not reflect the other sources of residues. For example, the two quaternary ammonium compounds BAC and DDAC (found in leafy vegetables, milk, and animal products) are used as biocides under Regulation (EU) No 528/2012[44].
- Environmental contaminants exceeding the MRLs:
    - Mercury in wild and cultivated fungi;
    - Bromide ion in vegetables (e.g. lettuces, rucola) and nuts (e.g. Brazil nuts, chestnuts);
    - Dieldrin, mainly in cucurbits (cucumbers, courgettes, melons, pumpkin seeds). Soil contamination has been identified in several countries/areas, and some plants such as cucurbits are known for their capacity to bioaccumulate dieldrin (EFSA, 2007a). Recently, dieldrin was also quantified in courgettes in the French Infant Total Diet Study (ANSES, 2016);
    - Other persistent organic pollutants included in the Stockholm Convention of prohibited substances (UNEP, 2001), such as chlordane and HCH-alpha in honey, hexachlorobenzene in milk, eggs and oilseeds, and chlordecone in products from some French Antilles (regional contaminations). These substances are no longer used as pesticide active substances, but are very persistent in the environment and are therefore found in the food chain.

The origin of the product with residues exceeding the legal limits was not reported for 137 samples (22 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.

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, 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

[44] 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 L167, 27.6.2012, p. 1-123

acceptable daily intake (ADI) and the Acute Reference Dose (ARfD)), gives an indication of whether 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 and long-term dietary 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 estimating the actual acute and chronic exposure to pesticide residues present in food that was analysed in monitoring programmes, EFSA used the 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, 2013b, 2016d). Currently, EFSA is working with high priority not only on the establishment of the cumulative assessment groups, but also on the adaptation of the available cumulative risk assessment methodologies for the practical implementation at EU level.

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

5.1.1. Method

The methodology used to calculate the short-term 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 washing or any processing that would reduce the residues (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[45]).

The short-term exposure assessments were performed for the pesticides covered by the 2015 EU-coordinated programme[46], considering the 11 food products, i.e. orange juice, table grapes, bananas, peppers, aubergines, broccoli, peas (without pods), olive oil, wheat, butter and chicken eggs. The exposure was calculated for the 10,884 samples taken in the framework of the EUCP and additional 5,313 samples of 10 of these food products for which the results were reported under the national control programmes.[47]

For 38 pesticides of the 164 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:

[45] The approach using the so-called unit variability factor of 5 or 7 is used 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 table grapes, bananas, peppers, aubergines and broccoli; 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 orange juice, olive oil, wheat, butter, spinach, peas without pods). The latter also applies to chicken eggs.

[46] For 37 substances included in the EU-coordinated monitoring 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.

[47] For butter, only the results of the 616 samples reported in the framework of the EUCP were used for the acute risk assessment, since the coding did not allow to discriminate between butter samples and other processed milk products.

- The short-term exposure was calculated for all pesticide/crop combinations covered by the 2015 EU-coordinated programme.[48]
- 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 (table grapes, bananas, peppers, aubergines, broccoli, peas (without pods) and wheat) was based on the large portion food consumption implemented in the EFSA PRIMo (EFSA, 2007b).
- For calculation of the exposure for orange juice is based on the food consumption figure (large portion) of fresh, unprocessed oranges.
- For olive oil, the EFSA PRIMo was modified, recalculating the consumption of unprocessed olives to olive oil, assuming that olives contain approximately 20% oil.
- Processing factors were not systematically taken into account. Only for those pesticide/crop combinations, where the result of the first risk assessment screening exceeded the toxicological reference value, EFSA explored the option to refine the calculation using processing factors. To identify appropriate processing factors the recently published database of the German Federal Institute for Risk Assessment (BfR, 2016) was consulted. Refined exposure calculations could be performed only for chlormequat in wheat (processing factor for wholemeal flour of 0.95).
- In butter, only fat soluble pesticides occurred in quantified concentrations. To estimate the exposure for these fat soluble pesticides present in butter, the following approach was used: the pesticide residues in butter were recalculated to whole milk (4% fat content), assuming a fat content of butter being approximately 80%. The exposure was then calculated with the large portion consumption of milk.
- 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 18. The toxicological reference values for the remaining pesticides are unchanged and can be retrieved from Appendix D, Table D1 of the 2013 EU report on pesticide residues (EFSA, 2015b) and Appendix D, Table 20 of the 2014 EU report on pesticide residues (EFSA, 2016c). For three pesticides with results at or above the LOQ, the short-term risk assessment has been performed with 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 (i.e. biphenyl, bromopropylate 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 in 2015 (e.g. glyphosate, pendimethalin, propyzamide; for fenamidone the previously used ARfD has been withdrawn).

The residue definitions for fenvalerate (RD), methomyl (RD) and triadimenol (RD) contain 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.

In addition, the residue definition for dimethoate contains compounds with significantly different toxicological potencies (i.e. dimethoate and omethoate). In fact, omethoate is six times more toxic compared with dimethoate considering short-term exposure (EFSA, 2006, 2010). In order to estimate the actual risk for consumers, it is therefore necessary to take into account the concentration of the individual components with their relative toxicity. According to the pesticide monitoring regulation relevant for 2015, Member States were asked to report in addition to the total residues (sum of dimethoate and omethoate, expressed as dimethoate) also the results for the individual components.

[48] 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.

Overall, for 12,394 samples of the food commodities relevant for the acute risk assessment, results for the legal residue definition (sum of dimethoate and omethoate, expressed as dimethoate) were reported to EFSA. For these samples EFSA calculated three scenarios:

- Scenario 1 ('optimistic dimethoate scenario') where it is assumed that the determined residues are related only to the less toxic compound dimethoate,
- Scenario 2 ('pessimistic omethoate scenario'), where the total residue concentration reported is assumed to refer to the more toxic compound omethoate and
- Scenario 3 ('realistic scenario') where the individual components were taken into account according to the toxicological potency.[49] The exposure was calculated based on the sum of dimethoate concentration plus 6 times the omethoate concentration. The exposure was then compared with the ARfD established for dimethoate.

Residues resulting from the use of dithiocarbamates are measured as CS_2, a common moiety of all the pesticides belonging to this group of chemicals. Some crops contain naturally occurring substances that are covered by the analytical method mimicking the presence of dithiocarbamates. 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 calculated, assuming that the measured CS_2 concentration refers exclusively to maneb, mancozeb, propineb, thiram or ziram. [50]

5.1.2. Results

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

- Grey cells refer to pesticide/crop combinations not covered by the 2015 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 contained quantified residues.
- The cells containing 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/ADI is 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. The results are expressed as percentage of the ARfD/ADI. Pesticide/crop combinations where the calculated dietary exposure exceeded the ARfD are highlighted in orange (exposure between 100% and 1,000%: light orange, exposure above 1,000%: dark orange), whereas pesticide/crop combinations where exposure was calculated to be below the toxicological reference values are indicated in yellow.

Overall, for 21 of the pesticides relevant for acute exposure assessments not a single 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 (chlordane, diazinon, EPN, fenarimol, fenitrothion, fluquinconazole, heptachlor, hexachlorocyclohexane (alpha), hexachlorocyclohexane (beta), isocarbophos, lindane, methidathion, methoxychlor, oxadixyl, oxydemeton-methyl, paclobutrazol, parathion, parathion-methyl, tefluthrin, thiamethoxam, tolylfluanid).

For 75 pesticides, residues were found in one or several of the food products analysed in concentrations at or above the LOQ, but the exposure was below the toxicological reference values (abamectin, aldicarb, azinphos-methyl, bifenthrin, biphenyl, bromopropylate, buprofezin, captan, carbosulfan, chlorfenapyr, chlorothalonil, chlorpropham, chlorpyrifos-methyl, clothianidin, cypermethrin, cyproconazole, dicloran, dicofol, dieldrin, difenoconazole, dimethomorph, diniconazole, dithianon, dodine, endosulfan, epoxiconazole, etofenprox, famoxadone, fenazaquin, fenbuconazole,

[49] The third scenario was based on the subset of data for which detailed results were provided for dimethoate and/or omethoate.

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

fenbutatin oxide, fenoxycarb, fenpropathrin, fenpropidin, fenpropimorph, fenpyroximate, fenthion, fenvalerate, fluopyram, flusilazole, flutriafol, folpet, fosthiazate, glyphosate, hexaconazole, imidacloprid, indoxacarb, linuron, malathion, mepanipyrim, mepiquat, metalaxyl, methoxyfenozide, myclobutanil, oxamyl, penconazole, pendimethalin, permethrin, phosmet, pirimicarb, pirimiphos-methyl, procymidone, profenofos, propamocarb, propiconazole, propyzamide, pymetrozine, spiromesifen, spiroxamine, tau-fluvalinate, tebufenpyrad, terbuthylazine, tetraconazole, thiacloprid and thiophanate-methyl). The dithiocarbamates - mancozeb scenario and dithiocarbamates - thiram scenario also fall in this category. According to the current scientific knowledge, the presence of these pesticides in the food products assessed was not likely to pose a short-term health risk to consumers.

For 29 pesticides, the screening for potential short-term consumer risks 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 (i.e. acephate, acetamiprid, acrinathrin, bitertanol, carbaryl, carbendazim, carbofuran, chlormequat, chlorpyrifos, cyfluthrin, deltamethrin, dichlorvos, ethephon, ethion ,fenamiphos, fipronil, formetanate, imazalil, lambda-cyhalothrin, methamidophos, methiocarb, methomyl, monocrotophos, pyraclostrobin, pyridaben, tebuconazole, thiabendazole, triadimenol and triazophos). In addition, the calculated exposure exceeded the toxicological reference values for one or several commodities in three of the five dithiocarbamates scenarios (maneb, propineb and ziram scenario) as well as for dimethoate scenario 2 and 3.

	Food product [a]										
Pesticide	**Oj**	**Gt**	**Ba**	**Pe**	**Au**	**Br**	**Pw**	**Oo**	**Wh**	**Bu**	**Eg**
2-phenylphenol [b]											
Abamectin (RD)	5	17		20	6						
Acephate		54		132	0.9						
Acetamiprid (RD)		52	10	302	24	582	0.4				
Acrinathrin		13	418	40	8						
Aldicarb (RD)						35					
Azinphos-methyl				50	3						
Azoxystrobin [b]											
Bifenthrin		14	23	38	0.4						
Biphenyl [c]				0.1					0.0		
Bitertanol		282			4				1		
Boscalid (RD) [b]											
Bromide ion											
Bromopropylate [c]		2						0.0			
Bupirimate [b]											
Buprofezin		4	7	2	0.1	0.1		0.0			
Captan (RD)		1		0.6			0.3	0.0			
Carbaryl			17	113							
Carbendazim (RD)	6	153	7	976	59	1,805	7		4		
Carbofuran (RD)				420	567						
Carbosulfan					65			0.3			
Chlorantraniliprole [b]											
Chlordane (RD) [c]											
Chlorfenapyr				46		66					
Chlormequat		3							275		
Chlorothalonil (RD)		5	0.3	18	3	4					
Chlorpropham (RD)						9					
Chlorpyrifos	15	3,143	3,344	1,386	105	1,922		1	25		
Chlorpyrifos-methyl		10	7	25	2	0.6		0.0	22		
Clofentezine (RD) [b]											
Clothianidin		4		0.8		0.7			0.6		
Cyfluthrin		39		123				0.1			
Cypermethrin		56	2	28	2	6		0.0	16	0.0	
Cyproconazole		28	6	18		22					
Cyprodinil (RD) [b]											
DDT (RD) [b]											
Deltamethrin		471		120	5	33	2	0.2	202		

Pesticide	Oj	Gt	Ba	Pe	Au	Br	Pw	Oo	Wh	Bu	Eg
Diazinon											
Dichlorvos						140			116		
Dicloran					8						
Dicofol (RD)				0.3							
Dieldrin (RD)										2	
Diethofencarb [b]											
Difenoconazole		9	1	55	0.3	35		0.0	0.7		
Diflubenzuron (RD) [b]											
Dimethoate (RD) - Scenario 1		90		13	21		2	0.2			
Dimethoate (RD) - Scenario 2		451		63	105		8	0.8			
Dimethoate (RD)- Scenario 3		477		18	95		23	0.4	10		
Dimethomorph	0.1	22	0.4	3	0.2	17	0.0				
Diniconazole				11							
Diphenylamine [b]											
Dithianon		13									
Dithiocarbamates-maneb scena		238	6	31	1	275	0.9		100		
Dithiocarbamates-mancozeb sc		78	2	10	0.4	90	0.3		33		
Dithiocarbamates-metiram sce											
Dithiocarbamates-propineb sce		494	13	64	3	571	2		207		
Dithiocarbamates- thiram scen		69	2	9	0.4	80	0.3		29		
Dithiocarbamates-ziram scenar		655	17	85	4	757	2		275		
Dodine		0.7		8							
Endosulfan (RD)		4	79	87				0.0			
EPN											
Epoxiconazole			4	12	2				3		
Ethephon		576		630					2		
Ethion				168							
Ethirimol [b]											
Etofenprox		6		3	0.1	0.2		0.0	0.0		
Famoxadone		46									
Fenamidone [d]		*				*					
Fenamiphos (RD)		39		120	39						
Fenarimol											
Fenazaquin	0.2	1.0		0.9				0.0			
Fenbuconazole		0.4				0.4					
Fenbutatin oxide		3		4	2						
Fenhexamid [b]											
Fenitrothion											

Pesticide	Oj	Gt	Ba	Pe	Au	Br	Pw	Oo	Wh	Bu	Eg
Fenoxycarb		0.2									
Fenpropathrin		1		4							
Fenpropidin (RD)			15								
Fenpropimorph (RD)			29								
Fenpyroximate		62		14	3						
Fenthion (RD)				13				0.8			
Fenvalerate (RD)		14				8		0.1			
Fipronil (RD)				50	0.6	278					
Fludioxonil (RD) [(b)]											
Flufenoxuron [(b)]											
Fluopyram (RD)		21	0.0	7	0.7	0.1	0.1				
Fluquinconazole											
Flusilazole (RD)		16		59							
Flutriafol		5	3	79							
Folpet (RD)		17									
Formetanate		10,574		227	27	12					
Fosthiazate			30		5						
Glyphosate									8		
Heptachlor (RD) [(c)]											
Hexachlorobenzene (d)										*	
Hexachlorocyclohexane (alpha)											
Hexachlorocyclohexane (beta)											
Hexaconazole [(c)]				93							
Hexythiazox [(b)]											
Imazalil	22	6	385			2		0.0	0.6		
Imidacloprid	28	55	4	82	17	8		0.0	5		
Indoxacarb		32	5	15	0.7	5					
Iprodione (RD) [(b)]											
Iprovalicarb [(b)]											
Isocarbophos											
Kresoxim-methyl (RD) [(b)]											
Lambda-cyhalothrin (RD)		210		151	12	77		0.1			
Lindane											
Linuron				25							
Lufenuron [(b)]											
Malathion (RD)									2		
Mandipropamid [(b)]											
Mepanipyrim					2						

Pesticide	Oj	Gt	Ba	Pe	Au	Br	Pw	Oo	Wh	Bu	Eg
Mepiquat									1		
Metalaxyl		7	0.8	3		2					
Methamidophos		284		1,134							
Methidathion											
Methiocarb (RD)		44	9	155							
Methomyl (RD)		3,929		1,335	51						
Methoxychlor [(c)]											
Methoxyfenozide		31		5	0.1	0.3					
Monocrotophos				2,809							
Myclobutanil (RD)		11	15	16	0.1			0.0			
Oxadixyl											
Oxamyl				63	75						
Oxydemeton-methyl (RD)											
Paclobutrazol											
Parathion											
Parathion-methyl (RD)											
Penconazole		7		0.7							
Pencycuron [(b)]											
Pendimethalin		0.3		2		0.2		0.0			
Permethrin				0.5					0.0		
Phosmet (RD)	0.1				0.8			0.9			
Pirimicarb (RD)		0.1		3	9	6	0.1	0.0			
Pirimiphos-methyl				8	2		0.1		66		
Procymidone (RD)		6		5				0.0			
Profenofos				16	4						
Propamocarb (RD)				1	0.3	15	0.0				
Propargite [(d)]	*	*		*	*						
Propiconazole		2		7		14			0.1		
Propyzamide (RD)		0.1				0.6		0.0			
Pymetrozine (RD)				13	1.0						
Pyraclostrobin		140		105	5	18			0.9		
Pyridaben		3		10	3	291					
Pyrimethanil (RD) [(b)]											
Pyriproxyfen [(b)]											
Quinoxyfen [(b)]											
Spinosad [(b)]											
Spirodiclofen [(b)]											
Spiromesifen			0.1	1	0.2		0.0				

Pesticide	Oj	Gt	Ba	Pe	Au	Br	Pw	Oo	Wh	Bu	Eg
Spiroxamine (RD)		49	0.6								
tau-Fluvalinate							0.8				
Tebuconazole (RD)	0.1	393	6	99	3	31	0.8	0.4	4		
Tebufenozide [(b)]											
Tebufenpyrad		36		44	7						
Teflubenzuron [(b)]											
Tefluthrin											
Terbuthylazine								0.1			
Tetraconazole		30		5					1		
Tetradifon [(b)]											
Thiabendazole (RD)	2	1	385	1	0.4				0.3		
Thiacloprid		2		14	6	4	0.9	0.0			
Thiametoxam (RD)											
Thiophanate-methyl (RD)		3		19	8	8	1		0.6		
Tolclofos-methyl [(b)]											
Tolylfluanid (RD)											
Triadimenol (RD)		210		87	3	12			0.6		
Triazophos				6,751							
Trifloxystrobin (RD) [(b)]											
Triflumuron [(b)]											

(a): Oj: orange juice, Gt:Table grapes, Ba: bananas, Pe: peppers, Au: aubergines, Br: broccoli, Pw: peas (without pods), Oo: olive oil, Wh: wheat, Bu: butter, Eg: chicken eggs
(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: Results of short-term (acute) dietary risk assessment (expressed as a percentage of the toxicological reference value)

Overall, 263 determinations (corresponding to 244 samples), were calculated to exceed the ARfD in the risk assessment screening.[51]

The highest number of cases with exceedances of the ARfD was identified for bananas (120 determinations), followed by table grapes (65 determinations), peppers (54 determinations), broccoli (12 determinations), wheat (6 determinations) and aubergines (5 determinations).

For orange juice, peas (without pods), olive oil, butter and chicken eggs no results exceeding the toxicological threshold were reported.

The detailed results of the short-term dietary exposure assessment for the pesticide residues found in the 11 food products covered by the 2015 EU-coordinated control programme, including the 263 cases with an exceedance of the ARfD, are presented in Appendix D, Figure 60 to Figure 70. 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 the MRL, and the number of samples with residues above the MRL. The highest number of exceedance of the ARfD was identified for bananas (120 determinations), followed by table grapes (65 determinations), sweet peppers (54 determinations), and broccoli (12 determinations). For the other commodities, less than 10 determinations exceeded the toxicological threshold (i.e. 100% of the ARfD/ADI).

Among the determinations exceeding the ARfD, 114 were related to chlorpyrifos residues (57 determinations in bananas, 32 in table grapes, 18 in peppers, 6 in broccoli and 1 in aubergines). A substantial number of exceedances of the ARfD were also identified for imazalil (33 cases in bananas)[52], acrinathrin (21 determinations in bananas), ethephon (10 determinations in table grapes and 4 in peppers) and lambda-cyhalothrin (8 determinations in table grapes and 4 in peppers). For the remaining 24 active substances with potential alerts for acute exposure, less than 10 samples contained residues exceeding the ARfD: thiabendazole, methomyl, formetanate, deltamethrin, carbendazim, carbofuran, tebuconazole, acetamiprid, methamidophos, triazophos, pyraclostrobin, monocrotophos, triadimenol, dichlorvos, cyfluthrin, pyridaben, carbaryl, acephate, bitertanol, chlormequat, fipronil, methiocarb, ethion and fenamiphos. It should be highlighted that following the lowering of the ARfD for chlorpyrifos, lambda-cyhalothrin and thiabendazole in 2014, the process of revising the agricultural practices and lowering the legal limit was triggered. However, in 2015, the modifications of the Good Agricultural Practices and the lower legal limits were not yet in place.

In 16 samples, multiple residues were noted in concentration exceeding the respective ARfD (one sample of broccoli from China with 5 pesticides –acetamiprid, carbendazim, dichlorvos, fipronil and pyridaben- exceeding the respective ARfD; the remaining 15 samples (5 samples of peppers, bananas and table grapes, respectively) exceeded the ARfD for 2 different pesticides.

It should be stressed again that the results of the acute risk assessment reflect the outcome of a conservative screening for potential risks. The calculations were performed without taking into account that the residues expected in the food consumed after peeling, processing or washing might be significantly lower. 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 three pesticides (fenamidone, hexachlorobenzene and propargite), residues were present in quantified concentrations, but due to the absence of toxicological reference values no short-term dietary risk assessment could be performed. None of these pesticides are authorised in the EU. The

[51] As regards the two compounds where no unambiguous risk assessment could be calculated (i.e. dimethoate (RD) and dithiocarbamates (RD)), the dimethoate (scenario 3) and the mancozeb scenario were used as for calculating the number of determinations/samples exceeding the ARfD.

[52] Imazalil is frequently used for post-harvest treatment. For the acute risk assessment screening the standard variability factors were used. Considering that a lower unit-to-unit variability may be expecpted, the acute risk assessment is likely to overestimate the real exposure. In addition, no appropriate peeling factors were available for refined exposure assessment. In the edible part of the crop the residues were probably lower than in the whole fruit including the peel. However, lacking this information, a more refined risk assessment based on reliable data on the distribution of residues between pulp and peel and the real unit-to-unit variability could not be performed.

estimated short-term exposure to these pesticides, using the food consumption data of EFSA PRIMo rev. 2 is presented in Table 12.

Table 12: Results of short-term exposure assessment for active substances without ARfD/ADI values

Pesticide	Food product	Short-term exposure (in µg/kg bw)
Fenamidone	Table grapes	5.9
	Broccoli	5.8
Hexachlorobenzene	Butter	0.1
Propargite	Orange juice	<0.1
	Table grapes	5.2
	Peppers	4.1
	Aubergines	0.7

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

5.2.1. Method

The chronic or long-term exposure assessment estimates the expected exposure of an individual consumer over a long period, predicting the lifetime exposure. 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, 2013a, 2014).

The exposure calculations are based on the most commonly consumed food commodities, i.e. the food products covered by the three years' cycle of the EU-coordinated monitoring programme.

Similar to previous year, EFSA calculated two long-term risk assessment scenarios referred to as adjusted upper-bound and lower-bound approach[53]. The adjusted upper-bound risk assessment methodology should be considered as a conservative screening, which is likely to overestimate the real exposure. The lower-bound approach is based on assumptions that may underestimate the exposure to a certain extent, since it postulates that samples with residues at or below the LOQ are completely free of the pertinent pesticide. However, the lower-bound calculations are useful to complement the adjusted upper-bound exposure assessments to get a better understanding of the uncertainties of the exposure assessment resulting from the samples without quantified residues (residues at or below the LOQ).

For the adjusted upper-bound and lower-bound approach, the residue concentration used as the input value in the chronic exposure estimations was derived according to the following approach:

- For each pesticide/crop combination, an overall mean residue concentration was calculated, using the residue concentrations measured in the individual samples.
- For samples with residues below the LOQ, EFSA used as a conservative assumption the numerical value of the LOQ to calculate the overall mean (adjusted upper-bound approach).
- 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 (adjusted upper bound approach).
- In the lower bound scenario, the results below the LOQ are replaced with zero, assuming that the pesticide was not present in the sample.
- For the food products covered by the 2015 EU-coordinated monitoring programme (i.e. orange juice, table grapes, bananas, peppers, aubergines, broccoli, peas (without pods), olive oil, wheat, butter and chicken eggs), the mean residue concentration was calculated from the results presented in Section 3.3 of this report.

[53] In previous years, only the scenario described as "upper-bound approach" was calculated. Thus, for comparing results of the 2014 exposure calculations with the results of previous years, the results described as upper-bound approach need to be taken into account.

- For olive oil, the residue concentration measured in oil was recalculated to unprocessed olives, assuming an oil content of 20% in olives.
- For the remaining food products considered in the long-term exposure assessment, the residue input figures were derived from the results of the 2015 national programmes. This applies to mandarins, apples, pears, peaches, table grapes, wine, strawberries, potatoes, carrots, tomatoes, cucumbers, head cabbage, lettuce, spinach, beans (with pods), leek, oats, rice, rye, swine meat, poultry meat and liver.
- All the results reported for liver samples (bovine, goat, sheep, swine and poultry liver) were pooled to calculate the mean residue concentrations. The exposure was assessed on the basis of the consumption of bovine liver.
- For poultry meat and swine meat the following approach was used:
  - For fat-soluble pesticides, the exposure was calculated assuming the poultry meat contained 10% of the residue measured in poultry fat (assuming a fat content of 10% for poultry meat). For swine meat, a similar approach as described for poultry meat was used. However, the default fat content of swine meat was assumed to be 20%.
  - For non-fat soluble pesticides, the exposure was calculated with the residue concentration measured in poultry muscle and swine muscle.
- 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 used for the risk assessment are reported in Appendix D, Table 18, and in the respective Appendices of the 2013 and 2014 EU report on pesticide residues (EFSA, 2015b. 2016c).

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 use of the authorised substance only (esfenvalerate, methomyl and triadimenol, respectively).

For dimethoate, EFSA calculated two scenarios: the optimistic dimethoate scenario where it is assumed that the calculated mean residue concentrations are related only to the less toxic dimethoate, while in the pessimistic omethoate scenario the total residue concentration reported is assumed to refer to the more toxic omethoate.[54]

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

5.2.2. Results

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

[54] Since the pessimistic scenario did not raise concumer health concerns, the calculation of a scenario based on the individual concentrations of dimethoate and omethoate, and the relative toxicological potency of the two compounds was not considered necessary.

Table 13: Results of long-term dietary risk assessment

Pesticide	Long-term exposure (in % of ADI) Adjusted upper-bound	Lower-bound
2-phenylphenol	0.15	0.03
Abamectin (RD)	2.89	0.03
Acephate	0.17	0.01
Acetamiprid (RD)	0.86	0.15
Acrinathrin	1.17	0.11
Aldicarb (RD)	1.40	0.00
Azinphos-methyl	0.51	0.00
Azoxystrobin	0.16	0.05
Bifenthrin	1.35	0.04
Biphenyl	0.02	0.01
Bitertanol	6.56	0.02
Boscalid (RD)	1.62	0.92
Bromide ion*	quantified residues in one or several commodities	
Bromopropylate	0.05	0.00
Bupirimate	0.38	0.02
Buprofezin	2.24	0.15
Captan (RD)	1.38	1.07
Carbaryl	1.76	0.00
Carbendazim (RD)	1.69	0.24
Carbofuran (RD)	11.66	0.12
Carbosulfan	0.14	0.00
Chlorantraniliprole	0.01	0.00
Chlordane (RD)	2.53	0.01
Chlorfenapyr	0.28	0.02
Chlormequat	2.72	2.42
Chlorothalonil (RD)	2.06	0.10
Chlorpropham (RD)	4.21	3.91
Chlorpyrifos	46.71	14.95
Chlorpyrifos-methyl	3.15	0.76
Clofentezine (RD)	0.79	0.03
Clothianidin	0.20	0.00
Cyfluthrin	8.36	0.03
Cypermethrin	1.02	0.06
Cyproconazole	0.50	0.00
Cyprodinil (RD)	1.63	0.51
DDT (RD)	2.83	0.03
Deltamethrin	4.71	0.51
Diazinon	21.13	0.04
Dichlorvos	143.28	4.99
Dicloran	0.17	0.00
Dicofol (RD)	1.85	0.01
Dieldrin (RD)	45.27	0.46
Diethofencarb	0.01	0.00
Difenoconazole	3.35	0.14
Diflubenzuron (RD)	0.21	0.01
Dimethoate (RD) - dimethoate	18.73	0.73
Dimethoate (RD) - omethoate	62.44	2.43
Dimethomorph	0.35	0.08
Diniconazole	0.07	0.00
Diphenylamine	0.49	0.01
Dithianon	5.82	3.95
Dithiocarbamates (RD) - maneb scenario	8.32	2.36
Dithiocarbamates (RD) - mancozeb scenario	8.62	2.45
Dithiocarbamates (RD) - metiram scenario	57.59	16.34
Dithiocarbamates (RD) - propineb scenario	60.34	17.12
Dithiocarbamates (RD) - thiram scenario	40.23	11.41
Dithiocarbamates (RD) - ziram scenario	80.45	22.83
Dodine	0.33	0.13
Endosulfan (RD)	1.07	0.01
EPN*	n.r.	
Epoxiconazole	2.00	0.06
Ethephon	2.01	0.43
Ethion	0.82	0.02
Ethirimol	0.41	0.01
Etofenprox	0.88	0.08
Famoxadone	0.99	0.12
Fenamidone*	quantified residues in one or several commodities	
Fenamiphos (RD)	9.52	0.13
Fenarimol	0.10	0.00
Fenazaquin	1.68	0.02
Fenbuconazole	2.89	0.02
Fenbutatin oxide	0.17	0.01
Fenhexamid	0.20	0.08
Fenitrothion	2.25	0.01
Fenoxycarb	0.30	0.01
Fenpropathrin	0.16	0.00
Fenpropidin (RD)	0.28	0.00
Fenpropimorph (RD)	2.07	0.13
Fenpyroximate	1.68	0.03
Fenthion (RD)	0.17	0.00
Fenvalerate (RD)	0.15	0.00
Fipronil (RD)	28.19	0.08
Fludioxonil (RD)	0.14	0.08
Flufenoxuron	1.59	0.00
Fluopyram (RD)	1.95	0.49
Fluquinconazole	6.70	0.02
Flusilazole (RD)	7.76	0.00
Flutriafol	2.14	0.05
Folpet (RD)	1.36	1.07
Formetanate	1.08	0.44
Fosthiazate	2.23	0.01
Glyphosate	0.16	0.05
Heptachlor (RD)	15.71	0.00
Hexachlorobenzene*	quantified residues in one or several commodities	
Hexachlorocyclohexane (alpha)*	quantified residues in one or several commodities	
Hexachlorocyclohexane (beta)*	quantified residues in one or several commodities	
Hexaconazole	0.27	0.01

Pesticide	Long-term exposure (in % of ADI)	
	Adjusted upper-bound	Lower-bound
Hexythiazox	0.66	0.01
Imazalil	4.99	3.78
Imidacloprid	0.59	0.05
Indoxacarb	3.88	0.25
Iprodione (RD)	1.11	0.59
Iprovalicarb	0.45	0.07
Isocarbophos*	n.d.	n.d.
Kresoxim-methyl (RD)	0.05	0.00
Lambda-cyhalothrin (RD)	9.86	0.43
Lindane	0.46	0.01
Linuron	1.26	0.14
Lufenuron	0.37	0.00
Malathion (RD)	0.54	0.13
Mandipropamid	0.06	0.01
Mepanipyrim	0.19	0.02
Mepiquat	0.11	0.03
Metalaxyl	0.34	0.03
Methamidophos	4.82	0.03
Methidathion	0.75	0.00
Methiocarb (RD)	1.44	0.01
Methomyl (RD)	1.46	0.11
Methoxychlor	0.13	0.00
Methoxyfenozide	0.18	0.02
Monocrotophos	2.53	0.03
Myclobutanil (RD)	1.10	0.14
Oxadixyl	0.09	0.00
Oxamyl	4.65	0.16
Oxydemeton-methyl (RD)	3.20	0.00
Paclobutrazol	0.60	0.00
Parathion	0.00	0.00
Parathion-methyl (RD)	0.00	0.00
Penconazole	0.63	0.03
Pencycuron	0.03	0.00
Pendimethalin	0.17	0.00
Permethrin	0.44	0.00
Phosmet (RD)	2.03	0.17
Pirimicarb (RD)	0.55	0.10
Pirimiphos-methyl	10.36	7.06
Procymidone (RD)	5.44	0.01

Pesticide	Long-term exposure (in % of ADI)	
	Adjusted upper-bound	Lower-bound
Profenofos	0.05	0.00
Propamocarb (RD)	0.20	0.16
Propargite*	quantified residues in one or several commodities	
Propiconazole	0.77	0.11
Propyzamide (RD)	0.29	0.00
Pymetrozine (RD)	0.16	0.01
Pyraclostrobin	0.92	0.24
Pyridaben	1.86	0.02
Pyrimethanil (RD)	0.52	0.29
Pyriproxyfen	0.19	0.01
Quinoxyfen	0.10	0.00
Spinosad	0.86	0.07
Spirodiclofen	1.28	0.07
Spiromesifen	0.20	0.04
Spiroxamine (RD)	0.73	0.02
tau-Fluvalinate	3.28	0.02
Tebuconazole (RD)	1.30	0.19
Tebufenozide	0.71	0.02
Tebufenpyrad	1.92	0.03
Teflubenzuron	0.73	0.00
Tefluthrin	1.45	0.03
Terbuthylazine	0.67	0.00
Tetraconazole	6.30	0.09
Tetradifon	0.20	0.00
Thiabendazole (RD)	0.82	0.46
Thiacloprid	1.96	0.27
Thiamethoxam (RD)	0.93	0.02
Thiophanate-methyl (RD)	0.35	0.02
Tolclofos-methyl	0.27	0.01
Tolylfluanid (RD)	0.15	0.00
Triadimenol (RD)	0.66	0.02
Triazophos	1.06	0.02
Trifloxystrobin (RD)	0.27	0.04
Triflumuron	1.35	0.03

* Active substance for which no ADI was established
n.r.: No quantified residues in any of the samples analysed

In the upper-bound scenario of the exposure calculation, the long-term exposure amounted to less than 100% of the ADI for all pesticides except dichlorvos. For the majority of pesticides, a wide safety margin to the toxicological reference value was observed (for 140 pesticides/scenarios the estimated long-term exposure was less than 10% of the ADI, for 76 thereof the result was lower than 1% of the ADI). EFSA concludes that for these pesticides, according to the current scientific knowledge, no long-term consumer health risk is expected.

For dichlorvos, the mean estimated long-term exposure reached 143% of the ADI in the upper-bound scenario. The major contributors to the total long-term exposure were wheat and rye, and to a minor extent also cucumbers and broccoli. Among all the 34,528 samples considered for the long-term exposure assessment that were analysed for dichlorvos residues, quantified residues of dichlorvos were found in five samples (two samples of rye and one sample of wheat, broccoli and cucumbers, respectively); the residues ranged from 0.014 mg/kg up to 0.048 mg/kg. In the lower bound scenario, the result was significantly lower (i.e. 4.9% 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. Considering that the active substance is no longer approved in the EU and that residues in imported products were found only sporadically (0.02% of the 66,640 overall samples analysed), according to the current scientific knowledge, dichlorvos was not likely to pose a consumer health risk.

For most pesticides, 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 six pesticides (bromide ion, fenamidone, hexachlorobenzene, hexachlorocyclohexane (alpha), hexachlorocyclohexane (beta) and propargite), residues were quantified in food but no long-term dietary risk assessment could be performed as there are no internationally agreed toxicological reference values available for these compounds. None of these pesticides is approved in Europe but residues may be present in food due to either persistence of the pesticides 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	18	6
Fenamidone	0.06	<0.01
Hexachlorobenzene	0.06	<0.01
Hexachlorocyclohexane (alpha)	0.02	<0.01
Hexachlorocyclohexane (beta)	0.02	<0.01
Propargite	0.33	0.01

Overall, the results of the 2015 pesticide monitoring gave comparable results with previous years. Thus, similar to the previous year EFSA concludes that based on the results of the 2015 monitoring programmes (EUCP and NP), the long-term dietary exposure to those pesticides covered by the EU coordinated monitoring programme for which toxicological data are available was unlikely to pose a health risk to consumers.

For the six pesticides without reliable toxicological assessments where quantified residues were reported, a final conclusion on possible consumer health concern cannot be derived. However, the dietary exposure estimated with conservative methodologies was found to be low.

6. Conclusions and recommendations

In the EU, comprehensive control programmes for pesticide residues in food are implemented. Overall, more than 84,000 samples of a wide variety of unprocessed and processed food products were analysed by the 30 countries contributing to the EU monitoring programmes in 2015. Considering that on average each sample was checked for compliance with the legal limits for 220 pesticides, the number of results submitted to EFSA amounted to approximately 20 million analytical results. In addition, results for individual compounds covered by the legal residue definition were provided, which is an additional source of information that can be used to answer specific questions, e.g. data analysis related to glyphosate (see Section 4.2.8) or detailed risk assessment on dimethoate/omethoate (see Section 5.1.2).

In previous years, major efforts were made by the reporting countries to harmonise the coding of the results, which is a pre-requisite to transfer the pesticide monitoring data to the data warehouse and perform on-line searches. For the 2015 data, EFSA noted that this increased quality improved the possibility to perform detailed data analysis at EU level based on the combined results submitted by all reporting countries.

Minor adjustments for the reporting of sample related information would further enhance the possibility to perform automated data analysis. Currently only the year of sampling is a mandatory data element to describe the samples analysed. EFSA proposes that in addition to the information on the year, the exact date of the sampling should be provided by the reporting countries. This information would allow a direct comparison of the reported residue concentrations with the MRLs applicable at the day of sampling and by that facilitating the result evaluation.

EFSA also noted that further guidance is needed on the reporting of analytical results for animal products. In particular, for lipophilic substances analysed in the fat fraction of animal products, incomplete or incorrect information was reported.

For processed milk products, additional codes for describing the nature of the product were considered necessary. In the new EFSA guidance document these three points related to the coding of data will be addressed.

The EU coordinated multiannual control programme (EUCP) defined in Regulation (EU) No 400/2014 is an essential part of the overall EU wide control programmes. This programme aims at providing statistically representative results from all reporting countries for major food products and the most frequently occurring pesticides. Comparing the results of the EU coordinated monitoring programme of 2015 with the results of 2012, the reference period where the same food products were analysed, comparable results were observed, both regarding the quantification rate (38.1% of the samples analysed in 2015 contained residues in quantified concentrations within the legal limit; in 2012 the quantification rate was 39.2%) and the MRL exceedance rate (0.8% of the samples exceeded the legal limit in 2015 while in 2012 the MRL exceedance rate was 0.9%).

The 2015 EUCP covered nine unprocessed food products (aubergines, bananas, broccoli, table grapes, peas without pod (fresh or frozen), peppers (sweet), wheat, butter and chicken eggs) and two processed food products (i.e. orange juice and virgin olive oil). In order to decide whether the residue concentration measured in processed products were compliant with the MRL in place, a processing factor needs to be taken into account. It would facilitate the work of enforcement bodies, if at the beginning of the reporting reference period, a list of scientifically valid processing factors was provided for the processed products/pesticides covered by the EUCP.

The results of the EUCP are a valuable source of information to estimate the dietary exposure for pesticide residues of European consumers. 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 some combinations. In the future, the use of probabilistic models for acute dietary exposure assessment together with processing factors would allow to perform more realistic exposure estimates.

In contrast to the EUCP, the national control programmes are in general more risk based. Depending on the national control focus, food products, pesticides frequently quantified in previous control programmes or pesticides leading to a high number of non-compliances are included in the national control programmes. Taking all results of the 84,341 samples for which results were reported to EFSA, the findings are comparable with the previous control years. In 2015, 43.9% of the samples contained residues in quantified concentrations but within the legally permitted concentration; 2.8% of the samples exceeded the MRL for one or several pesticides.

Considering the exceedances of MRLs reported by reporting countries, the following pesticides should be considered in designing future risk based control programmes at Member state level:

- Anthraquinone, flonicamid, fosetyl-Al, BAC and DDAC, tolfenpyrad, prochloraz, amitraz, ethoxyquin, dinotefuran, trifluralin, cyromazine, trichlorfon, metobromuron, metrafenone, nicotine (only in cultivated and wild fungi), clomazone, phenthoate, diafenthiuron, dimoxystrobin, prosulfocarb, isoprothiolane, propoxur.

For the following pesticides, no infringements were identified, but considering the relatively high quantification rate, they may result in a significant dietary exposure and therefore qualifies them as candidates for the national control programmes:

- Phosphines and phosphides, maleic hydrazide, prochloraz, spirotetramat and trimethyl-sulfonium cation (the latter is linked to the use of glyphosate-trimesium).

Some pesticides that show high persistence in soils (DT_{90} greater than 100 days in field studies) should be included in the next EUCP or national control programmes, since residues of these substances may be present in crops that are not treated directly:

- Fluopicolide, flupyradifurone, penthiopyrad. It is also recommended to maintain the existing EU monitoring of boscalid.

EFSA also recommends to explore the possibility to include the following active substances in the upcoming national control programmes, because MRLs have been recently established at international level by the Codex Alimentarius, but no analytical results have been provided by the reporting countries so far:

- Benzovindiflupyr, fluensulfone, sedaxane, sulfoxaflor.

Considering that due to the Zika virus outbreak, the use of certain pesticides was promoted for mosquito vector control by authorities in the countries concerned, an increased presence of these substances in the food chain may be expected. It is therefore recommended to include these compounds in the national control programmes, which are currently analysed only by a limited number of Member States:

- Cyphenothrin, phenothrin, methoprene, naled, novaluron, temephos and prallethrin.

Several food products, which are not covered by the 2015 EUCP, have been repeatedly identified as containing residues exceeding the MRL. Thus, these products should be taken into account in the national control programmes:

- Table olives, teas, tropical fruits (e.g. mangoes, papayas, passion fruit), fresh herbs, wild fungi, figs, pomegranates, spring onions, berries (e.g. gooseberries, currants), chards, Chinese cabbages, celeries, kale, fennels, peas with pods, limes, lentils (dry), celeriac, cherries and grapefruits;
- In addition processed grape leaves, figs (dried), apricots (dried), tomatoes (pulp) and table grapes (dried). Beer would be also a potential candidate for a food product to be included in national control programmes considering the importance of the product in the diet.

Cultivated and wild fungi should be further discussed by risk managers for being included in the EUCP considering the diversity of pesticides occurring in quantified levels (63 different pesticides were found, in particular fosetyl-Al, copper, cypermethrin, mepiquat, mercury, nicotine, carbendazim, chlormequat, DDAC, thiabendazole and trimethyl-sulfonium cation; for 12 pesticides MRL exceedances were noted).

Honey was found to contain pesticide residues applied to crops foraged by bees, such as thiacloprid. Moreover, substances authorised in the EU for apicultural use (e.g. amitraz) and persistent organic pollutants (e.g. DDT) were quantified in honey. The inclusion of honey in the EUCP or national control programmes could provide valuable information on the appropriateness of the current legal limits for honey; in addition, monitoring results could be used as a source of information to monitor the effect of use restrictions for certain pesticides.

Member States should increase the number of analyses of glyphosate and related residues (e.g. trimethyl-sulfonium) in products for which the use of glyphosate is approved and where measurable residues are expected. In particular, the number of samples of soybeans, maize and oilseed rape should be increased. Member States are also encouraged to develop and/or implement existing analytical methods to control glyphosate related metabolites and to share the results with EFSA.

As regards food for infants and young children covered by Directives 2006/125/EC and 2006/141/EC, the default MRL of 0.01 mg/kg is applicable also for naturally occurring and intentionally added substances (e.g. copper compounds). Considering that these substances can occur in concentrations exceeding the default MRL, possible risk management measures should be discussed. In addition, the source of fosetyl-Al residues[55] exceeding the legal limit applicable for this food group should be further investigated and depending on the results of this analysis, appropriate risk management measures should be defined to avoid future MRL exceedances.

Analysing the results reported for products covered by Regulation (EC) No 669/2009, it became evident that a substantial number of results related to these products has not been reported to EFSA, or Member States did not code the results according to the coding rules. The competent national authorities and EFSA should further investigate the reasons for the incomplete data submission and identify possible coding errors.

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.

[55] The residue definition for fosetyl-Al is the sum of fosetyl, phosphonic acid and their salts, expressed as fosetyl.

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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

Other abbreviations

ADI	Acceptable Daily Intake
ARfD	Acute Reference Dose
BAC	Benzalkonium Chloride
CAG	Cumulative Assessment Group
CS_2	Carbon disulphide
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 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
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 ella 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
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 and detailed results on EU-coordinated programme

Table 15: Description of 2015 EU-coordinated control programme

Pesticide	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		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Abamectin (RD)	P	Abamectin (sum of avermectin B1a, avermectinB1b and delta-8,9 isomer of avermectin B1a)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Acephate	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Acetamiprid (RD)	P	Acetamiprid	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Acrinathrin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Aldicarb (RD)	P	Aldicarb (sum of aldicarb, its sulfoxide and its sulfone, expressed as aldicarb)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Azinphos-methyl	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Azoxystrobin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Bifenthrin	PA		Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Biphenyl	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Bitertanol	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Boscalid (RD)	P	Boscalid	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Bromide ion	P		Pe
Bromopropylate	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Bupirimate	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Buprofezin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Captan (RD)	P	Captan	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Carbaryl	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Carbendazim (RD)	P	Carbendazim and benomyl (sum of benomyl and carbendazim expressed as carbendazim)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Carbofuran (RD)	P	Carbofuran (sum of carbofuran and 3-hydroxy-carbofuran expressed as carbofuran)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Carbosulfan	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Chlorantraniliprole	P	Chlorantraniliprole (DPX E-2Y45)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Chlordane (RD)	A	Chlordane (sum of cis- and trans-chlordane)	Bu, Eg
Chlorfenapyr	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Chlormequat	P		Au, Gt, Wh
Chlorothalonil (RD)	P	Chlorothalonil	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Chlorpropham (RD)	P	Chlorpropham	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh

Pesticide	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		Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Chlorpyrifos-methyl	PA		Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Clofentezine (RD)	P	Clofentezine	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Clothianidin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Cyfluthrin	P	Cyfluthrin (cyfluthrin including other mixtures of constituent isomers (sum of isomers))	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Cypermethrin	PA	Cypermethrin (cypermethrin including other mixtures of constituent isomers (sum of isomers))	Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Cyproconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Cyprodinil (RD)	P	Cyprodinil	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
DDT (RD)	A	DDT (sum of p,p´-DDT, o,p´-DDT, p-p´-DDE and p,p´-TDE (DDD) expressed as DDT)	Bu, Eg
Deltamethrin	PA	Deltamethrin (cis-deltamethrin)	Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Diazinon	PA		Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Dichlorvos	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Dicloran	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Dicofol (RD)	P	Dicofol (sum of p, p' and o,p' isomers)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Dieldrin (RD)	PA	Aldrin and dieldrin (aldrin and dieldrin combined expressed as dieldrin)	Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Diethofencarb	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Difenoconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Diflubenzuron (RD)	P	Diflubenzuron	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Dimethoate (RD)	P	Dimethoate (sum of dimethoate and omethoate expressed as dimethoate)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Dimethomorph	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Diniconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Diphenylamine	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Dithianon	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Dithiocarbamates (RD)	P	Dithiocarbamates (dithiocarbamates expressed as CS2, including maneb, mancozeb, metiram, propineb, thiram and ziram)	Au, Ba, Br, Gt, Pe, Pw, Wh
Dodine	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh

Pesticide	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)]
Endosulfan (RD)	PA	Endosulfan (sum of alpha- and beta-isomers and endosulfan-sulphate expresses as endosulfan)	Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
EPN	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Epoxiconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Ethephon	P		Gt, Oj, Pe, Wh
Ethion	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Ethirimol	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Etofenprox	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Famoxadone	PA		Au, Ba, Br, Bu, Gt, Oj, Oo, Pe, Pw, Wh
Fenamidone	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenamiphos (RD)	P	Fenamiphos (sum of fenamiphos and its sulphoxide and sulphone expressed as fenamiphos)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenarimol	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Fenazaquin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Fenbuconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenbutatin oxide	P		Au, Gt, Pe
Fenhexamid	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenitrothion	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenoxycarb	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenpropathrin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenpropidin (RD)	P	Fenpropidin (sum of fenpropidin and its salts, expressed as fenpropidin)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenpropimorph (RD)	P	Fenpropimorph	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenpyroximate	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenthion (RD)	P	Fenthion (fenthion and its oxigen analogue, their sulfoxides and sulfone expressed as parent)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fenvalerate (RD)	PA	Fenvalerate (any ratio of constituent isomers (RR, SS, RS & SR) including esfenvalerate)	Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Fipronil (RD)	P	Fipronil (sum of fipronil and sulfone metabolite (MB46136) expressed as fipronil)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fludioxonil (RD)	P	Fludioxonil	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Flufenoxuron	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fluopyram (RD)	P	Fluopyram	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fluquinconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Flusilazole (RD)	P	Flusilazole	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh

Pesticide	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)]
Flutriafol	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Folpet (RD)	P	Folpet	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Formetanate	P	Formetanate (sum of formetanate and its salts expressed as formetanate (hydrochloride))	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Fosthiazate	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Glyphosate	P		Wh
Heptachlor (RD)	A	Heptachlor (sum of heptachlor and heptachlor epoxide expressed as heptachlor)	Bu, Eg
Hexachlorobenzene	A		Bu, Eg
Hexachlorocyclohexane (alpha)	A	Hexachlorocyclohexane (HCH), alpha-isomer	Bu, Eg
Hexachlorocyclohexane (beta)	A	Hexachlorocyclohexane (HCH), beta-isomer	Bu, Eg
Hexaconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Hexythiazox	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Imazalil	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Imidacloprid	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Indoxacarb	PA	Indoxacarb (sum of indoxacarb and its R enantiomer)	Au, Ba, Br, Bu, Gt, Oj, Oo, Pe, Pw, Wh
Iprodione (RD)	P	Iprodione	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Iprovalicarb	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Isocarbophos	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Kresoxim-methyl (RD)	P	Kresoxim-methyl	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Lambda-cyhalothrin (RD)	P	Lambda-cyhalothrin	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Lindane	A	Lindane (gamma-isomer of hexachlorociclohexane (HCH))	Bu, Eg
Linuron	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Lufenuron	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Malathion (RD)	P	Malathion (sum of malathion and malaoxon expressed as malathion)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Mandipropamid	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Mepanipyrim	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Mepiquat	P		Wh
Metalaxyl	P	Metalaxyl and metalaxyl-M (metalaxyl including other mixtures of constituent isomers including metalaxyl-M (sum of isomers))	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Methamidophos	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh

Pesticide	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)]
Methidathion	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Methiocarb (RD)	P	Methiocarb (sum of methiocarb and methiocarb sulfoxide and sulfone, expressed as methiocarb)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Methomyl (RD)	P	Methomyl and thiodicarb (sum of methomyl and thiodicarb expressed as methomyl)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Methoxychlor	A		Bu, Eg
Methoxyfenozide	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Monocrotophos	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Myclobutanil (RD)	P	Myclobutanil	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Oxadixyl	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Oxamyl	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Oxydemeton-methyl (RD)	P	Oxydemeton-methyl (sum of oxydemeton-methyl and demeton-S-methylsulfone expressed as oxydemeton-methyl)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Paclobutrazol	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Parathion	PA		Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Parathion-methyl (RD)	P	Parathion-methyl (sum of parathion-methyl and paraoxon-methyl expressed as parathion-methyl)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Penconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pencycuron	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pendimethalin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Permethrin	PA	Permethrin (sum of isomers)	Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Phosmet (RD)	P	Phosmet (phosmet and phosmet oxon expressed as phosmet)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pirimicarb (RD)	P	Pirimicarb (sum of pirimicarb and desmethyl pirimicarb expressed as pirimicarb)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pirimiphos-methyl	PA		Au, Ba, Br, Bu, Eg, Gt, Oj, Oo, Pe, Pw, Wh
Procymidone (RD)	P	Procymidone	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Profenofos	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Propamocarb (RD)	P	Propamocarb (sum of propamocarb and its salt expressed as propamocarb)	Au, Br, Pe, Pw
Propargite	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Propiconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh

Pesticide	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)]
Propyzamide (RD)	P	Propyzamide	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pymetrozine (RD)	P	Pymetrozine	Au, Pe
Pyraclostrobin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pyridaben	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pyrimethanil (RD)	P	Pyrimethanil	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Pyriproxyfen	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Quinoxyfen	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Spinosad	P	Spinosad (sum of spinosyn A and spinosyn D, expressed as spinosad)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Spirodiclofen	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Spiromesifen	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Spiroxamine (RD)	P	Spiroxamine	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
tau-Fluvalinate	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tebuconazole (RD)	P	Tebuconazole	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tebufenozide	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tebufenpyrad	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Teflubenzuron	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tefluthrin	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Terbuthylazine	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tetraconazole	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tetradifon	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Thiabendazole (RD)	P	Thiabendazole	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Thiacloprid	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Thiametoxam (RD)	P	Thiametoxam (sum of thiametoxam and clothianidin expressed as thiametoxam)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Thiophanate-methyl (RD)	P	Thiophanate-methyl	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tolclofos-methyl	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Tolylfluanid (RD)	P	Tolylfluanid (sum of tolylfluanid and dimethylaminosulfotoluidide expressed as tolylfluanid)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw
Triadimenol (RD)	P	Triadimefon and triadimenol (sum of triadimefon and triadimenol)	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Triazophos	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Trifloxystrobin (RD)	P	Trifloxystrobin	Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh
Triflumuron	P		Au, Ba, Br, Gt, Oj, Oo, Pe, Pw, Wh

(a): P: to be analysed in plant products; A: to be analysed in animal products
(b): Legal residue definition applicable in 2015 for the relevant food products covered by the EUCP; if not specifically mentioned, the residue definition comprises the parent compound only
(c): Au: Aubergines ; Ba: Bananas ; Br: Broccoli ; Bu: Butter ; Eg: Chicken eggs ; Gt: Table grapes ; Oj: Orange juice ; Oo: Virgin olive oil ; Pe: Peppers (sweet) ; Pw: Peas without pod (fresh or frozen) ; Wh: Wheat

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

Table 16: Scope of pesticide analyses

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
1,1-dichloro-2,2-bis(4-ethylphenyl)ethane	4,322	0	0.00	5	No
1,2-Dibromo-3-chloropropane	379	0	0.00	3	No
1-naphthylacetamide	14,136	17	0.12	11	No
1-naphthylacetic acid	2,544	4	0.16	1	No
2,3,4,5-TCNB (2,3,4,5-Tetrachloronitrobenzene)	1,640	0	0.00	1	No
2,3,5-Trimethacarb	6,016	0	0.00	3	No
2,4,5-T (RD)	2,380	0	0.00	8	No
2,4-D (RD)	14,777	111	0.75	19	No
2,4-DB (RD)	11,995	0	0.00	12	No
2-phenylphenol	46,429	650	1.40	28	Yes
3,4,5-Trimethacarb	2,838	0	0.00	2	No
4-CPA	12,706	6	0.05	8	No
6-Benzyladenine	7,479	1	0.01	7	No
Abamectin (RD)	33,983	121	0.36	27	Yes
Acephate	64,660	61	0.09	30	Yes
Acequinocyl	1,726	0	0.00	2	No
Acetamiprid (RD)	64,390	2,679	4.16	30	Yes
Acetochlor	19,477	0	0.00	15	No
Acibenzolar-S-methyl (RD)	18,921	0	0.00	10	No
Acifluorfen	2,322	0	0.00	2	No
Aclonifen	38,704	73	0.19	20	No
Acrinathrin	67,848	110	0.16	30	Yes
Alachlor	28,577	2	0.01	17	No
Alanycarb	4,234	0	0.00	2	No
Aldicarb (RD)	56,926	5	0.01	28	Yes
Aldimorph	16	0	0.00	1	No
Allethrin	8,666	0	0.00	11	No
Allidochlor	2,267	0	0.00	1	No
Alloxydim	216	0	0.00	1	No
Ametoctradin (RD)	13,955	65	0.47	14	No
Ametryn	25,039	5	0.02	13	No
Amidithion	2,307	0	0.00	1	No
Amidosulfuron (RD)	15,903	0	0.00	11	No
Aminocarb	12,931	0	0.00	10	No
Aminopyralid	5,485	4	0.07	3	No
Amisulbrom	8,591	0	0.00	9	No
Amitraz (RD)	25,120	29	0.12	22	No
Amitrole	3,465	0	0.00	6	No
Ancymidol	7,297	0	0.00	4	No
Anilazine	1,400	0	0.00	1	No
Anilofos	5,092	0	0.00	3	No
Anthraquinone	21,800	144	0.66	13	No
Aramite	9	0	0.00	1	No
Aspon	5,975	2	0.03	3	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Asulam	11,654	0	0.00	9	No
Atraton	3,207	0	0.00	4	No
Atrazine	46,612	4	0.01	24	No
Azaconazole	21,600	0	0.00	14	No
Azadirachtin	11,967	19	0.16	8	No
Azamethiphos	9,573	0	0.00	12	No
Azimsulfuron	6,014	0	0.00	7	No
Azinphos-ethyl	55,258	3	0.01	28	No
Azinphos-methyl	69,529	19	0.03	30	Yes
Aziprotryne	5,240	1	0.02	3	No
Azoxybenzene	1,641	0	0.00	1	No
Azoxystrobin	70,592	3,655	5.18	30	Yes
BAC (RD)	7,481	174	2.33	7	No
Barban	1,107	0	0.00	1	No
Beflubutamid	13,237	0	0.00	10	No
Benalaxyl	41,232	15	0.04	19	No
Benazolin	2,321	0	0.00	1	No
Bendiocarb	23,012	1	0.00	15	No
Benfluralin	29,863	2	0.01	12	No
Benfuracarb	33,103	1	0.00	21	No
Benfuresate	2,402	0	0.00	2	No
Benodanil	4,179	0	0.00	3	No
Bensulfuron	37	0	0.00	1	No
Bensulfuron-methyl	6,200	0	0.00	8	No
Bensulide	4,334	0	0.00	1	No
Bensultap	2,321	0	0.00	1	No
Bentazone (RD)	17,567	0	0.00	17	No
Benthiavalicarb	13,979	0	0.00	9	No
Benzobicyclon	113	0	0.00	1	No
Benzoximate	3,410	0	0.00	5	No
Benzoylprop	35	0	0.00	1	No
Benzoylprop-Ethyl	7,162	0	0.00	5	No
Bifenazate (RD)	11,365	25	0.22	8	No
Bifenox	25,080	1	0.00	13	No
Bifenthrin	72,977	903	1.24	30	Yes
Binapacryl	10,958	0	0.00	12	No
Bioallethrin	2,333	0	0.00	4	No
Bioresmethrin	2,216	0	0.00	4	No
Biphenyl	47,262	26	0.06	27	Yes
Bis(tributyltin) oxide	53	0	0.00	1	No
Bispyribac	5,256	0	0.00	6	No
Bitertanol	65,919	14	0.02	30	Yes
Bixafen (RD)	25,979	16	0.06	22	No
Boscalid (RD)	70,411	6,704	9.52	30	Yes
Bromacil	26,943	0	0.00	14	No
Bromadiolone	671	0	0.00	2	No
Bromfenvinfos	4,335	0	0.00	5	No
Bromfenvinfos-methyl	501	0	0.00	2	No
Bromide ion	3,597	614	17.07	19	Yes
Bromobutide	1	0	0.00	1	No
Bromocyclen	6,029	0	0.00	4	No
Bromofenoxim	4	0	0.00	1	No
Bromophos	40,516	0	0.00	23	No
Bromophos-ethyl	51,676	0	0.00	25	No
Bromopropylate	70,976	10	0.01	30	Yes

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Bromoxynil (RD)	11,706	0	0.00	17	No
Bromuconazole	57,521	3	0.01	29	No
Bupirimate	70,889	277	0.39	30	Yes
Buprofezin	69,529	680	0.98	30	Yes
Butachlor	8,209	0	0.00	9	No
Butafenacil	10,183	0	0.00	8	No
Butamifos	5,123	0	0.00	2	No
Butocarboxim	15,289	0	0.00	10	No
Butoxycarboxim	9,630	0	0.00	6	No
Butralin	20,790	0	0.00	11	No
Butroxydim	1	0	0.00	1	No
Buturon	2,030	0	0.00	2	No
Butylate	10,282	0	0.00	8	No
Cadusafos	54,906	3	0.01	27	No
Cafenstrole	2,322	0	0.00	2	No
Camphechlor (RD)	400	0	0.00	2	No
Captafol	17,971	0	0.00	15	No
Captan (RD)	32,370	208	0.64	25	Yes
Carbaryl	67,688	28	0.04	30	Yes
Carbendazim (RD)	59,310	1,449	2.44	28	Yes
Carbetamide	19,421	0	0.00	11	No
Carbofuran (RD)	62,391	45	0.07	29	Yes
Carbon tetrachloride	298	0	0.00	1	No
Carbophenothion	27,169	0	0.00	14	No
Carbosulfan	39,516	9	0.02	26	Yes
Carboxin	43,208	1	0.00	25	No
Carfentrazone-ethyl	18,044	0	0.00	11	No
Carpropamid	1,397	0	0.00	4	No
Chinomethionat	32,283	0	0.00	19	No
Chlorantraniliprole	51,517	1,431	2.78	27	Yes
Chlorbenside	8,896	0	0.00	12	No
Chlorbromuron	15,820	0	0.00	12	No
Chlorbufam	13,590	0	0.00	13	No
Chlordane (RD)	38,285	168	0.44	27	Yes
Chlordecone	736	36	4.89	3	No
Chlordimeform	6,847	0	0.00	10	No
Chlorfenapyr	62,402	225	0.36	28	Yes
Chlorfenethol	1,642	0	0.00	2	No
Chlorfenprop-Methyl	8,458	0	0.00	3	No
Chlorfenson	26,413	4	0.02	20	No
Chlorfenvinphos	66,366	3	0.00	30	No
Chlorfluazuron	19,262	5	0.03	12	No
Chlorflurenol	484	0	0.00	2	No
Chlorflurenol-Methyl	555	0	0.00	2	No
Chloridazon	24,677	0	0.00	15	No
Chlorimuron	279	0	0.00	1	No
Chlormephos	21,738	0	0.00	15	No
Chlormequat	8,888	835	9.39	26	Yes
Chlornitrofen	1,107	0	0.00	1	No
Chlorobenzilate	41,779	3	0.01	26	No
Chloroneb	7,862	0	0.00	9	No
Chloropropylate	13,351	0	0.00	7	No
Chlorothalonil (RD)	56,057	459	0.82	28	Yes
Chlorotoluron	24,289	1	0.00	14	No
Chloroxuron	16,551	0	0.00	13	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Chlorpropham (RD)	53,571	604	1.13	28	Yes
Chlorpyrifos	76,063	3,991	5.25	30	Yes
Chlorpyrifos-methyl	75,591	712	0.94	30	Yes
Chlorsulfuron	7,677	0	0.00	11	No
Chlorthal	11	0	0.00	2	No
Chlorthal-dimethyl	40,437	4	0.01	18	No
Chlorthiamid	3,049	0	0.00	3	No
Chlorthion	1,288	0	0.00	4	No
Chlorthiophos	11,996	0	0.00	10	No
Chlozolinate	40,580	0	0.00	21	No
Chromafenozide	11,434	0	0.00	4	No
Cinidon-ethyl	6,465	0	0.00	6	No
Cinosulfuron	8,857	0	0.00	5	No
Clethodim (RD)	15,468	1	0.01	12	No
Climbazole	1,254	0	0.00	2	No
Clodinafop	8,148	0	0.00	6	No
Clofentezine (RD)	56,202	85	0.15	27	Yes
Clomazone	42,785	32	0.07	20	No
Clopyralid	17,663	12	0.07	13	No
Clothianidin	35,016	124	0.35	26	Yes
Copper	2,386	1,633	68.44	3	No
Coumachlor	3,970	0	0.00	1	No
Coumaphos	28,393	2	0.01	21	No
Coumatetralyl	5,138	0	0.00	2	No
Crimidine	2,841	0	0.00	5	No
Crotoxyphos	1,649	0	0.00	1	No
Crufomate	1,685	0	0.00	3	No
Cyanamide	112	0	0.00	1	No
Cyanazine	25,665	0	0.00	14	No
Cyanofenphos	15,201	0	0.00	14	No
Cyanophos	15,212	0	0.00	8	No
Cyantraniliprole	7	1	14.29	2	No
Cyazofamid	44,142	105	0.24	22	No
Cyclanilide	6,571	0	0.00	6	No
Cycloate	9,612	0	0.00	10	No
Cycloxydim (RD)	13,080	0	0.00	12	No
Cycluron	5,558	0	0.00	3	No
Cyenopyrafen	2,321	0	0.00	1	No
Cyflufenamid	27,517	65	0.24	14	No
Cyflumetofen	7,503	1	0.01	4	No
Cyfluthrin	59,326	107	0.18	28	Yes
Cyhalofop-butyl (RD)	5,584	0	0.00	8	No
Cyhalothrin	2,735	3	0.11	5	No
Cyhalothrin, gamma-	433	0	0.00	3	No
Cyhexatin (RD)	1,208	0	0.00	3	No
Cymiazole	4,387	0	0.00	10	No
Cymoxanil	49,666	33	0.07	27	No
Cypermethrin	71,401	1,722	2.41	29	Yes
Cyphenothrin	4,553	0	0.00	4	No
Cyprazin	4,334	0	0.00	1	No
Cyproconazole	66,500	88	0.13	30	Yes
Cyprodinil (RD)	68,636	3,344	4.87	30	Yes
Cyprofuram	2,030	0	0.00	2	No
Cyromazine	29,683	65	0.22	20	No
Cythioate	717	0	0.00	1	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Daimuron	2,321	0	0.00	1	No
Dalapon	2,321	1	0.04	1	No
Daminozide (RD)	2,655	2	0.08	5	No
Dazomet (RD)	1,949	0	0.00	1	No
DDAC	8,739	97	1.11	10	No
DDT (RD)	56,135	531	0.95	27	Yes
Deltamethrin	74,127	880	1.19	30	Yes
Demeton	503	0	0.00	3	No
Demeton-S	4,850	0	0.00	5	No
Demeton-S-Methyl	34,105	0	0.00	22	No
Desmedipham	20,975	0	0.00	14	No
Desmetryn	13,454	0	0.00	12	No
Diafenthiuron	26,337	7	0.03	17	No
Dialifos	16,239	0	0.00	11	No
Di-allate	4,694	0	0.00	7	No
Diazinon	75,130	54	0.07	30	Yes
Dicamba	15,037	2	0.01	15	No
Dichlobenil	34,992	0	0.00	17	No
Dichlofenthion	21,445	0	0.00	13	No
Dichlofluanid	57,533	0	0.00	28	No
Dichlone	1	0	0.00	1	No
Dichlorophen	2,850	0	0.00	3	No
Dichlorprop (RD)	23,113	16	0.07	17	No
Dichlorvos	66,640	16	0.02	30	Yes
Diclobutrazol	24,885	0	0.00	11	No
Diclofop (RD)	10,687	0	0.00	6	No
Dicloran	65,614	9	0.01	29	Yes
Dicofol (RD)	52,952	29	0.05	29	Yes
Dicrotophos	49,719	1	0.00	29	No
Dieldrin (RD)	61,111	66	0.11	28	Yes
Diethofencarb	62,983	14	0.02	29	Yes
Difenoconazole	69,120	1,935	2.80	30	Yes
Difenoxuron	2,748	0	0.00	4	No
Difenzoquat	2,464	0	0.00	2	No
Diflubenzuron (RD)	52,636	155	0.29	26	Yes
Diflufenican	39,285	1	0.00	19	No
Diflufenzopyr	6,463	0	0.00	2	No
Dikegulac	4,007	0	0.00	5	No
Dimefox	2,784	0	0.00	4	No
Dimefuron	10,195	0	0.00	5	No
Dimepiperate	2,014	0	0.00	2	No
Dimethachlor	16,909	0	0.00	11	No
Dimethenamid–p	12,678	3	0.02	9	No
Dimethipin	1,664	0	0.00	2	No
Dimethirimol	717	0	0.00	1	No
Dimethoate (RD)	64,721	503	0.78	30	Yes
Dimethomorph	63,162	1,451	2.30	30	Yes
Dimethylvinphos	4,350	0	0.00	2	No
Dimetilan	1,972	0	0.00	2	No
Dimoxystrobin	32,849	14	0.04	20	No
Diniconazole	62,535	11	0.02	28	Yes
Dinitramine	5,401	0	0.00	5	No
Dinobuton	3,055	0	0.00	3	No
Dinocap (RD)	9,209	0	0.00	14	No
Dinoseb	4,738	0	0.00	6	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Dinotefuran	29,222	11	0.04	18	No
Dinoterb (RD)	3,781	0	0.00	8	No
Dioxabenzofos	2,642	0	0.00	4	No
Dioxacarb	10,096	0	0.00	8	No
Dioxathion	22,839	0	0.00	12	No
Diphenamid	13,527	0	0.00	10	No
Diphenylamine	66,809	59	0.09	30	Yes
Dipropetryn	2,822	0	0.00	3	No
Diquat	570	5	0.88	7	No
Disulfoton (RD)	40,415	0	0.00	23	No
Ditalimfos	23,099	0	0.00	16	No
Dithianon	16,129	309	1.92	16	Yes
Dithiocarbamates (RD)	12,469	1,634	13.10	25	Yes
Dithiopyr	4,335	0	0.00	2	No
Diuron	34,183	8	0.02	19	No
DNOC	3,436	0	0.00	5	No
Dodemorph	11,750	0	0.00	12	No
Dodine	41,284	309	0.75	25	Yes
Edifenphos	10,810	0	0.00	9	No
Emamectin	11,199	28	0.25	10	No
Empenthrin	144	0	0.00	3	No
Endosulfan (RD)	72,236	105	0.15	29	Yes
Endrin	50,094	12	0.02	28	No
EPN	63,117	0	0.00	30	Yes
Epoxiconazole	67,600	47	0.07	30	Yes
EPTC	11,600	0	0.00	13	No
Esprocarb	4,335	0	0.00	2	No
Etaconazole	11,381	0	0.00	7	No
Ethalfluralin	7,793	0	0.00	7	No
Ethametsulfuron-methyl	5,119	0	0.00	7	No
Ethephon	7,043	284	4.03	23	Yes
Ethidimuron	2,477	0	0.00	4	No
Ethiofencarb	37,999	0	0.00	18	No
Ethion	70,755	48	0.07	30	Yes
Ethiprole	6,653	0	0.00	6	No
Ethirimol	51,484	102	0.20	26	Yes
Ethofumesate (RD)	27,039	7	0.03	17	No
Ethoprophos	65,520	8	0.01	29	No
Ethoxyquin	22,556	14	0.06	15	No
Ethoxysulfuron	6,471	0	0.00	5	No
Ethylene oxide (RD)	7	0	0.00	2	No
Etofenprox	64,948	669	1.03	30	Yes
Etoxazole	33,946	96	0.28	16	No
Etridiazole	29,964	7	0.02	16	No
Etrimfos	42,094	0	0.00	24	No
Famoxadone	57,537	182	0.32	28	Yes
Famphur	7,272	0	0.00	6	No
Fenamidone	62,624	51	0.08	29	Yes
Fenamiphos (RD)	55,397	24	0.04	28	Yes
Fenarimol	70,765	4	0.01	30	Yes
Fenazaflor	618	0	0.00	1	No
Fenazaquin	64,030	37	0.06	29	Yes
Fenbuconazole	65,387	315	0.48	30	Yes

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Fenbutatin oxide	18,300	61	0.33	21	Yes
Fenchlorphos (RD)	23,313	0	0.00	21	No
Fenfluthrin	434	0	0.00	2	No
Fenfuram	5,822	0	0.00	3	No
Fenhexamid	68,876	1,844	2.68	30	Yes
Fenitrothion	70,128	19	0.03	30	Yes
Fenobucarb	14,529	2	0.01	11	No
Fenothiocarb	9,268	0	0.00	6	No
Fenoxaprop	14,500	0	0.00	3	No
Fenoxaprop-ethyl	1,000	0	0.00	3	No
Fenoxaprop-P	5,911	0	0.00	8	No
Fenoxaprop-P-Ethyl	8,545	0	0.00	9	No
Fenoxycarb	65,914	90	0.14	28	Yes
Fenpiclonil	18,172	0	0.00	10	No
Fenpropathrin	69,114	110	0.16	29	Yes
Fenpropidin (RD)	43,160	19	0.04	23	Yes
Fenpropimorph (RD)	62,368	149	0.24	30	Yes
Fenpyrazamine	2,993	11	0.37	4	No
Fenpyroximate	58,972	221	0.37	27	Yes
Fenson	24,148	0	0.00	13	No
Fensulfothion	25,474	2	0.01	19	No
Fenthion (RD)	58,908	13	0.02	28	Yes
Fentin acetate (RD)	10	0	0.00	1	No
Fentin hydroxide (RD)	723	0	0.00	9	No
Fenuron	9,903	1	0.01	10	No
Fenvalerate (RD)	49,442	80	0.16	25	Yes
Fipronil (RD)	49,657	40	0.08	27	Yes
Flamprop	2,439	0	0.00	3	No
Flamprop-isopropyl	2,984	0	0.00	4	No
Flamprop-methyl	3,328	0	0.00	5	No
Flamprop-M-Isopropyl	320	0	0.00	1	No
Flazasulfuron	13,381	0	0.00	10	No
Flocoumafen	2,607	0	0.00	1	No
Flonicamid (RD)	39,371	459	1.17	21	No
Florasulam	14,427	0	0.00	15	No
Fluacrypyrim	5,166	1	0.02	3	No
Fluazifop-P-butyl (RD)	27,633	40	0.14	20	No
Fluazinam	36,201	11	0.03	22	No
Fluazuron	5,013	0	0.00	1	No
Flubendiamide	29,100	56	0.19	21	No
Flubenzimine	3,585	0	0.00	2	No
Fluchloralin	6,552	0	0.00	5	No
Flucycloxuron	5,425	0	0.00	4	No
Flucythrinate (RD)	33,682	2	0.01	20	No
Fludioxonil (RD)	65,584	3,649	5.56	30	Yes
Flufenacet (RD)	17,324	5	0.03	14	No
Flufenoxuron	60,484	21	0.03	30	Yes
Flufenzin	654	0	0.00	2	No
Flumethrin	1,462	0	0.00	3	No
Flumetralin	15,157	0	0.00	10	No
Flumetsulam	1,176	0	0.00	1	No
Flumioxazine	14,197	0	0.00	8	No
Fluometuron	7,606	0	0.00	8	No
Fluopicolide	54,329	476	0.88	25	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Fluopyram (RD)	45,278	1,374	3.03	25	Yes
Fluorodifen	3,251	0	0.00	2	No
Fluotrimazole	9,309	0	0.00	4	No
Fluoxastrobin	27,261	0	0.00	14	No
Flupyrsulfuron-methyl	7,382	0	0.00	6	No
Fluquinconazole	61,717	7	0.01	29	Yes
Fluridone	1,649	0	0.00	1	No
Flurochloridone	22,204	3	0.01	13	No
Fluroxypyr (RD)	26,751	1	0.00	20	No
Flurprimidole	6,952	0	0.00	5	No
Flurtamone	23,717	0	0.00	10	No
Flusilazole (RD)	66,736	32	0.05	28	Yes
Flusulfamide	4,460	0	0.00	2	No
Fluthiacet-Methyl	2,280	0	0.00	4	No
Flutolanil (RD)	52,898	19	0.04	25	No
Flutriafol	65,051	357	0.55	30	Yes
Fluvalinate	4,555	0	0.00	7	No
Fluxapyroxad	21,475	7	0.03	18	No
Folpet (RD)	39,605	1,172	2.96	26	Yes
Fomesafen	8,910	0	0.00	5	No
Fonofos	36,128	0	0.00	22	No
Foramsulfuron	7,930	0	0.00	8	No
Forchlorfenuron	21,144	10	0.05	13	No
Formetanate	34,873	35	0.10	21	Yes
Formothion	39,830	0	0.00	26	No
Fosetyl-Al (RD)	4,881	1,460	29.91	3	No
Fosthiazate	54,893	32	0.06	28	Yes
Fuberidazole	20,274	0	0.00	15	No
Furalaxyl	23,740	0	0.00	11	No
Furathiocarb	42,363	1	0.00	23	No
Furmecyclox	2,461	0	0.00	3	No
Genite	2,072	0	0.00	2	No
Gibberellic acid	2,357	54	2.29	2	No
Glufosinate (RD)	3,337	10	0.30	6	No
Glyphosate	5,329	167	3.13	22	Yes
Griseofulvin	20	0	0.00	1	No
Halfenprox	5,405	0	0.00	4	No
Halofenozide	10,864	0	0.00	5	No
Halosulfuron	1,945	0	0.00	2	No
Halosulfuron-methyl	4,079	0	0.00	4	No
Haloxyfop-R (RD)	16,299	25	0.15	20	No
Heptachlor (RD)	27,133	20	0.07	24	Yes
Heptenophos	41,792	0	0.00	25	No
Hexachlorobenzene	55,772	572	1.03	28	Yes
Hexachlorobutadiene	100	0	0.00	2	No
Hexachlorocyclohexane (alpha)	35,544	33	0.09	26	Yes
Hexachlorocyclohexane (beta)	34,921	72	0.21	26	Yes
Hexachlorocyclohexane (RD)	40,085	0	0.00	23	No
Hexaconazole	68,776	77	0.11	29	Yes
Hexaflumuron	31,816	2	0.01	19	No
Hexazinone	19,651	0	0.00	14	No
Hexythiazox	62,746	335	0.53	30	Yes

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Hydramethylnon	33	0	0.00	1	No
Hydrogen phosphide	94	13	13.83	3	No
Hymexazol	4,581	0	0.00	3	No
Imazalil	67,024	3,860	5.76	30	Yes
Imazamethabenz	5,777	0	0.00	6	No
Imazamox	11,448	1	0.01	8	No
Imazapyr	13,671	0	0.00	10	No
Imazaquin	13,403	0	0.00	7	No
Imazethapyr	9,191	0	0.00	6	No
Imazosulfuron	8,214	0	0.00	7	No
Imibenconazole	8,083	0	0.00	5	No
Imidacloprid	64,807	2,818	4.35	30	Yes
Inabenfide	4,334	0	0.00	1	No
Indoxacarb	66,437	719	1.08	30	Yes
Iodfenphos	13,744	0	0.00	10	No
Iodosulfuron-methyl	12,026	0	0.00	10	No
Ioxynil (RD)	11,751	0	0.00	17	No
Ipconazole	10,584	0	0.00	10	No
Iprobenfos	12,654	1	0.01	10	No
Iprodione (RD)	65,746	1,842	2.80	29	Yes
Iprovalicarb	66,941	175	0.26	30	Yes
Isazofos	12,763	0	0.00	9	No
Isobenzan	3,378	0	0.00	3	No
Isocarbamid	1,641	0	0.00	1	No
Isocarbophos	52,166	6	0.01	27	Yes
Isodrin	8,621	0	0.00	9	No
Isofenphos	39,057	0	0.00	22	No
Isofenphos-methyl	58,730	1	0.00	29	No
Isomethiozin	4,059	0	0.00	2	No
Isonoruron	3,335	0	0.00	5	No
Isoprocarb	45,824	2	0.00	28	No
Isopropalin	8,143	0	0.00	6	No
Isoprothiolane	48,673	88	0.18	26	No
Isoproturon	43,316	0	0.00	24	No
Isopyrazam	3,141	1	0.03	4	No
Isoxaben	21,649	0	0.00	13	No
Isoxaflutole (RD)	11,235	0	0.00	11	No
Isoxathion	8,363	0	0.00	6	No
Ivermectin	176	0	0.00	2	No
Karbutilate	1,169	0	0.00	1	No
Kasugamycin	42	0	0.00	1	No
Kresoxim-methyl (RD)	69,673	239	0.34	30	Yes
Lactofen	3,983	0	0.00	2	No
Lambda-cyhalothrin (RD)	54,062	1,229	2.27	30	Yes
Lenacil	31,400	9	0.03	14	No
Leptophos	9,764	0	0.00	9	No
Lindane	65,198	44	0.07	30	Yes
Linuron	64,605	393	0.61	30	Yes
Lufenuron	56,543	49	0.09	28	Yes
Malathion (RD)	65,898	72	0.11	29	Yes
Maleic hydrazide (RD)	3,380	97	2.87	6	No
Mandipropamid	54,227	379	0.70	30	Yes
MCPA (RD)	20,558	18	0.09	17	No
Mecarbam	52,082	5	0.01	26	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Mecoprop	15,541	0	0.00	17	No
Mefenacet	6,233	0	0.00	5	No
Mefluidide	4,334	0	0.00	1	No
Mepanipyrim	53,718	156	0.29	28	Yes
Mephosfolan	9,100	0	0.00	7	No
Mepiquat	8,411	296	3.52	24	Yes
Mepronil	37,194	1	0.00	19	No
Meptyldinocap (RD)	5,457	6	0.11	10	No
Mercury	1,024	160	15.63	1	No
Merphos	190	0	0.00	1	No
Mesosulfuron	2,875	0	0.00	7	No
Mesotrione (RD)	4,954	0	0.00	8	No
Metaflumizone	37,223	16	0.04	25	No
Metalaxyl	62,814	1,373	2.19	28	Yes
Metaldehyde	6,447	7	0.11	3	No
Metamitron	40,502	16	0.04	18	No
Metazachlor (RD)	40,558	4	0.01	21	No
Metconazole	55,459	4	0.01	30	No
Methabenzthiazuron	27,189	7	0.03	13	No
Methacrifos	42,233	1	0.00	26	No
Methamidophos	65,322	43	0.07	30	Yes
Methidathion	72,320	16	0.02	30	Yes
Methiocarb (RD)	62,772	77	0.12	29	Yes
Methomyl (RD)	56,380	95	0.17	29	Yes
Methoprene	2,972	1	0.03	8	No
Methoprotryne	10,582	0	0.00	8	No
Methoxychlor	56,329	17	0.03	29	Yes
Methoxyfenozide	62,161	614	0.99	30	Yes
Metobromuron	46,110	13	0.03	25	No
Metolachlor	12,350	1	0.01	16	No
Metolcarb	12,116	0	0.00	7	No
Metominostrobin	3,999	1	0.03	2	No
Metosulam	14,883	0	0.00	12	No
Metoxuron	21,509	0	0.00	15	No
Metrafenone	48,971	525	1.07	23	No
Metribuzin	58,919	11	0.02	28	No
Metsulfuron-methyl	18,166	0	0.00	12	No
Mevinphos	56,305	0	0.00	27	No
Milbemectin (RD)	7,338	2	0.03	3	No
Mirex	14,266	0	0.00	11	No
Molinate	21,167	0	0.00	14	No
Monalide	6,989	0	0.00	2	No
Monocrotophos	65,073	14	0.02	29	Yes
Monolinuron	25,063	0	0.00	16	No
Monuron	14,428	0	0.00	9	No
Myclobutanil (RD)	69,150	1,215	1.76	30	Yes
Naled	7,736	0	0.00	7	No
Naphthoxyacetic acid, 2-	4,463	2	0.04	3	No
Napropamide	36,710	11	0.03	17	No
Naptalam	4,772	0	0.00	2	No
Neburon	6,025	0	0.00	6	No
Nicosulfuron	11,442	0	0.00	11	No
Nicotine	942	25	2.65	6	No
Nitenpyram	45,615	0	0.00	27	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Nitralin	5,564	0	0.00	8	No
Nitrapyrin	6,140	0	0.00	3	No
Nitrofen	38,997	0	0.00	26	No
Nitrothal-Isopropyl	16,888	1	0.01	10	No
Norflurazon	6,435	0	0.00	8	No
Novaluron	26,156	15	0.06	15	No
Noviflumuron	2,321	0	0.00	1	No
Nuarimol	36,311	1	0.00	20	No
Octhilinone	180	0	0.00	1	No
Ofurace	23,414	0	0.00	11	No
Orbencarb	3,556	0	0.00	3	No
Orthosulfamuron	618	0	0.00	1	No
Oryzalin	5,135	0	0.00	3	No
Oxadiargyl	12,333	0	0.00	8	No
Oxadiazon	30,480	10	0.03	15	No
Oxadixyl	67,580	14	0.02	29	Yes
Oxamyl	62,494	18	0.03	28	Yes
Oxasulfuron	7,256	0	0.00	5	No
Oxycarboxin	12,507	1	0.01	10	No
Oxydemeton-methyl (RD)	51,249	4	0.01	27	Yes
Oxyfluorfen	33,834	122	0.36	16	No
Paclobutrazol	60,047	17	0.03	29	Yes
Paraquat	562	2	0.36	5	No
Parathion	72,347	1	0.00	28	Yes
Parathion-methyl (RD)	57,394	1	0.00	28	Yes
Pebulate	7,107	0	0.00	7	No
Penconazole	70,193	546	0.78	29	Yes
Pencycuron	65,451	60	0.09	30	Yes
Pendimethalin	70,690	361	0.51	30	Yes
Penflufen	1	0	0.00	1	No
Penfluron	4,334	0	0.00	1	No
Penoxsulam	9,627	0	0.00	6	No
Pentachlorophenol	8,445	5	0.06	6	No
Pentanochlor	6,928	0	0.00	4	No
Penthiopyrad	2,898	1	0.03	5	No
Permethrin	70,055	117	0.17	30	Yes
Pethoxamid	16,247	0	0.00	11	No
Phenkapton	3,351	0	0.00	3	No
Phenmedipham (RD)	38,265	30	0.08	19	No
Phenothrin	10,837	1	0.01	12	No
Phenthoate	61,275	8	0.01	29	No
Phorate (RD)	42,257	6	0.01	24	No
Phosalone	70,479	5	0.01	30	No
Phosfolan	3,927	0	0.00	4	No
Phosmet (RD)	58,287	262	0.45	27	Yes
Phosphamidon	46,231	1	0.00	25	No
Phosphines and phosphides (RD)	31	3	9.68	2	No
Phoxim	49,158	2	0.00	28	No
Picloram	4,929	0	0.00	9	No
Picolinafen	25,006	1	0.00	14	No
Picoxystrobin	46,594	5	0.01	21	No
Pinoxaden	7,978	0	0.00	10	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Piperophos	1,842	0	0.00	3	No
Pirimicarb (RD)	65,487	612	0.93	29	Yes
Pirimiphos-ethyl	40,373	0	0.00	24	No
Pirimiphos-methyl	74,570	679	0.91	30	Yes
Prallethrin	130	0	0.00	1	No
Pretilachlor	4,351	0	0.00	7	No
Primisulfuron	620	0	0.00	2	No
Primisulfuron-Methyl	4,043	1	0.02	3	No
Probenazole	3,962	0	0.00	1	No
Prochloraz (RD)	36,221	402	1.11	23	No
Procymidone (RD)	68,395	27	0.04	30	Yes
Profenofos	71,621	74	0.10	30	Yes
Profluralin	14,973	0	0.00	9	No
Profoxydim	5,197	0	0.00	3	No
Prohexadione	2,763	2	0.07	3	No
Promecarb	34,217	0	0.00	15	No
Prometon	6,738	0	0.00	7	No
Prometryn	42,678	4	0.01	21	No
Propachlor	11,495	1	0.01	11	No
Propamocarb (RD)	54,353	1,447	2.66	25	Yes
Propanil	22,078	2	0.01	14	No
Propaphos	2,321	0	0.00	1	No
Propaquizafop	24,428	0	0.00	17	No
Propargite	68,796	167	0.24	30	Yes
Propazine	21,132	0	0.00	14	No
Propetamphos	21,798	0	0.00	11	No
Propham	43,583	1	0.00	25	No
Propiconazole	70,164	557	0.79	30	Yes
Propineb	163	0	0.00	2	No
Propisochlor	1,004	0	0.00	1	No
Propoxur	56,540	14	0.02	29	No
Propoxycarbazone (RD)	6,060	0	0.00	5	No
Propyzamide (RD)	68,314	131	0.19	30	Yes
Proquinazid	41,416	57	0.14	20	No
Prosulfocarb	42,417	129	0.30	22	No
Prosulfuron	9,674	0	0.00	10	No
Prothiocarb	717	0	0.00	1	No
Prothioconazole (RD)	49,491	53	0.11	27	No
Prothiofos	58,376	5	0.01	28	No
Prothoate	3,897	0	0.00	3	No
Pymetrozine (RD)	55,519	175	0.32	29	Yes
Pyracarbolid	33	0	0.00	1	No
Pyraclofos	4,010	0	0.00	7	No
Pyraclostrobin	64,730	2,814	4.35	30	Yes
Pyraflufen-ethyl (RD)	15,147	0	0.00	11	No
Pyrasulfotole	81	0	0.00	1	No
Pyrazophos	60,302	2	0.00	28	No
Pyrazoxyfen	393	0	0.00	1	No
Pyrethrins	29,739	35	0.12	27	No
Pyributicarb	4,335	0	0.00	2	No
Pyridaben	68,787	367	0.53	30	Yes
Pyridafol	10	0	0.00	1	No
Pyridalyl	13,465	22	0.16	9	No
Pyridaphenthion	44,430	0	0.00	20	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Pyridate (RD)	11,741	4	0.03	11	No
Pyrifenox	42,619	1	0.00	20	No
Pyrimethanil (RD)	68,817	2,198	3.19	30	Yes
Pyrimidifen	6,910	1	0.01	5	No
Pyriofenone	10	0	0.00	1	No
Pyriproxyfen	66,554	730	1.10	30	Yes
Pyroquilon	6,234	0	0.00	7	No
Pyroxsulam	5,197	0	0.00	6	No
Quassia	1,799	0	0.00	1	No
Quinalphos	57,928	12	0.02	27	No
Quinclorac	11,390	2	0.02	11	No
Quinmerac	13,052	2	0.02	10	No
Quinoclamine	9,979	0	0.00	8	No
Quinoxyfen	69,178	312	0.45	30	Yes
Quintozene (RD)	46,423	9	0.02	23	No
Quizalofop	11,344	4	0.04	12	No
Rabenzazole	4,334	0	0.00	1	No
Resmethrin	16,726	2	0.01	21	No
Rimsulfuron	23,226	0	0.00	16	No
Rotenone	43,840	0	0.00	26	No
Schradan	2,321	0	0.00	1	No
Sebuthylazine	5,919	0	0.00	5	No
Secbumeton	2,663	0	0.00	7	No
Siduron	7,700	0	0.00	5	No
Silafluofen	4,937	0	0.00	5	No
Silthiofam	14,462	0	0.00	9	No
Simazine	43,278	0	0.00	24	No
Simetryn	2,769	0	0.00	4	No
Spinetoram	14,930	34	0.23	6	No
Spinosad	59,375	943	1.59	29	Yes
Spirodiclofen	58,948	170	0.29	28	Yes
Spiromesifen	52,717	347	0.66	27	Yes
Spirotetramat (RD)	23,769	248	1.04	14	No
Spiroxamine (RD)	65,314	227	0.35	30	Yes
Streptomycin	55	0	0.00	1	No
Sulcotrione	8,507	0	0.00	7	No
Sulfallate	180	0	0.00	1	No
Sulfentrazone	4,070	0	0.00	7	No
Sulfosulfuron	5,629	0	0.00	7	No
Sulfotep	41,359	2	0.00	20	No
Sulphur	1,092	47	4.30	2	No
Sulprofos	9,522	0	0.00	10	No
tau-Fluvalinate	63,040	37	0.06	28	Yes
TCMTB	4,171	0	0.00	6	No
Tebuconazole (RD)	69,507	2,605	3.75	30	Yes
Tebufenozide	63,032	93	0.15	30	Yes
Tebufenpyrad	68,259	238	0.35	30	Yes
Tebupirimphos	619	0	0.00	2	No
Tebutam	2,790	0	0.00	5	No
Tebuthiuron	1,679	0	0.00	1	No
Tecloftalam	4,334	0	0.00	1	No
Tecnazene	50,833	0	0.00	27	No
Teflubenzuron	55,063	18	0.03	27	Yes
Tefluthrin	61,842	33	0.05	28	Yes
Tembotrione (RD)	12,269	0	0.00	5	No

Pesticide	No of analyses	No of quantifications (levels > LOQ)	Quantification rate (%)	No of countries analysing	Pesticide covered by 2015 EUCP
Temephos	1,772	0	0.00	5	No
TEPP	4,902	0	0.00	4	No
Tepraloxydim (RD)	2,942	0	0.00	5	No
Terbacil	14,004	1	0.01	11	No
Terbucarb	1,705	0	0.00	2	No
Terbufos	37,076	0	0.00	23	No
Terbumeton	11,221	0	0.00	8	No
Terbuthylazine	61,296	31	0.05	28	Yes
Terbutryn	39,428	0	0.00	19	No
Tetrachlorvinphos	29,350	0	0.00	20	No
Tetraconazole	70,012	242	0.35	30	Yes
Tetradifon	67,259	9	0.01	30	Yes
Tetramethrin	44,264	4	0.01	26	No
Tetrasul	11,661	0	0.00	8	No
Thenylchlor	2,322	0	0.00	2	No
Thiabendazole (RD)	63,905	2,435	3.81	28	Yes
Thiacloprid	65,534	1,664	2.54	30	Yes
Thiamethoxam (RD)	62,038	823	1.33	29	Yes
Thiazafluron	226	0	0.00	2	No
Thiazopyr	2,403	0	0.00	2	No
Thidiazuron	2,468	0	0.00	2	No
Thiencarbazone	1,646	0	0.00	1	No
Thifensulfuron	118	0	0.00	1	No
Thifensulfuron-methyl	16,919	0	0.00	12	No
Thiobencarb	13,161	0	0.00	10	No
Thiocyclam	3,618	0	0.00	3	No
Thiofanox	4,749	0	0.00	5	No
Thiometon	24,638	0	0.00	14	No
Thionazin	6,303	0	0.00	8	No
Thiophanate-ethyl	2,567	0	0.00	3	No
Thiophanate-methyl (RD)	55,704	395	0.71	28	Yes
Thiosultap sodium	2,318	0	0.00	1	No
Thiram	44	0	0.00	2	No
Tiocarbazil	5,311	0	0.00	5	No
Tolclofos-methyl	69,918	58	0.08	30	Yes
Tolfenpyrad	9,337	15	0.16	9	No
Tolylfluanid (RD)	50,787	4	0.01	27	Yes
Topramezone	5,792	0	0.00	4	No
Tralkoxydim	12,208	0	0.00	9	No
Tralomethrin	2,194	0	0.00	4	No
Transfluthrin	8,169	0	0.00	10	No
Triadimenol (RD)	66,234	548	0.83	29	Yes
Tri-allate	32,127	3	0.01	17	No
Triamiphos	2,045	0	0.00	2	No
Triapenthenol	784	0	0.00	1	No
Triasulfuron	10,864	0	0.00	13	No
Triazamate	11,329	0	0.00	9	No
Triazophos	71,926	52	0.07	29	Yes
Triazoxide	3,806	0	0.00	2	No
Tribenuron-methyl	7,616	0	0.00	11	No
Tribufos	2,259	0	0.00	1	No
Trichlamide	2,321	0	0.00	1	No
Trichlorfon	53,295	9	0.02	29	No

Pesticide	**No of analyses**	**No of quantifications** (levels > LOQ)	**Quantification rate** (%)	**No of countries analysing**	**Pesticide covered by 2015 EUCP**
Trichloronat	16,698	0	0.00	10	No
Triclopyr	21,696	13	0.06	14	No
Tricyclazole	43,213	151	0.35	26	No
Tridemorph	6,730	7	0.10	7	No
Tridiphane	1,637	0	0.00	1	No
Trietazine	2,915	0	0.00	3	No
Trifloxystrobin (RD)	68,079	1,457	2.14	29	Yes
Trifloxysulfuron	4,334	0	0.00	1	No
Triflumizole (RD)	30,091	20	0.07	12	No
Triflumuron	57,002	65	0.11	29	Yes
Trifluralin	64,649	19	0.03	29	No
Triflusulfuron	2,113	0	0.00	2	No
Triflusulfuron-Methyl	9,603	0	0.00	5	No
Triforine	28,690	2	0.01	20	No
Trimethacarb	2,940	0	0.00	4	No
Trimethyl-sulfonium cation	2,570	62	2.41	3	No
Trinexapac	7,935	34	0.43	7	No
Trinexapac-Ethyl	8,547	3	0.04	7	No
Triticonazole	54,495	2	0.00	29	No
Tritosulfuron	9,176	0	0.00	6	No
Uniconazole	3,730	1	0.03	5	No
Valifenalate	7,375	0	0.00	5	No
Vamidothion	26,913	0	0.00	21	No
Vernolate	2,321	0	0.00	1	No
Vinclozolin (RD)	34,549	1	0.00	25	No
Warfarin	381	0	0.00	1	No
XMC	2,321	0	0.00	1	No
Ziram	5	0	0.00	1	No
Zoxamide	59,639	97	0.16	29	No

Table 17: Food to be analysed in 2015 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* spp. *sesquipedalis*)	Beans with pods (0260010)
China	Broccoli	
	Tea, whether or not flavoured	
Dominican Republic	Aubergines	
	Bitter melon (*Mormodica charantia*)	Courgettes (0232030)
	Peppers (*Capsicum* spp.)	
	Yardlong beans (*Vigna unguiculata* spp. *sesquipedalis*)	Beans with pods (0260010)
Egypt	Peppers (*Capsicum* spp.)	
	Strawberries	
Kenya	Beans with pods (unshelled)	
	Peas with pods (unshelled)	
Morocco	Mint	Basil (0256080)
Nigeria	Dried beans	
Peru	Table grapes	
Thailand	Aubergines	
	Peppers (*Capsicum* spp.)	
	Yardlong beans (Vigna unguiculata spp. sesquipedalis)	Beans with pods (0260010)
Turkey	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	
	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 18: ADI/ARfD values for compounds added to the EUCP and changed ADI/ARfD values (compared with toxicological reference values reported in the 2014 EU report on pesticide residues in food (EFSA 2016))

Pesticide	ADI (mg/kg bw per d)	Year	Source	ARfD (mg/kg bw)	Year	Source
Biphenyl	0.5	2013	EPA	Not set	-	-
Bromide ion[(a)]	Not set	2013	EFSA	Not necessary	2013	EFSA
Diniconazole	0.02	2007	France	0.02	2007	France
Endosulfan	0.006	2006	JMPR	0.02	2006	JMPR
Ethion	0.002	1990	JMPR	0.015	1999	UK ACP
Fenamidone[(b)]	Not set	2016	EFSA	Not set	2016	EFSA
Methoxychlor	0.005	2011	ATSDR	Not set	-	-
Oxadixyl	0.01	1984	France	0.01	1984	France
Propyzamide (RD)	0.05	2016	EFSA	0.13	2016	EFSA
Pyriproxyfen	0.1	2008	COM	Not necessary	2008	COM

(a): The toxicological profile of bromide ion, main metabolite of methyl bromide, was evaluated by JMPR in 1988, but EFSA (2013) considered that the proposed ADI of 1 mg/kg bw/day is not sufficiently supported by data and that the necessity of an ARfD for bromide ion should be reassessed.

(b): In the framework of the 2015 peer review, Member State experts did not set reference values for fenamidone because no conclusion on the genotoxic potential of fenamidone could be drawn (EFSA 2016).

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, the residue concentrations are presented individually expressed 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 (see also footnotes 23 and 24).

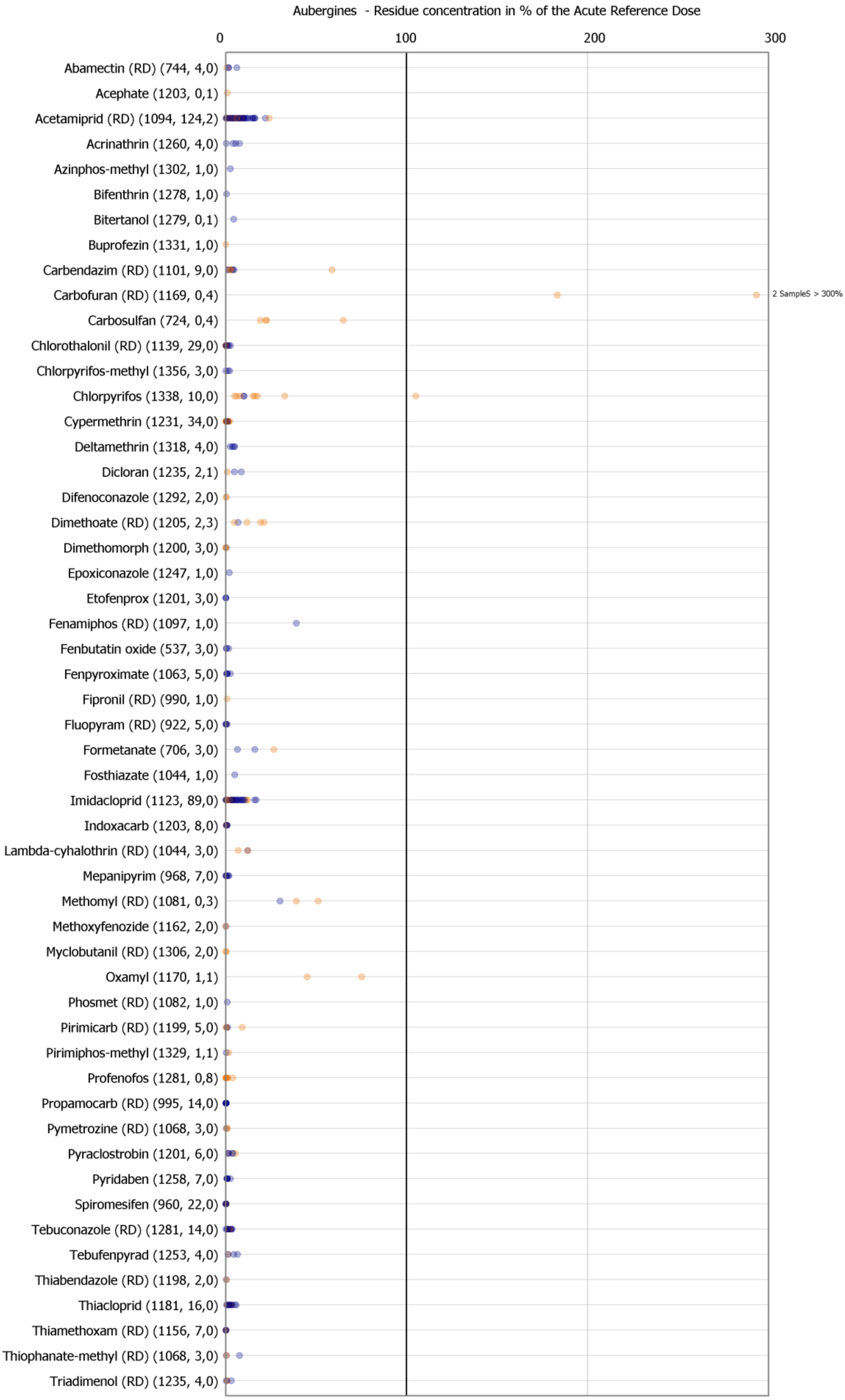

Figure 60: Short-term dietary risk assessment – aubergines (see footnotes 25 and 26)

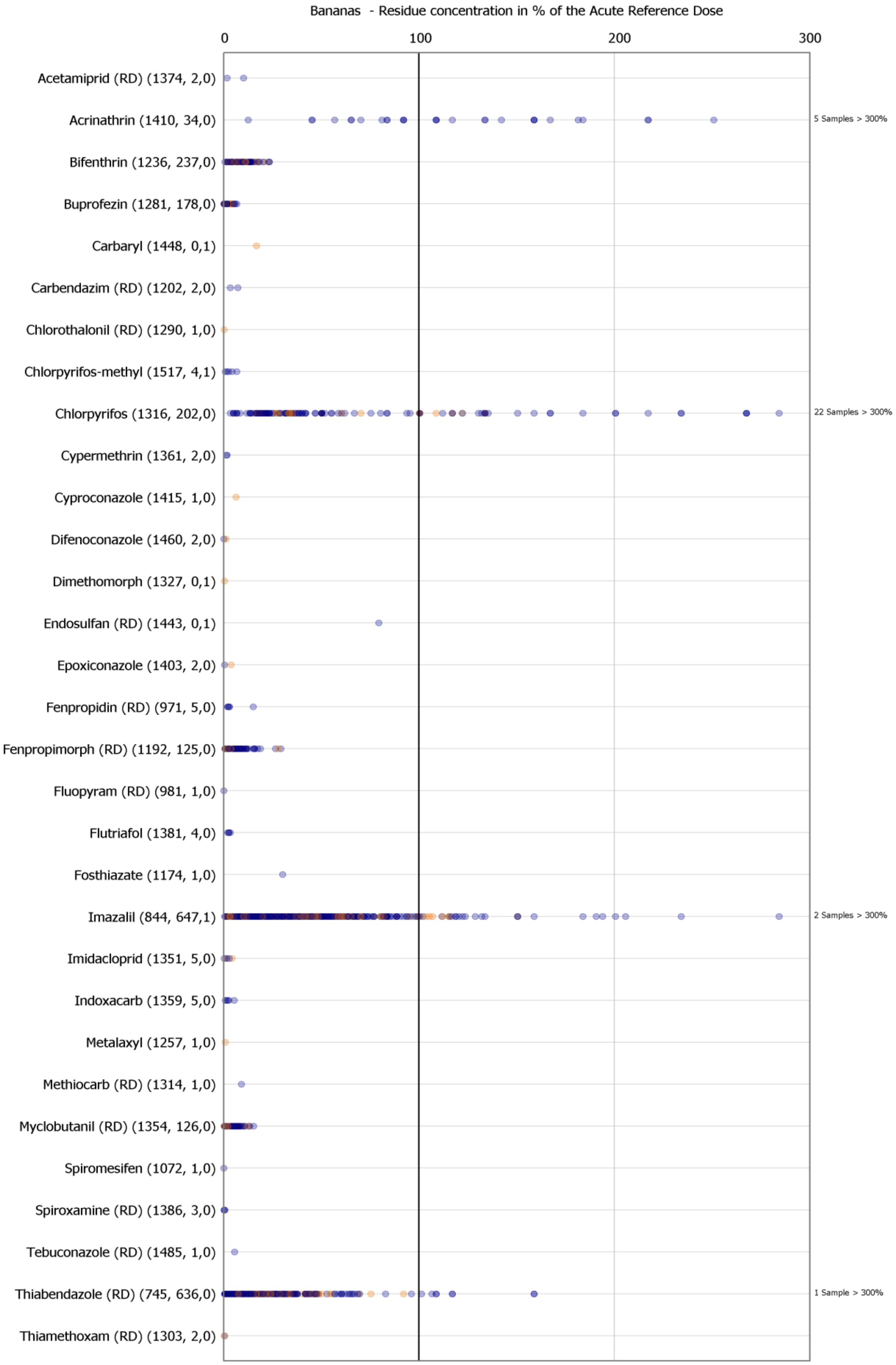

Figure 61: Short-term dietary risk assessment – bananas (see footnotes 25 and 26)

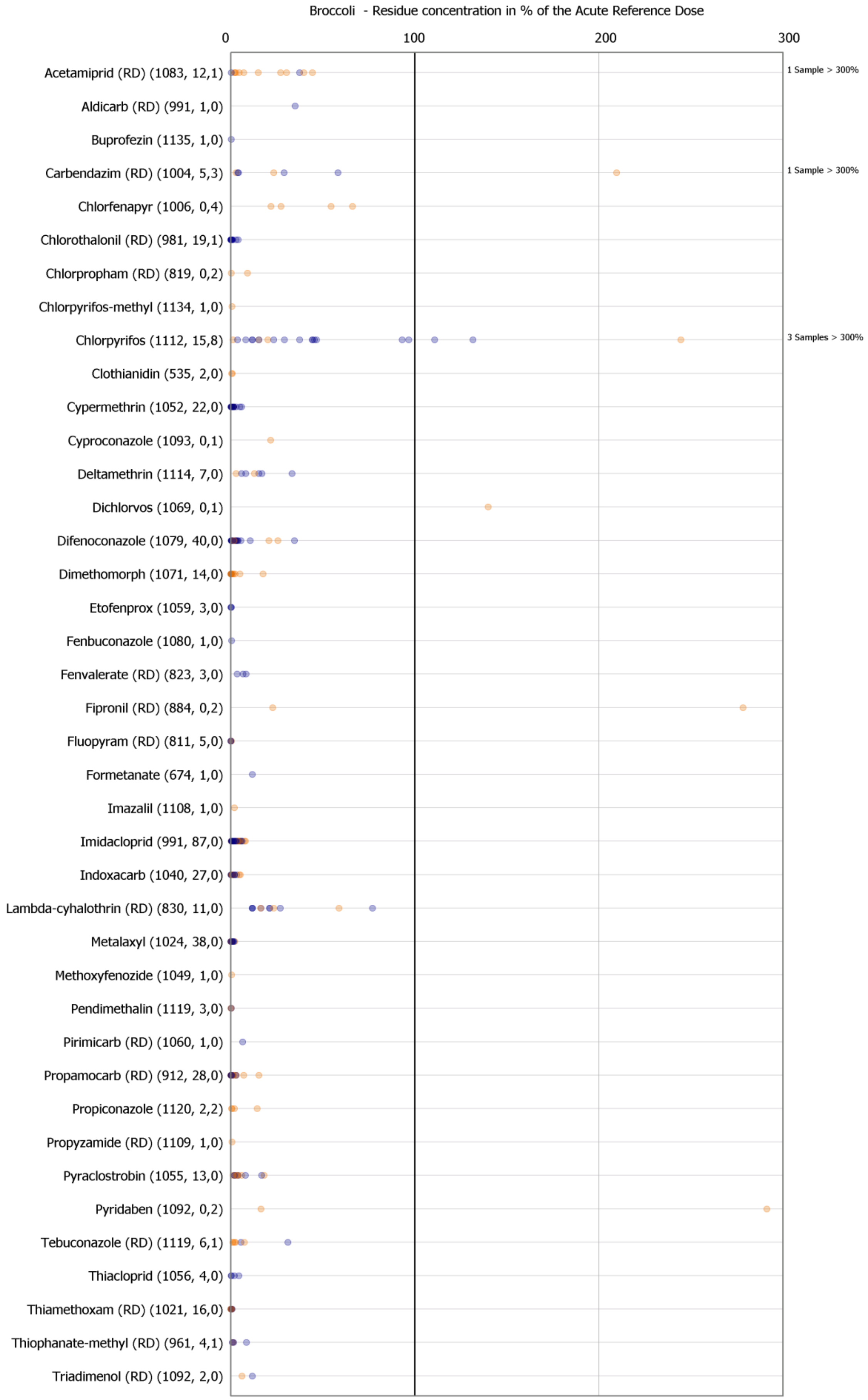

Figure 62: Short-term dietary risk assessment - broccoli (see footnotes 25 and 26)

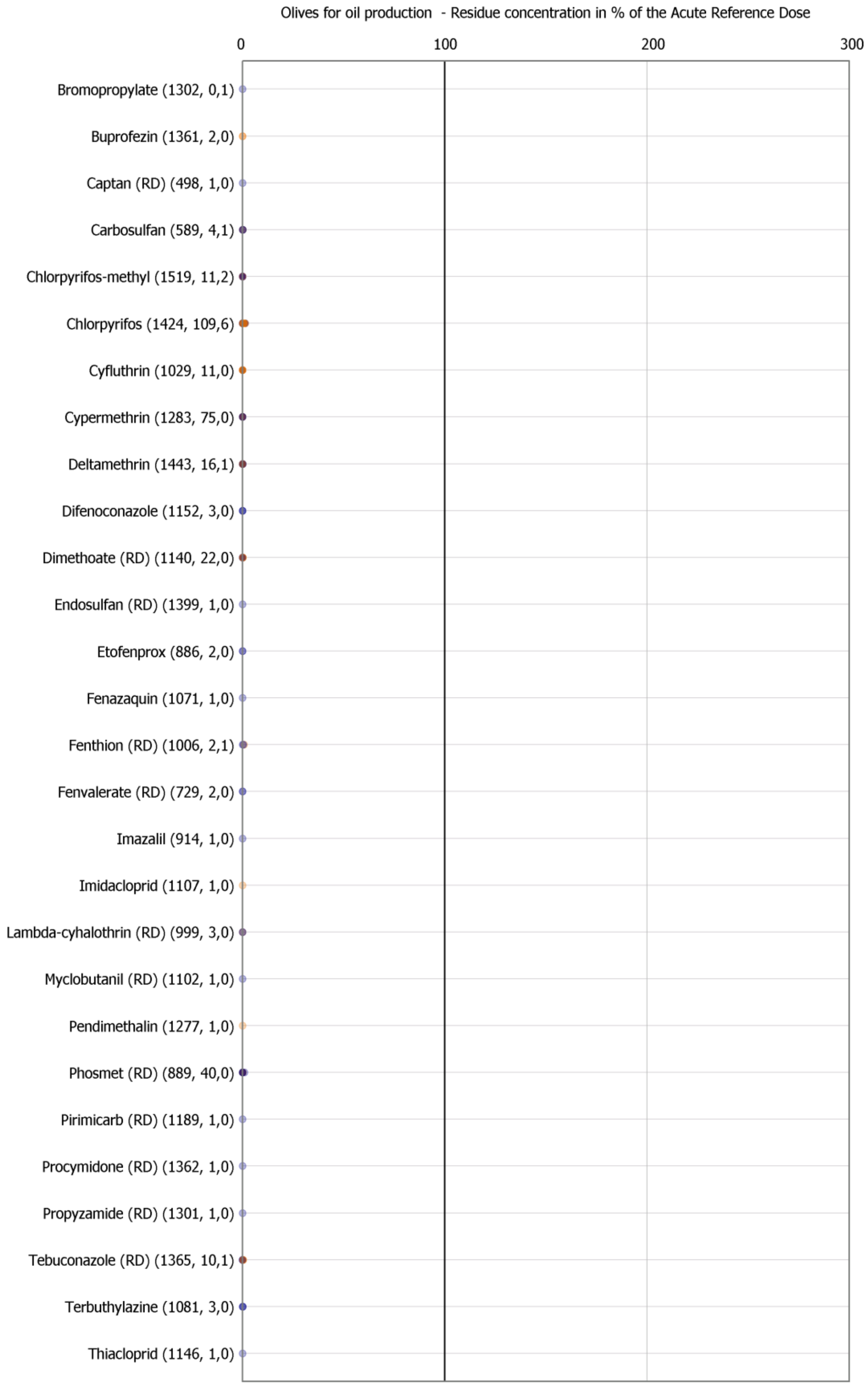

Figure 63: Short-term dietary risk assessment – olive oil (see footnotes 25 and 26)

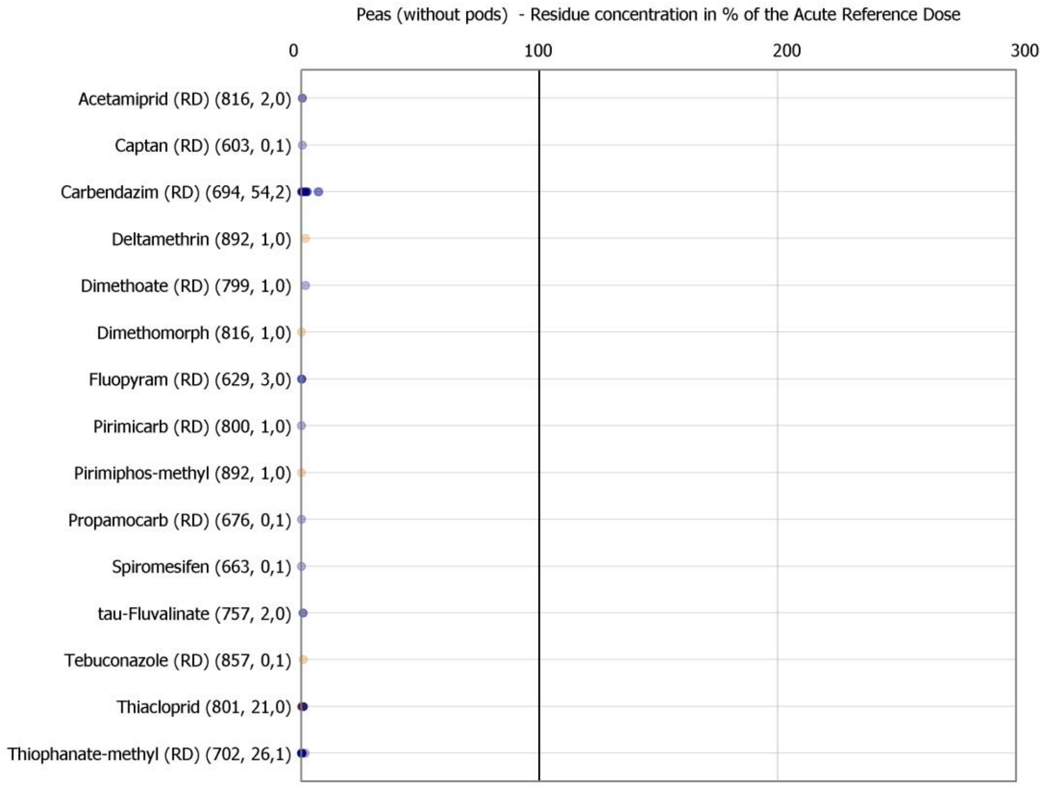

Figure 64: Short-term dietary risk assessment – peas (without pods) (see footnotes 25 and 26)

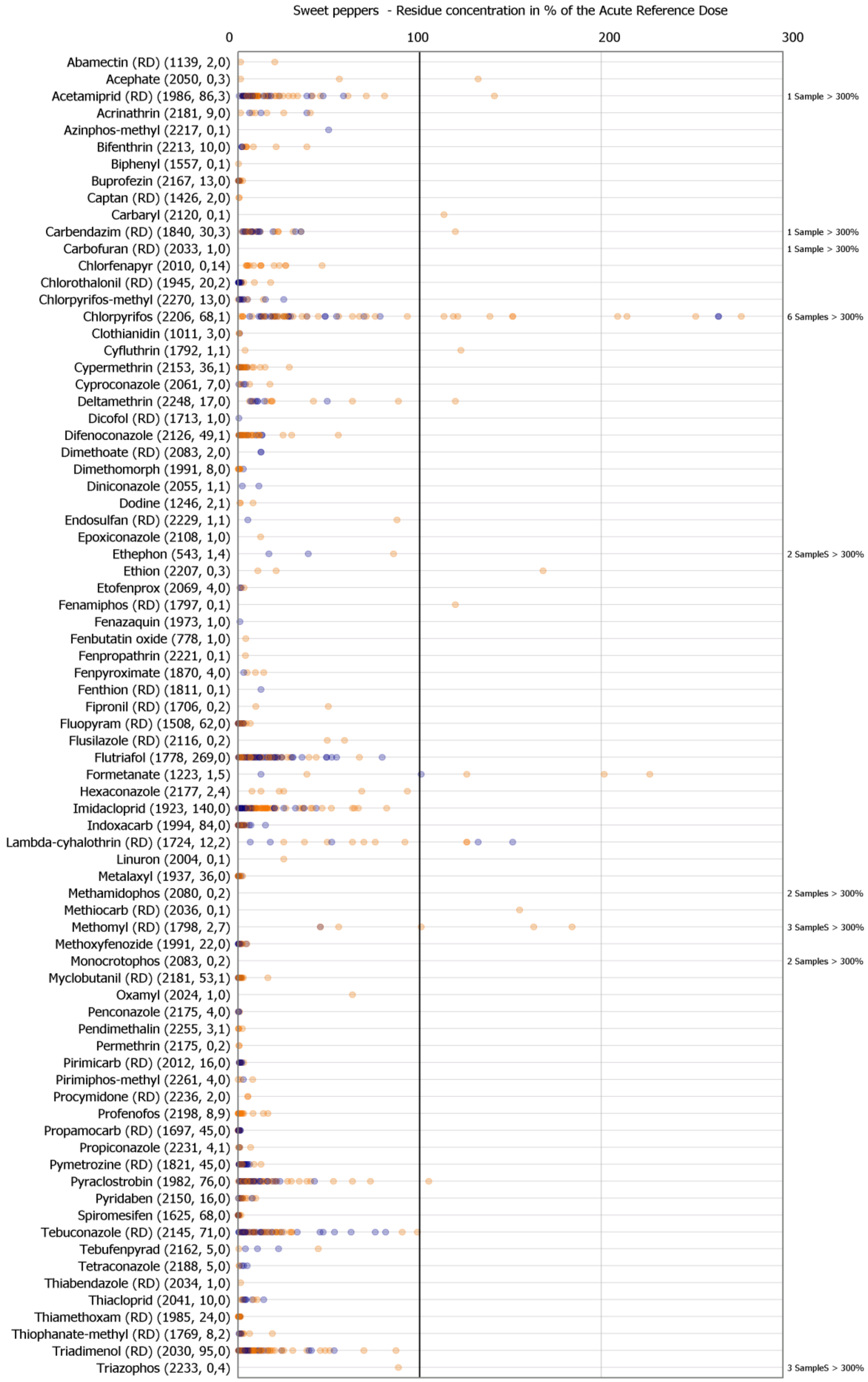

Figure 65: Short-term dietary risk assessment – sweet peppers (see footnotes 25 and 26)

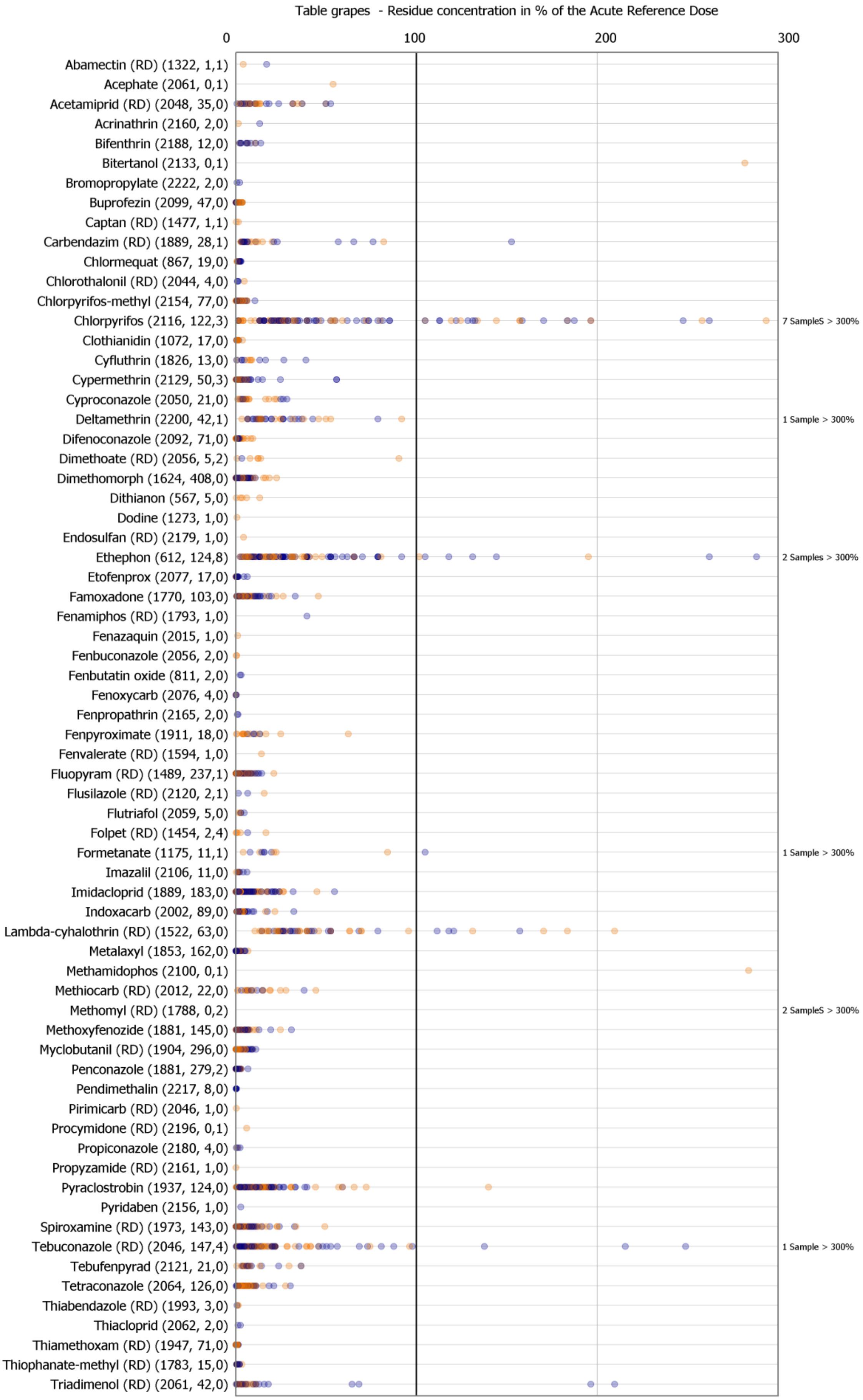

Figure 66: Short-term dietary risk assessment – table grapes (see footnotes 25 and 26)

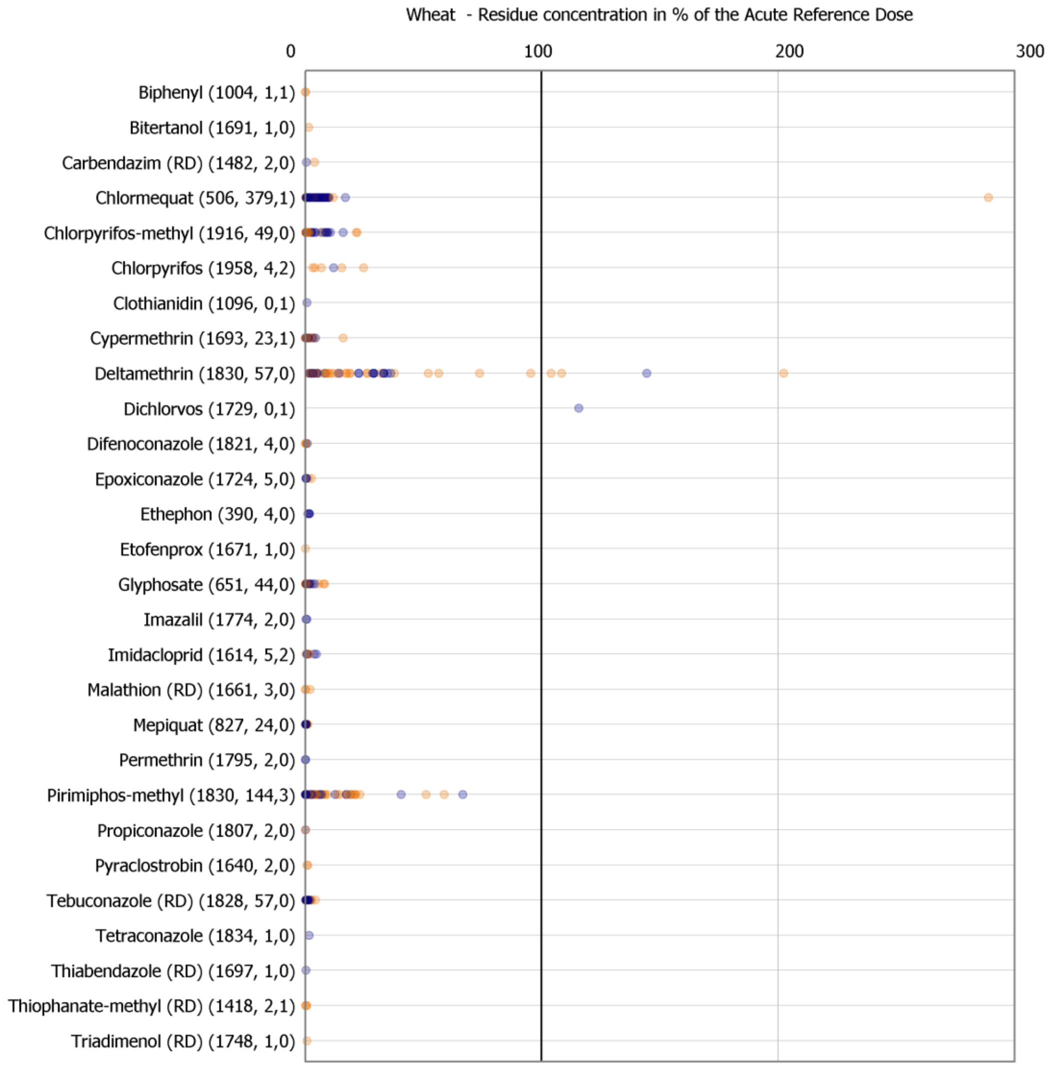

Figure 67: Short-term dietary risk assessment - wheat (see footnotes 25 and 26)

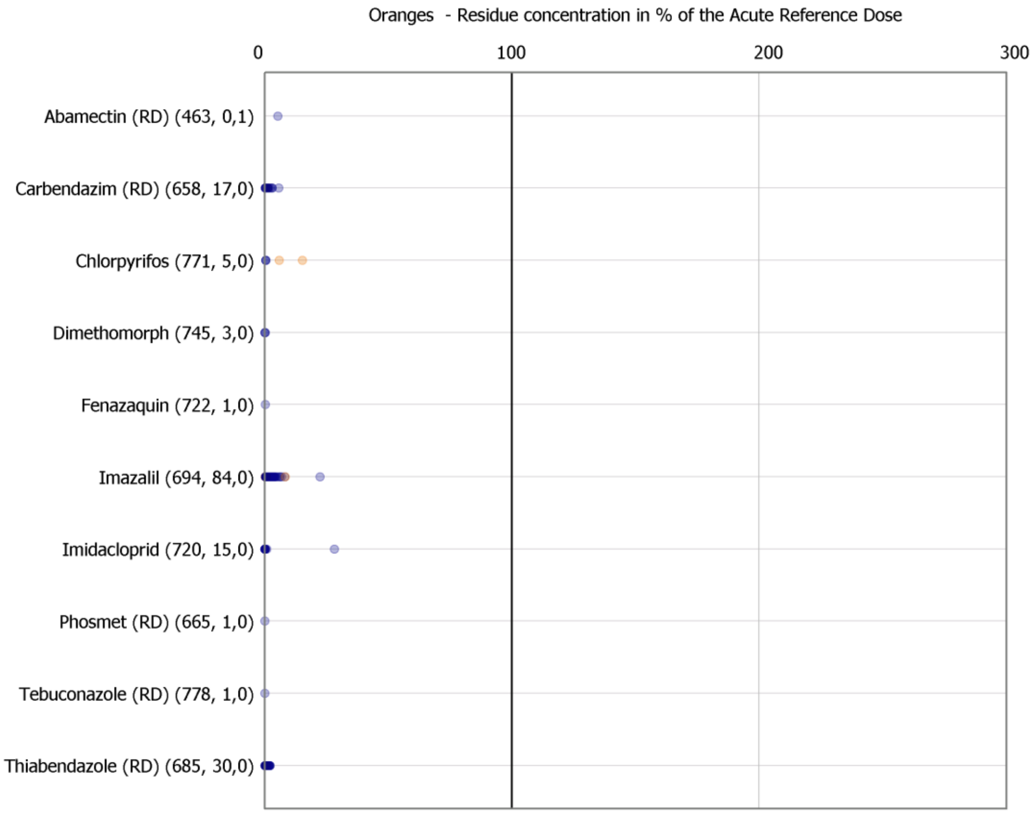

Figure 68: Short-term dietary risk assessment - orange juice (see footnotes 25 and 26)

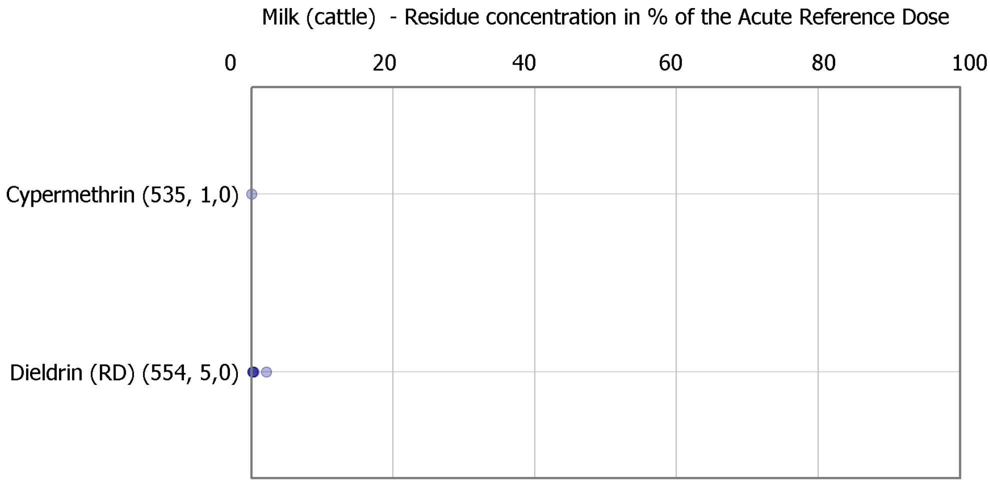

Figure 69: Short-term dietary risk assessment – butter (cattle milk) (see footnotes 25 and 26)

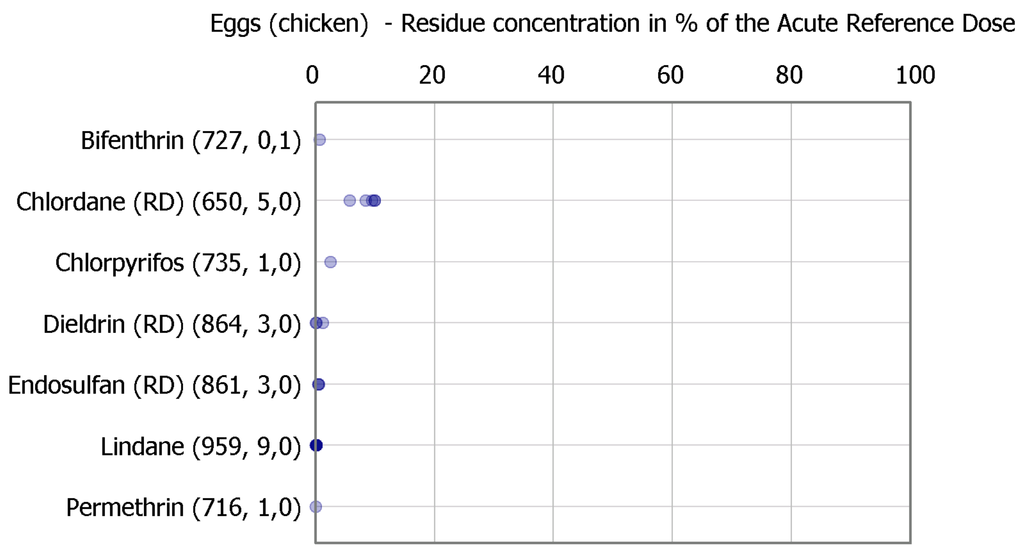

Figure 70: Short-term dietary risk assessment – eggs (see footnotes 25 and 26)