SCIENTIFIC REPORT OF EFSA

The 2012 European Union Report on pesticide residues in food[1]

European Food Safety Authority[2, 3]

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ABSTRACT

The report summarises the results of the control activities related to pesticide residues in food carried out in 2012 in the EU Member States, Norway and Iceland (hereafter referred to as reporting countries). A total of 78,390 samples of more than 750 food products were analysed for pesticide residues. A substantial number of samples from third countries (6,472 samples) were taken for products subject to increased import controls under Regulation (EC) No 669/2009. In the framework of the EU-coordinated monitoring programme which is aimed at providing statistically representative results for the EU, 10,235 samples of 12 different food commodities were analysed for 205 different pesticides. Overall, 98.3 % of the tested food samples were compliant with the legal limits; 54.9 % of the samples contained no quantifiable residues at all. In general, a higher prevalence of residues exceeding the Maximum Residue Levels (MRLs) was observed for products imported from third countries (7.5 % for imported products versus 1.4 % for products produced in one of the reporting countries). On the basis of the dietary exposure assessment performed for the pesticides covered by the EU-coordinated monitoring programme EFSA concluded that according to the current scientific knowledge, the presence of residues found in food in 2012 was unlikely to have a long-term effect on the health of consumers. In 280 cases of the total of 1,765,663 determinations reported for food products covered by the EU-coordinated programme the residues occurred in concentrations where a potential short-term consumer health outcome could not be excluded if the products were consumed in high quantities.

KEY WORDS

pesticide residues, food control, monitoring, Maximum Residue Levels, consumer risk assessment, Regulation (EC) No 396/2005

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SUMMARY

This report summarises the results of the control activities related to pesticide residues in food carried out in 2012 in 27 Member States and two EFTA countries (Iceland and Norway). On the basis of the pesticide monitoring results reported by Member States, EFSA calculated the dietary exposure to pesticides via food and the associated risks. EFSA also derived a number recommendations aimed at improving the enforcement of the European pesticide residue legislation.

Altogether, in 2012 more than 78,390 samples of more than 750 different food products were tested for approximately 800 different pesticides.

The analysis of the results of the 2012 EU-coordinated programme, which requested the control of 12 different food products for 205 different pesticides, has shown that 0.9 % of the samples numerically exceeded the Maximum Residue Levels (MRLs) (92 out of the 10,235 samples); approximately half of them (0.5 % of the samples) were found to be non-compliant with the legal limits when the measurement uncertainty was taken into account. Measurable residues within the legally permitted levels were found in 39 % of the samples (3,992 samples). In 59.9 % of the samples (6,771 samples), no residues were detected (residues below the limit of quantification). Overall, the most frequently detected pesticides ranked according to the absolute number of detections were imazalil (629 detections), followed by thiabendazole (581 detections), chlorpyrifos (469 detections) and azoxystrobin (466 detections).

The food products assessed under the EU-coordinated programme with the highest MRL exceedance rate were broccoli (2.8 % of the samples exceeding the MRL), cauliflower (2.2 % MRL exceedances), table grapes (1.8 %), peppers (1.4 %), aubergines (1.0 %), bananas (0.7 %%) and wheat (0.7 %). For peas without pods and olive oil 0.1 % of the samples exceeded the legal limits. No MRL exceedances were identified in orange juice, butter and chicken eggs. Multiple pesticide residues were found most frequently in bananas (61.2 % of the samples analysed, followed by table grapes (59.6 % of the samples analysed) and sweet peppers (21.5 %).

The pesticide/product combinations for which residue concentrations were quantified above the reporting level most frequently in the EU-coordinated programme were thiabendazole/bananas (53.5 %), imazalil/bananas (48.6 %), chlormequat/wheat (39.6 %) and fenhexamid/table grapes (26.6 %). High detection frequencies were also reported for dithiocarbamates in broccoli (57.1 %) and in cauliflower (42.3 %), but these findings are related to naturally occurring substances present in brassica vegetables and are not necessarily linked to the use of dithiocarbamates pesticides. The highest percentages of MRL exceedances were found for dithiocarbamates in broccoli and cauliflower (3.3 % and 1.1 %, respectively), followed by residues of fluazifop-P-butyl (1.1 %), ethephon and folpet in table grapes (1.0 % and 0.8 %, respectively) dimethoate in cauliflower (0.8 %). No notable variations in the frequency of MRL exceedances and detection rates were found compared with 2009 where the same food products were analysed under the EU-coordinated programme.

In 2012, in total 78,390 samples were taken in the context of the national programmes. Compared to the previous monitoring year, the number of samples analysed in 2012 represented a slight decrease by 0.8 %. Of the total, 70,870 samples were surveillance samples while the remaining ones were classified as enforcement samples, thus targeting products which are expected to be non-compliant with the legal limits.

Of all samples analysed, 97.1 % were at or below the MRL; in 2.9 % of the samples, the legal limits were numerically exceeded for one or more pesticides (2,308 samples). For 1.7 % of the samples administrative or legal actions were taken be the national competent authorities against the responsible food business operators since the residue concentrations clearly exceeded the legal limits taking into account the measurement uncertainty. Overall, 54.9 % of the samples were free of detectable residues; in 26.1 % of the samples two or more pesticides were present simultaneously.

Samples originating from third countries were found to have a significantly higher MRL exceedance rate compared to food produced in the EU and EEA countries (7.5 % of the samples produced in third countries exceeded the legal limit compared to 1.4 % of the surveillance samples with EU and EEA provenance). Among the third country products, the highest MRL exceedance rates were identified for food originating from Malaysia (38.2 % of 102 samples analysed), Laos (34.6 % of 26 samples), Cambodia (26.5 % of 68 samples), Vietnam (24.6 % of 179 samples), Kenya (20.6 % of 286 samples), India (19.8 % of 698 samples) and China (18.7 % of 1788 samples). The products that most frequently exceeded the legal limit were basil (44.3 % of the samples analysed), okra (27.0 %), grapefruit (17.9 %) and celery leaves (17.3 %). All these products were in focus for specific import controls under Regulation (EC) No 669/2009. Under this regulation Member States had to perform an increased level of official controls before food products were allowed to be imported to the EU. Overall, 9.8 % of the samples taken under this programme exceeded the legal limits and were therefore rejected at the border.

In total 1,659 samples of baby food were analysed in 2012. Measurable residues were found in 139 samples (7.8 %). The MRLs for baby food were exceeded in 10 samples (0.6 % of the samples). Thus, compared to other food products, the frequency of residues detection and MRL exceedances in baby food was significantly lower.

Organically produced food contained less frequently residues in concentrations exceeding the legal limits, compared to products produced conventionally: among the 4,576 organically produced food products, the MRLs were exceeded in 0.8 % of the samples, while in non-organic products the MRL exceedance rate was 3.1 %. In 85.1 % of the organic products no detectable residues were found; in non-organic samples this percentage is significantly lower (53.1 %).

The majority of samples of food of animal origin were free of detectable pesticide residues (79.3 %); MRL exceedances were noted in 0.5 % of the samples. The detected residues were mainly linked to compounds that were used as pesticides in the past but are still present in the environment due to their persistence and the accumulation in the food chain.

Based on the results of the dietary risk assessment, EFSA concluded that the pesticide residue concentrations measured in the samples analysed in 2012 analysis were not likely to pose a long-term dietary risk for European consumers. The risk assessment that focussed on the short-term exposure revealed that in 280 cases negative health outcomes could not be fully excluded if the products containing the highest residue concentrations measured in the 2012 monitoring programmes were consumed in high quantities.

In 2012 EFSA investigated whether the occurrence of multiple residues present on the 12 food products covered by the EU-coordinated programme was likely to pose a consumer health risk, focussing on pesticides which share a common mechanism of toxicological action and which need to be considered for the cumulative risk assessment. Overall, it was concluded that the presence of pesticides belonging to the same cumulative assessment groups did not lead to a significant number of short-term dietary intake alerts.

Based on the detailed analysis of the monitoring results, EFSA derived a number of recommendations which aimed at improving the clarity and efficiency of the EU-coordinated and national monitoring programmes run by the official food safety authorities. The information on MRL violations identified in 2012 should be taken into account for planning future control programmes; in particular the findings on food products, pesticides and origin of products with previously high prevalence of MRL exceedance should be used to efficiently target future control activities. Finally, some proposals were made which focus on data that would allow improving the dietary risk assessment.

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LEGAL BASIS

Pesticide residues are present in food and feed because of the use of plant protection products on crops or food products used for food and feed production. In order to ensure a high level of consumer protection, legal limits, so called 'Maximum Residue Levels' or briefly 'MRLs', are set at European level. The MRLs define the maximum concentration of pesticide residues permitted in food and feed. These legal standards are established under Regulation (EC) No 396/2005.[4] Harmonised MRLs are currently in place for more than 500 pesticides. For pesticides not explicitly mentioned in the MRL legislation a default MRL of 0.01 mg/kg is applicable, a level equal to the limit of quantification (LOQ) achievable with analytical methods used for MRL enforcement. Regulation (EC) No 396/2005 also provides the legal framework for pesticide residue control activities to be carried out by Member States in order to enforce the MRLs.

Member States should ensure that food placed on the market is compliant with the legal limits. Official controls are carried out for this purpose. According to Regulation (EC) No 396/2005 two control programmes are distinguished:

- The EU-coordinated control programme: this programme is established on a tri-annual basis and defines the food products and pesticides that should be monitored by Member States; it is revised every year. The EU-coordinated programme (EUCP) relevant for the calendar year 2012 was set up in Commission Regulation (EU) No 1274/2011[5,6], hereafter referred to as '2012 monitoring regulation'.

- The national control programme: Member States usually define the scope of national control programmes focussing on specific risks regarding compliance with food standards for pesticide and risks for consumer safety (Article 30 of Regulation (EC) No 396/2005). Thus, the type of food products analysed, the origin of the samples, the pesticides searched for and other parameters differ considerably among the reporting countries, reflecting the specific agronomic, socioeconomic and political framework of the reporting countries and the capacity the official control laboratories (e.g. number of samples, scope of the analytical methods).

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. On the basis of these results, 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.

The 2012 monitoring regulation requested Member States to take at least ten samples of cereal-based baby foods. According to the specific baby food legislation in place at EU level (Directives 2006/125/EC[7] and 2006/141/EC[8]) specific MRLs for baby food are in place, which are in general more restrictive than the legal limits for other food products.

[4] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC. OJ L 070, 16.3.2005, p. 1.

[5] 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, p. 24–43.

[6] The results of the national monitoring programmes have to be reported using the Standard Sample Description, a data reporting format developed by EFSA. The description of the data model and explanations on the coding to be used for the different parameters can be found in a guidance document prepared by EFSA (EFSA, 2012)

[7] 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.

[8] 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.

According to the 2012 monitoring regulation Member States had to take at least one organic sample for each of the food products in focus. It is noted that no specific MRLs are established for organic products. Thus, the MRLs set in Regulation (EC) No 396/2005 apply equally to organic food and to conventional food. Regulation (EC) No 834/2007[9] and Regulation (EC) No 889/2008[10] on organic production of agricultural products define specific labelling provisions and production methods which entail significant restrictions on the use of pesticides.

Regulation (EC) No 669/2009[11] lays down rules concerning the increased level of official controls to be carried out for imported food and feed originating from certain third countries where repeated violations of the EU food standards have been observed. The food products, the country of origin of the products, the frequency of checks to be performed at the point of entry in 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 2012, four updated versions were relevant.[12,13,14,15]

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).

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 2012.

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;

[9] Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91. OJ L 189, 20.7.2007, p. 1.

[10] 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.

[11] 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.

[12] Commission Implementing Regulation (EU) No 1277/2011 of 8 December 2011 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 327, 9.12.2011, p. 42–48.

[13] Commission Implementing Regulation (EU) No 294/2012 of 3 April 2012 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 98, 4.4.2012, p. 7–12.

[14] Commission Implementing Regulation (EU) No 514/2012 of 18 June 2012 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 158, 19.6.2012, p. 2–8.

[15] Commission Implementing Regulation (EU) No 889/2012 of 27 September 2012 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 263, 28.9.2012, p. 26–31.

- an assessment of consumer exposure to pesticide residues based on the information provided by Member States and any other relevant information available, including reports submitted under Directive 96/23/EC.[16]

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

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

1. Introduction

This report provides an overview of the official control activities (also referred to as 'monitoring or control programmes') performed by EU Member States and EFTA countries[17] in order to ensure compliance of food with the legal limits, to summarise the results provided by the reporting countries, to identify critical areas of concern regarding sample compliance with Maximum Residue Levels (MRLs), to assess the actual consumer exposure to pesticide residues and to perform an analysis of the chronic and acute risks to consumer health.

The official food controls performed by the competent authorities in the Member States are normally an 'end of the pipe' testing giving only limited possibilities to influence the compliance rate of food placed on the market. In order to take efficient corrective measures to prevent consumer health risks related to pesticide residues in food it is not sufficient to take and analyse samples at the end of the food production chain, but it is necessary to intervene at earlier stages of food production, closer to the producer and to the user of the pesticides. A major objective of this report therefore is to share the findings on MRL exceedances with all partners who have responsibilities in the food chain, in particular with food business operators. The findings of non-compliant food samples in previous control programmes should help to target future self-control activities of food business operators towards food products which have a higher probability of being non-compliant. The report gives guidance on how to set up efficient self-control systems to implement the legal obligations imposed on them by the general food law.[18] Efficient strategies to identify food products that are potentially violating the EU food safety standards at an early stage will reduce non- compliant food being placed on the market and will have an effect on the dietary exposure situation of European consumers regarding pesticides.

Based on the findings, EFSA derived a number of recommendations on how to improve enforcement practice of the legal limits for pesticides.

The report is also intended to inform consumers about the European situation on pesticide residues in food and gives an overview of potential risks identified for certain food products/product groups.

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 2012 EU-coordinated programme defined in Commission Regulation (EC) No 1274/2011 are summarised in Section 2. In 2012, 205 pesticides were requested to be analysed in 12 food commodities. The purpose of this programme is to generate statistically representative data which are considered as an indicator for the MRL exceedance rate in food of plant and animal origin placed on the European common market and which can be used to estimate the actual consumer exposure of the European population.

The national control programmes are carried out complementary to the controls performed in the context of the EU-coordinated programme; the design and the results of the national control programmes are reported in Section 3 of this report. 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 reported in this section.

The results of the dietary exposure assessments are described in Section 4. This section is intended to provide scientifically based data on risks for consumers related to pesticide residues in food.

[17] Among the EFTA countries, Norway and Iceland have provided the results of their national food control activities to be included in the EU annual Report.

[18] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, p. 1–24.

Additional information and more detailed results related to the 2012 monitoring activities can be found on the EFSA website[19] and on the websites of the national competent authorities (see Appendix I). EFSA would like to draw the attention to the technical report (EFSA, 2014b) which was prepared on the basis of the national summary reports submitted by the reporting countries, containing further details on pesticide monitoring activities.

[19] Information available under http://www.efsa.europa.eu/en/multimedia/interactive.htm

2. EU-coordinated control programme

The EU-coordinated programme is designed to provide statistically representative results for the EU to derive general conclusions on the residue situation in food and to estimate the consumer exposure to pesticides via food (see also Section 4).

2.1. Design of the EU-coordinated control programme

In the framework of the 2012 EU-coordinated programme reporting countries were requested to analyse a total of 12 different food products, nine of them are unprocessed raw food products (aubergines, bananas, broccoli or cauliflower[20], peas (without pods), peppers (sweet), table grapes, wheat and chicken eggs); in addition three processed food products (butter, olive oil and orange juice) had to be analysed. 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.

In 2009, nearly the same food products were analysed as in 2012[21]. In terms of pesticides, the 2012 programme covers all the pesticides analysed in 2009 except cadusafos and chlorobenzilate in plant products and camphechlor in animal products (the analysis of these substances was voluntary in 2009). For the overlapping commodities and pesticides, EFSA performed a comparative assessment of results reported in 2012 and 2009.

In total, 10,235 samples were analysed in the framework of the 2012 EUCP by the 29 reporting countries. The breakdown of the number of samples taken by each country is reported Figure 2-1.

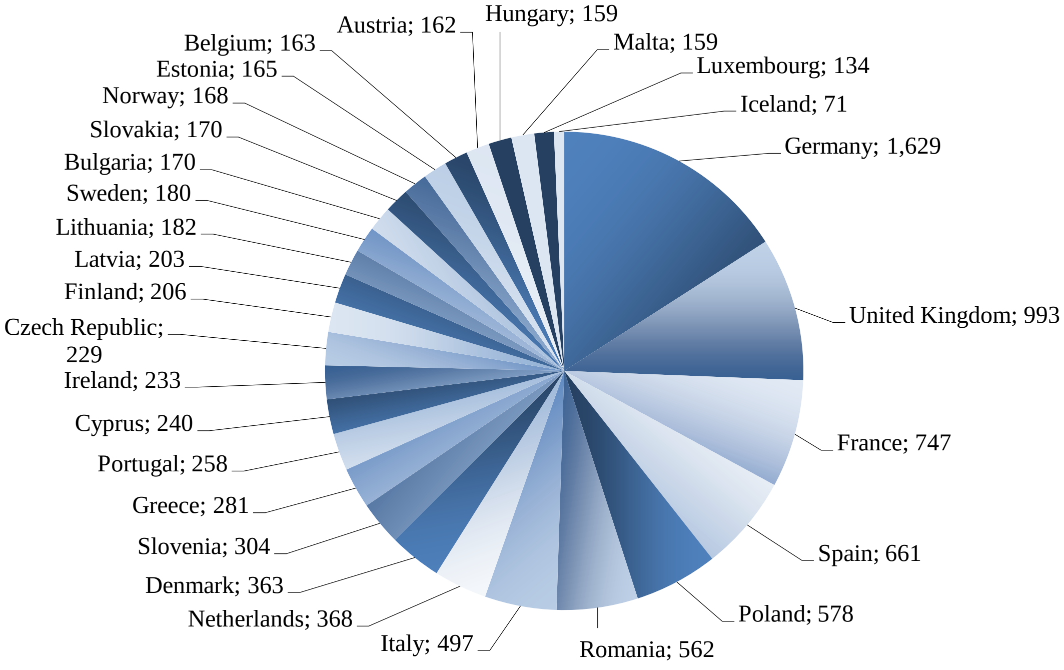

Figure 2-1: Number of samples taken by reporting country under the EUCP

The 2012 EUCP requested the sampling and the analysis of 10 cereal-based baby food samples and of at least one organic sample of the 12 products covered by the EUCP per reporting country. Due to the limited number of results reported in the framework of the EUCP (337 results for baby food samples and 549 organic product results) which do not allow a sound statistical analysis, the results for baby food and organic food are reported in Section 3.2.4.1 and Section 3.2.4.2 of this report, together with the results for these commodities from the national programmes.

[20] Broccoli and cauliflower were alternative products to be analysed. EFSA assessed them separately since different MRLs are established for the two products.

[21] In addition to the commodities analysed in 2009, in 2012 broccoli was included as alternative product to cauliflower. Olive oil is a new food product analysed for the first time in 2012 under the EUCP.

The 2012 monitoring regulation (EU) No 1274/2011 defines a total of 205 pesticides to be analysed – 188 in food of plant origin and 43 in food of animal origin. Appendix II, Table A, of the present report provides the full list of pesticides covered by the 2012 EUCP, including further details on the pesticides that are to be analysed on food of plant or animal origin. The regulation provides that for some pesticides the analysis is not mandatory for certain commodities (see Appendix II, Table A). The data analysis presented in the subsequent sections refers to the results compliant with the SSD reporting format.

2.2. Results by pesticide

For the following 50 pesticides which were analysed in plant products, not a single positive determination was reported[22,23,24]: aldicarb (RD)**, amitraz (RD), amitrol, benfuracarb**, bromopropylate*, captan**, chlorfenvinphos**, dichlofluanid**, dichlorvos*, dicofol (RD)**, dicrotophos**, diethofencarb**, dithianon, EPN**, ethoprophos*, fenbuconazole**, fenitrothion*, fluquinconazole**, formothion**, hexaconazole*, isocarbophos, isofenphos-methyl**, isoprocarb, linuron**, meptyldinocap (RD), metconazole**, methoxychlor**, metobromuron**, nitenpyram**, oxadixyl*, oxamyl**, oxydemeton-methyl (RD)**, paclobutrazol**, parathion**, parathion-methyl (RD)**, phenthoate**, phoxim**, prothioconazole (RD), prothiofos**, pyrethrins, rotenone, teflubenzuron**, tetramethrin**, tolclofos-methyl*, tolylfluanid (RD)**, trichlorfon**, triflumuron**, trifluralin**, triticonazole** and vinclozolin (RD).

Regarding animal products, the following pesticides have not been detected in any of the samples analysed (pesticides with at least 321 results per product): azinphos-ehyl, bifenthrin, chlorpyrifos, chlorpyrifos-methyl, cyfluthrin (RD), cypermethrin (RD), deltamethrin, diazinon, endrin, fenthion (RD), methidathion, methoxychlor, parathion, parathion-methyl (RD), permethrin, pirimiphos-methyl, profenofos, pyrazofos, resmethrin (RD) and triazophos. Also not detected were bixafen (RD), boscalid (RD), chlorobenzilate, chlorpropham (RD), esfenvalerate (RD), etofenprox, fluquinconazole, tau-fluvalinate and metaflumizone, but only a limited number of results was available (less than 321 samples). No results compliant with the legal residue definition were reported for maleic hydrazide.

Measurable residues were found for 138 different substances. Overall, the most frequently detected residues ranked according to the absolute number detections were imazalil (629 detections), followed by thiabendazole (581 detections), chlorpyrifos (469 detections) and azoxystrobin (466 detections). 78 pesticides were detected in more than 0.15 % of the samples. Residues exceeding the legal limits were related to 44 different pesticides. It is noted that out of the 108 determinations exceeding the MRLs numerically (without considering the measurement uncertainty), 56 were considered as non-compliant with the legal limits by the competent national authorities (i.e. samples that clearly exceeded the MRL taking into account the measurement uncertainty).

In Figure 2-2 the most frequently detected pesticides in plant products are depicted (only pesticides occurring in at least 1 % of the samples analysed or pesticides with more than 1 sample exceeding the MRL). The numbers in brackets next to the name of the pesticide represented in the figure, refer to the number of samples without measurable residues, the number of samples with residues within the legally permitted concentrations and the number of samples exceeding the MRLs, respectively. More

[22] According to the monitoring regulation at least 642 samples should be analysed for each pesticide/commodity combination. This number of samples is required to derive a statistically sound database which would allow the detection with a certainty of more than 99 % of a sample containing pesticide residues above the LOQ, provided that not less than 1 % of the products contain residues above that limit. For pesticides that were not mandatory, the number of results mostly did not reach the level of 642 determinations. Also for mandatory substances, the number of determinations was lower for certain pesticide/crop combinations because of analytical problems encountered by enforcement laboratories. In these cases the statistical uncertainty is higher.

[23] For pesticides labelled with * at least 321 results were reported for the food products were the analysis was mandatory (i.e. 50 % of the minimum number of determinations defined in the monitoring regulation).

[24] For pesticides labelled with ** the number of determinations for the mandatory commodities was at least 321, except for broccoli, where in general a lower number of samples were analysed (see Section 2.3.3).

details on the individual results for each of the products covered by the EU-coordinated monitoring programme are reported in Appendix II (Table B) and Section 2.3.

The most frequently detected pesticides in plant products were bromide ion (16.1 %), glyphosate (10.9 %), chlormequat (9.68 %) and dithiocarbamates (RD) (10.5 %). Since bromide ion occurs naturally in plants it is not an unambiguous marker for the use of the pesticide methyl bromide. The presence of dithiocarbamates is also not necessarily a result of pesticide use, since in certain commodities naturally occurring substances lead to positive detections for dithiocarbamates. The results for glyphosate and chlormequat are biased as the monitoring was requested only for those commodities where these pesticides are mainly used. Among the pesticides that had to be analysed in all plant products and which have a wider use pattern, imazalil, thiabendazole, azoxystrobin, chlorpyrifos, boscalid and fenhexamid were the most frequently detected pesticides present in more than 4 % of the samples analysed.

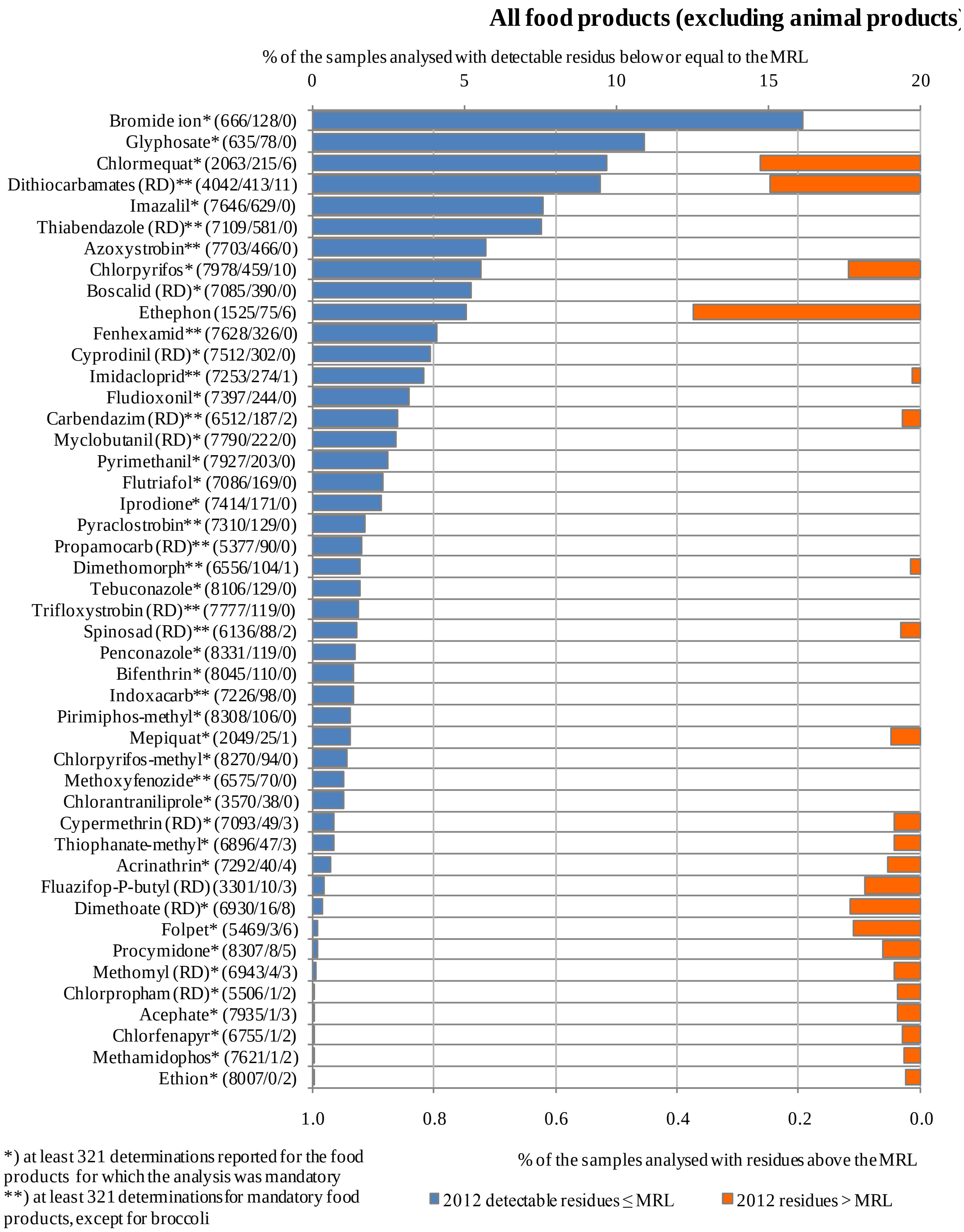

Figure 2-2: Most frequently detected pesticides in all food products covered by the EUCP (all pesticides detected in more than 1 % of the samples analysed or with more than one MRL exceedance)[25]

[25] The numbers in brackets after the name of the pesticide refer to the number of samples below the LOQ, the number of samples with measurable residues below the MRL and the number of samples exceeding the MRL.

2.3. Results by food product

In this section, more detailed information is reported on the results concerning the 12 food products covered by the 2012 EU-coordinated programme. For each of the products, the following analyses are presented:

- A pie chart presenting the percentage of samples free of detectable residues, and samples with single and multiple residues;
- A chart presenting the pesticides found, sorted according to the frequency of detection[26] below or equal to the MRL (blue bars or left part of the chart; upper x-axis scale). In the same chart, the percentages of samples with residues exceeding the MRLs (orange bars or right part of the chart; lower x-axis scale) are included. As in Figure 2-2 the numbers in brackets next to the name of the pesticide, refer to the number of samples without measurable residues, the number of samples with residues within the legally permitted concentrations and the number of samples exceeding the MRLs, respectively. In the context of this section, the results exceeding the MRL always refer to the numerical exceedances of the regulated MRLs, not taking into account measurement uncertainties (see EFSA, 2014a). The light bars refer to the results of 2009, while the bars in the darker shade refer to the results of 2012. A maximum of 40 pesticides are plotted for each food item, and the pesticides are sorted according to the frequency of detection below or equal to the MRL in 2012, unless stated differently. The pesticides with no detections in 2012, but where MRL exceedances were observed in 2009, are plotted at the bottom of the bar chart.
- A table containing background information on the pesticides most frequently found in the food products concerned (pesticides detected in at least 5 % of the samples[27], unless stated differently).

- A figure presenting the distribution of the measured residue levels, expressed as percentage of the MRL applicable for the specific pesticide/crop combination[28]. The numbers in brackets next to the name of the pesticide refer to the number of samples without measurable residues, the number of samples with residues within the legally permitted concentrations and the number of samples exceeding the MRLs, respectively. Each result above the LOQ is depicted as a dot in the respective figure. Pesticides that were not analysed in the specific crop or where no detectable results were found are not reflected in this presentation.

[26] It should be noted that not all samples were analysed for all active substances included in the EUCP. Thus, the numbers reported in brackets vary to a certain extent.

[27] All detections above the LOQ and above the MRL are taken into account.

[28] In case the MRL for a given pesticide/food combination changed during the monitoring year, EFSA compared the numerical value of the pesticide residue measured in the sample with the MRL applicable on 01/01/2012.

2.3.1. Aubergines

In 2012, 944 samples of aubergines were analysed; no pesticide residues were detected in 646 samples (68.4 %), while 298 samples contained one or several pesticides in measurable concentrations. 113 samples (12.0 %) contained multiple residues; up to seven different pesticides were detected in an individual aubergine sample (Figure 2-3).

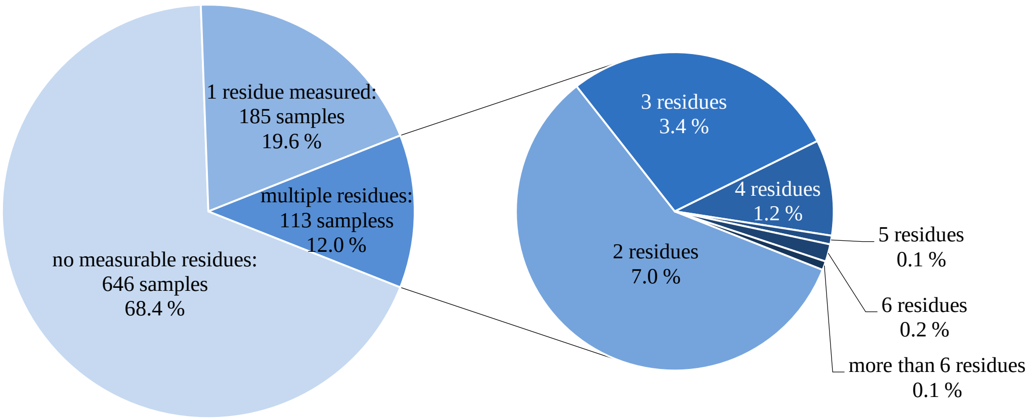

Figure 2-3: Number of detectable residues in individual aubergine samples

In total 61 different pesticides were detected. The most frequently found pesticides were propamocarb (RD) (detected in 7.2 % of the tested samples), cyprodinil (RD) (7.1 %) and imidacloprid (5.9 %). In 1.0 % of the samples (nine samples concerning 12 individual determinations), the residue concentration exceeded the MRL. The MRL exceedances were related to eight pesticides, most frequently the MRL was exceeded for chlormequat (in total three samples originating from Spain), dimethoate (RD) (one sample from Bangladesh and Cambodia, respectively) and acephate (one sample from Bangladesh and Kenya, respectively). In Appendix II (Table B) the full list of samples exceeding the MRLs can be found, including information on the measured residue concentrations and the origin of the samples.

Figure 2-4 depicts the results for all pesticides with MRL exceedances and the most frequently detected pesticides with residues below or at the MRL (detected in more than 0.4 % of the samples). Compared to 2009, the detection rate was slightly lower or in the same range for most pesticides. For some pesticides such as imidacloprid the detection rate was lower in 2012 than in 2009. A specific reason for this fact could not be identified. For five pesticides (acephate, carbofuran (RD), diazinon, mepiquat and procymidone) MRL exceedances were observed in 2012 while in 2009 no such events were reported.

Background information on the most frequently detected pesticides found in aubergines in 2012 can is compiled in Table 2-1. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted n Figure 2-5.

Table 2-1: Pesticides most frequently detected in aubergines in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Propamocarb (RD)	7.2 %	Systemic fungicide used to control diseases in a wide range of vegetables and other crops. Approved in the EU.
Cyprodinil (RD)	7.1 %	Foliar fungicide used for control of plant diseases in a range of fruit and vegetables. Approved in the EU.
Imidacloprid	5.9 %	Systemic insecticide used against different pests in a wide range of crops. Approved in the EU.

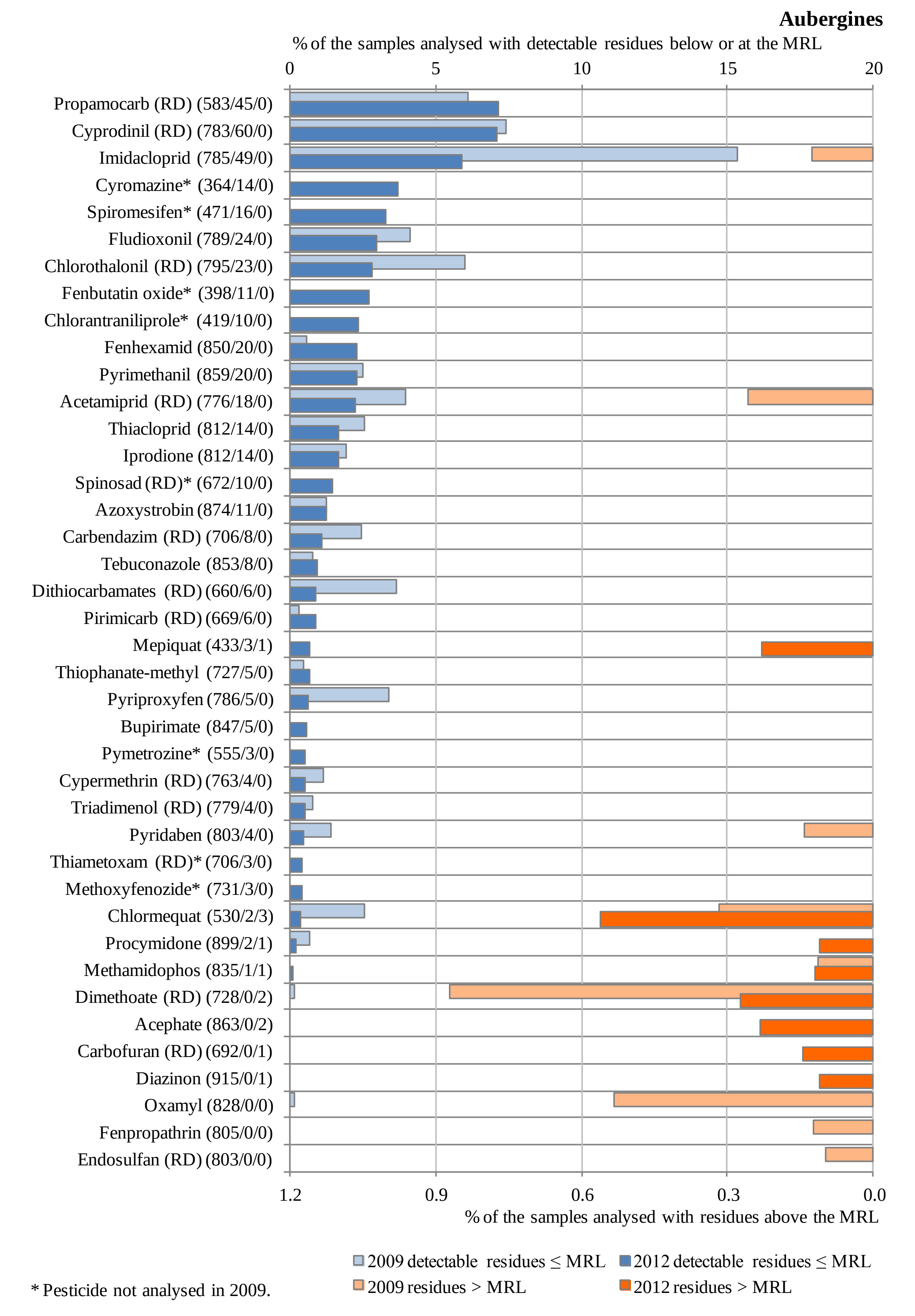

Figure 2-4: Percentage of aubergine samples with detectable residues below or equal to the MRL and residues above the MRL[25]

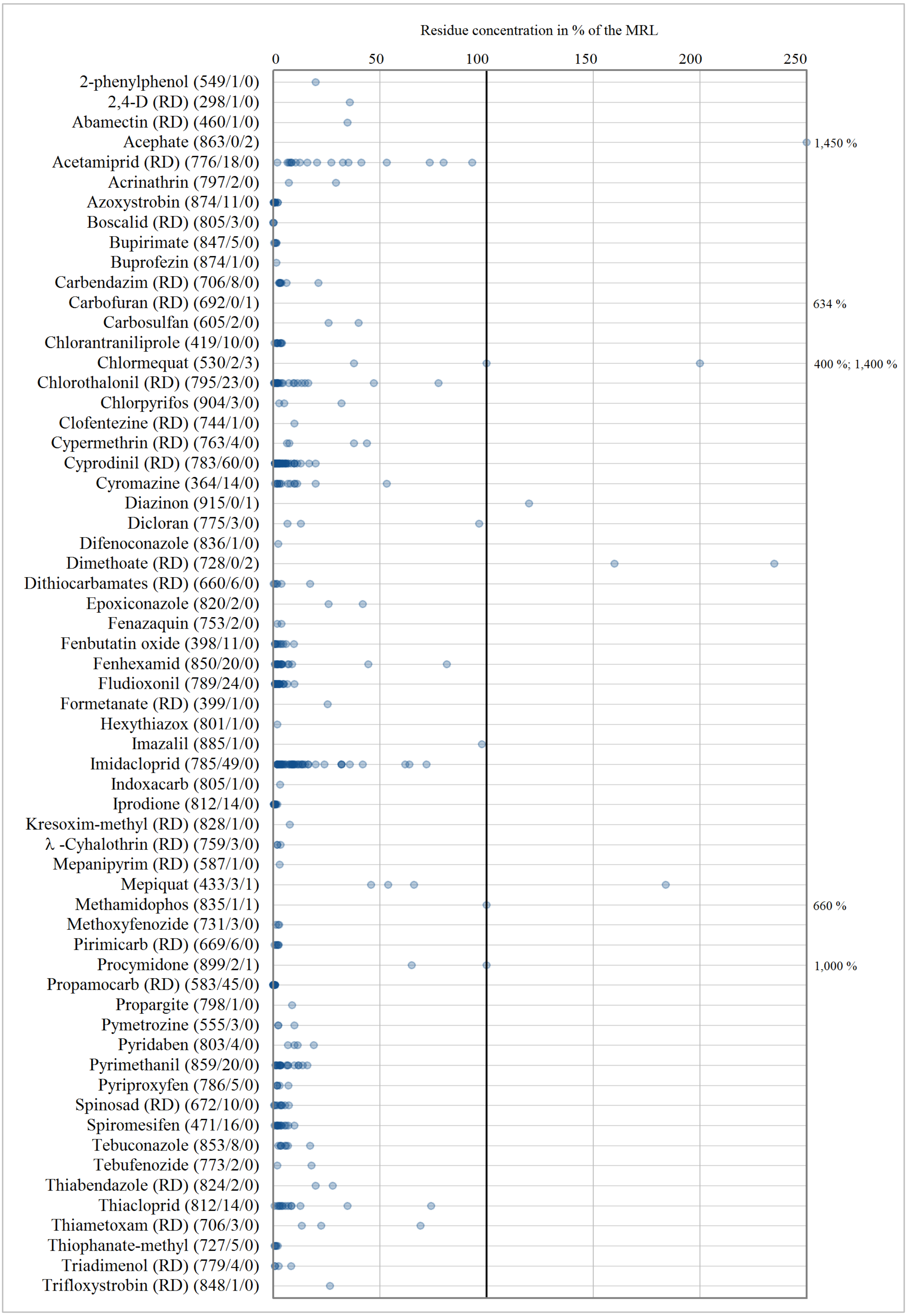

Figure 2-5: Residue concentrations measured in aubergine, expressed as percentage of the MRL (only samples with residues > LOQ) [25]

2.3.2. Bananas

In 2012, 1,109 samples of bananas were analysed; no pesticide residues were detected in 246 samples (22.2 %), while 863 samples contained one or several pesticides in measurable concentrations. 679 samples (61.2 %) contained multiple residues; banana samples with up to seven different pesticides were found (Figure 2-6).

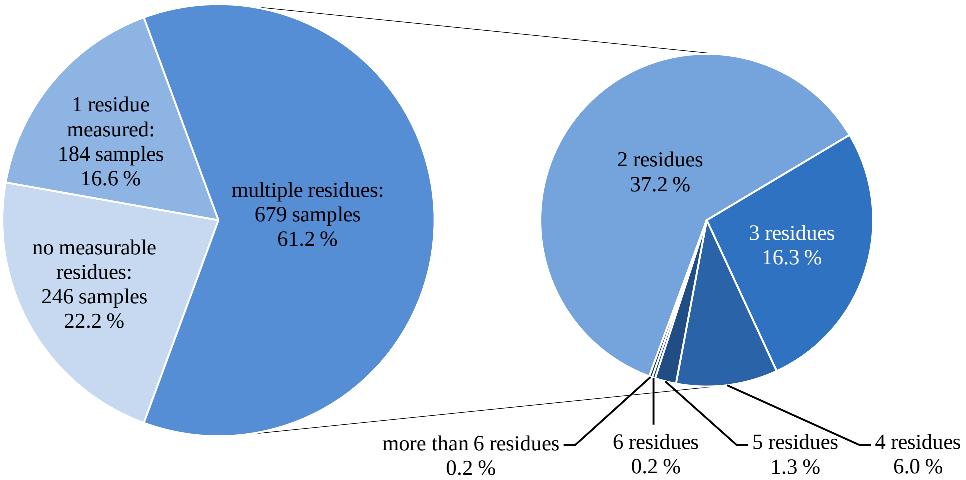

Figure 2-6: Number of detectable residues in individual bananas samples

In total, 34 different pesticides were detected. The most frequently found pesticides were thiabendazole (RD) (detected in 53.5 % of the tested samples), imazalil (48.6 %), azoxystrobin (24.9 %), chlorpyrifos (20.4 %), bifenthrin (9.6 %), myclobutanil (RD) (5.7 %) and fenpropimorph (RD) (5.2 %). In 0.7 % of the samples (eight samples), the residue concentration exceeded the MRL. The MRL exceedances were related to five pesticides, most frequently the MRL was exceeded for acrinathrin (in total three samples, originating from Portugal) and spinosad (RD)[29] (two samples, one sample originating from Portugal and the origin of the other sample was unknown). In Appendix II (Table B) the full list of samples exceeding the MRLs can be found, including information on the measured residue concentrations and the origin of the samples.

In Figure 2-7 all pesticides found in 2012 in bananas are listed, ranked according to the frequency of residue detections below or at the MRL. Compared to 2009, the detection rates were comparable or slightly higher in 2012, with the exception of azoxystrobin, for which the detection frequency was approximately 4-fold higher in 2012. The MRL exceedances of 2012 are due to pesticides for which no MRL exceedances were found in 2009.

Background information on the most frequently detected pesticides found in bananas in 2012 is listed in Table 2-2. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted in Figure 2-8.

[29] MRL for spinosad (RD) in bananas in place on 01/01/2012 was 0.02 mg/kg, corresponding to the LOQ. The MRL was raised to 2 mg/kg in March 2012.

Table 2-2: Pesticides most frequently detected in bananas in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Thiabendazole (RD)	53.5 %	Mainly used as post-harvest fungicide to control a wide range of different plant pathogens and storage diseases. Approved in the EU.
Imazalil	48.6 %	Systemic fungicide used to control a wide range of diseases in fruit and other crops. Used as post-harvest treatment. Approved in the EU.
Azoxystrobin	24.9 %	Systemic fungicide used to control a wide range of diseases in fruit and other crops. Azoxystrobin is also used for post-harvest treatment of bananas. Approved in the EU.
Chlorpyrifos	20.4 %	Non-systemic insecticide used to control different pests in soil or on foliage of fruit and other crops. Chlorpyrifos is also used as post-harvest treatment of bananas. Approved in the EU.
Bifenthrin	9.6 %	Non-systemic pyrethroid acaricide/insecticide for use in a wide range of crops to control sucking and biting foliar pests. Approved in the EU.
Myclobutanil (RD)	5.7 %	Systemic fungicide used to control fungal diseases in a wide range of crops. Approved in the EU.
Fenpropimorph (RD)	5.2 %	Systemic fungicide used to control fungal diseases in a wide range of crops, esp. cereals.

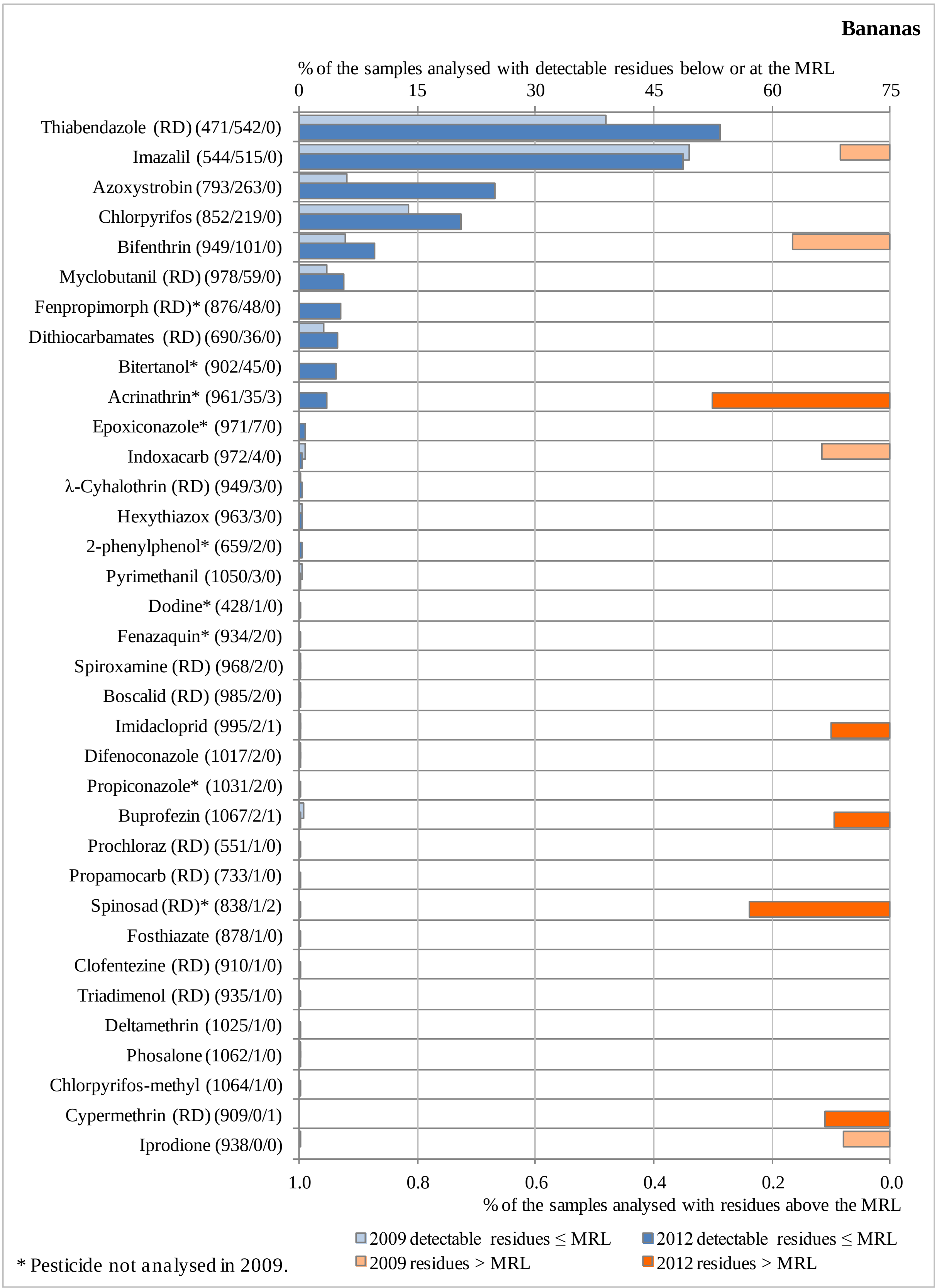

Figure 2-7: Percentage of bananas samples with detectable residues below or equal to the MRL and residues above the MRL[25]

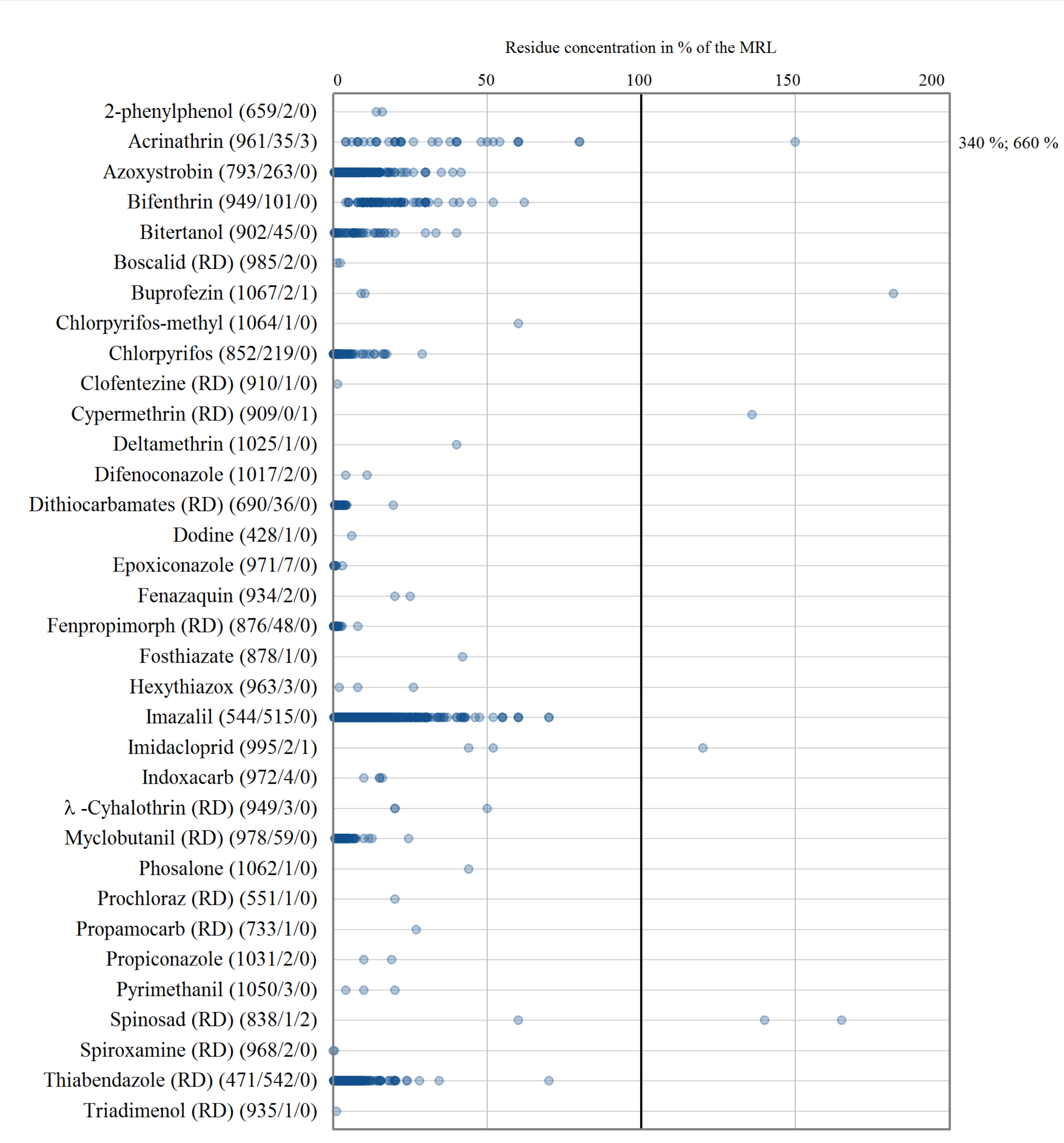

Figure 2-8: Residue concentrations measured in bananas, expressed as a percentage of the MRL (only samples with residues > LOQ) [25]

2.3.3. Broccoli

In 2012, 362 samples of broccoli were analysed. Compared to the other food products covered by the EU-coordinated programme, the number of samples is lower, since the 2012 monitoring regulation defined broccoli or cauliflower as alternative products to be analysed[30]. No pesticide residues were detected in 247 samples (68.2 %), while 115 samples contained one or several pesticides in measurable concentrations. 27 samples (7.5 %) contained multiple residues; up to five different pesticides were detected in individual broccoli samples (Figure 2-9).

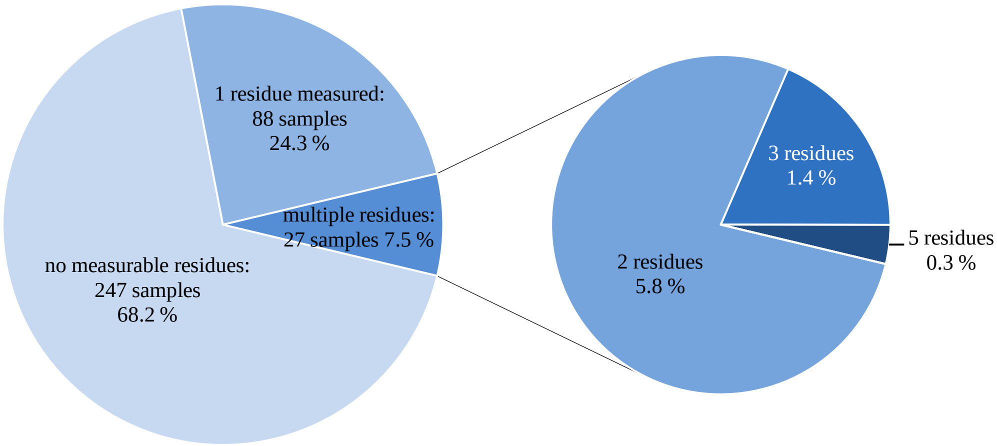

Figure 2-9: Number of detectable residues in individual broccoli samples

In total, 23 different pesticides were detected. The most frequently found pesticide was dithiocarbamates (RD) (detected in 57.5 % of the tested samples). In 2.8 % of the samples (10 samples), the residue concentration exceeded the MRL. It is noted that 14 of pesticides found in broccoli were also detected in cauliflower, demonstrating that the pesticide use patterns are overlapping to a certain extent for these two crops which belong to the same taxonomic family. The MRL exceedances were related to five pesticides, most frequently the MRL was exceeded for dithiocarbamates (RD) (in total four samples, originating from Spain (two samples), Italy (one sample) and the Netherlands (one sample)), fluazifop-P-butyl (RD) (one sample from Luxembourg and from Spain, respectively) and chlorpyrifos (two samples, originating both from Poland). In Appendix II (Table B) the full list of samples exceeding the MRLs can be found, including information on the measured residue concentrations and the origin of the samples.

In Figure 2-10 all pesticides found in broccoli in 2012 are listed, ranked according to the frequency of detection below or at the MRL. Since broccoli was not included in the 2009 EU-coordinated monitoring programme, no comparison of the results is presented.

Background information on the most frequently detected pesticides found in broccoli in 2012 is summarised in Table 2-3. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted in Figure 2-11.

[30] Due to the lower number of samples, the results for broccoli are affected by a higher level of statistical uncertainties.

Table 2-3: Pesticides most frequently detected in broccoli in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Dithiocarbamates (RD)	57.5 %	Non-systemic fungicides used for foliar treatment of fruit and vegetables. Probably false positive results arising from natural occurring substances in brassica vegetables mimicking the presence of dithiocarbamates. The following dithiocarbamates pesticides are approved in the EU: maneb, mancozeb, metiram, propineb, thiram and ziram.

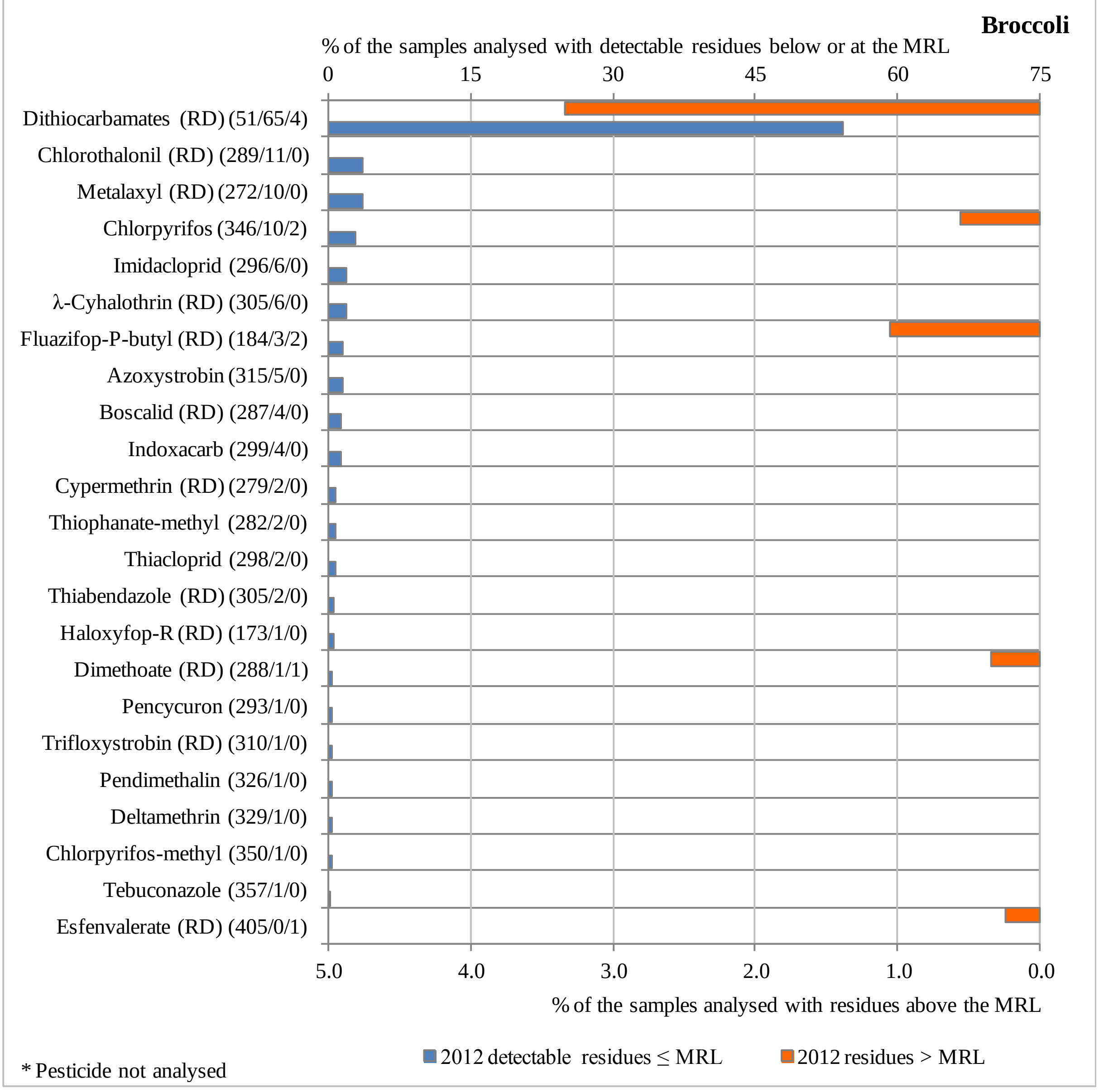

Figure 2-10: Percentage of broccoli samples with detectable residues below or equal to the MRL and residues above the MRL[25]

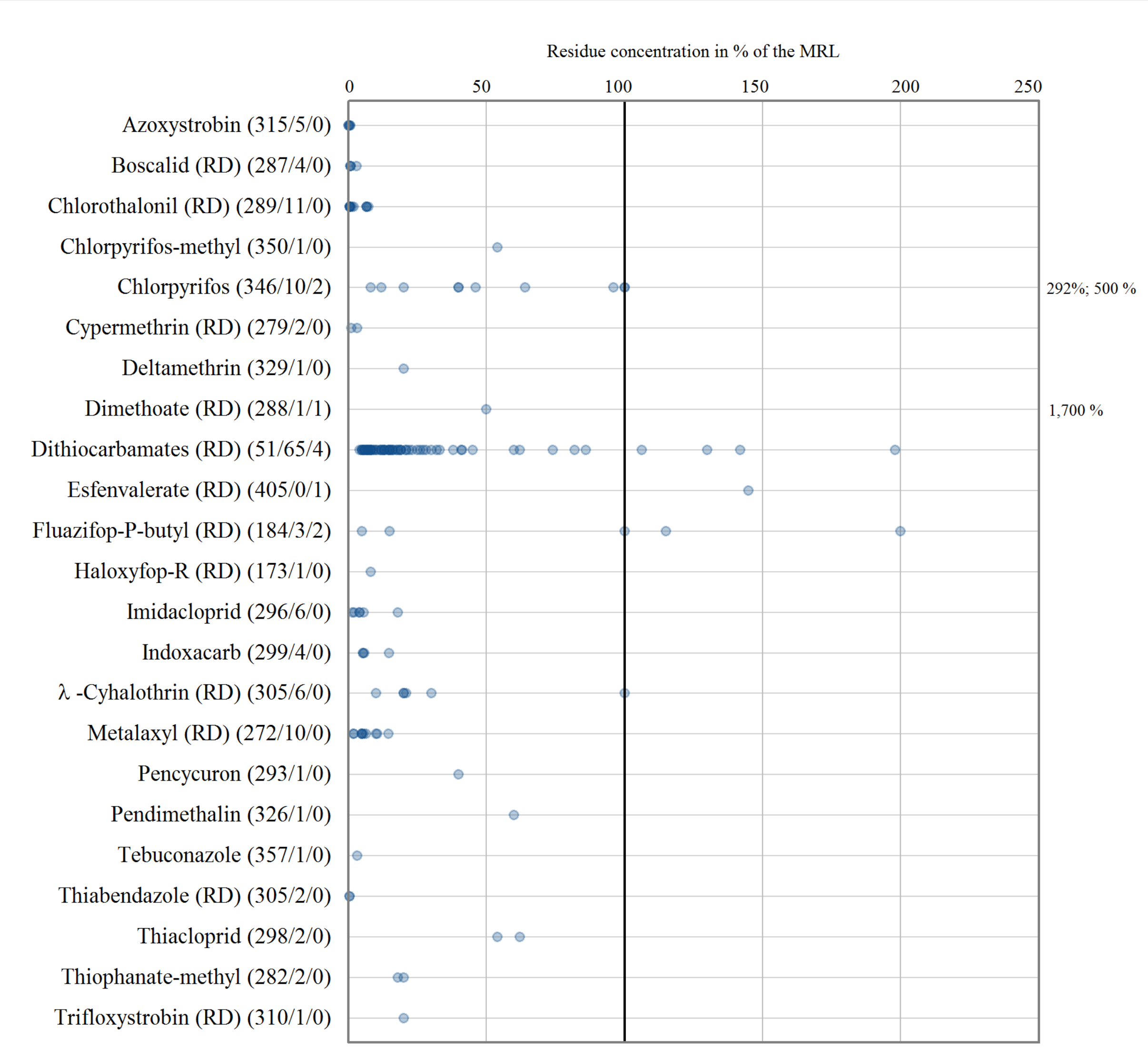

Figure 2-11: Residue concentrations measured in broccoli, expressed as a percentage of the MRL (only samples with residues > LOQ) [25]

2.3.4. Cauliflower

In 2012, 760 samples of cauliflower were analysed; no pesticide residues were detected in 540 samples (71.1 %), while 220 samples contained one or several pesticides in measurable concentrations. 24 samples (3.2 %) contained multiple residues; up to four different pesticides were detected in individual cauliflower samples (Figure 2-12).

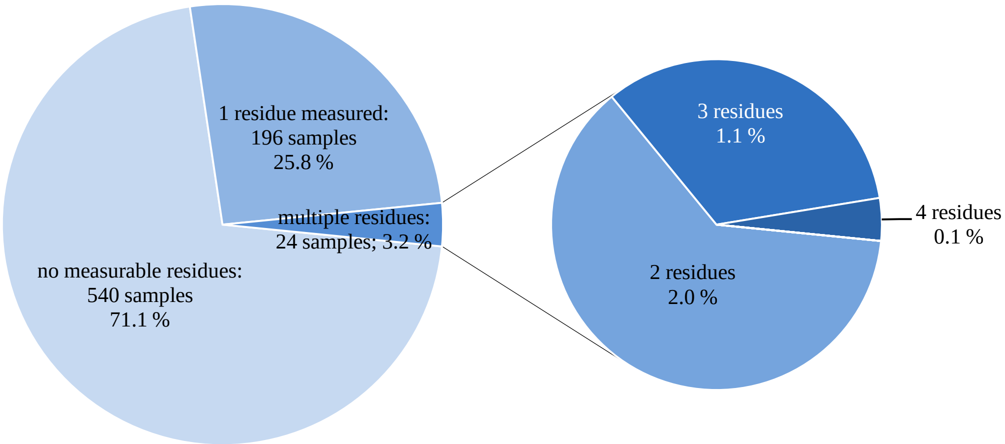

Figure 2-12: Number of detectable residues in individual cauliflower samples

In total, 23 different pesticides were detected. Dithiocarbamates (RD) were detected most frequently (detected in 42.3 % of the tested samples). It is noted that 14 of pesticides found in cauliflower were also detected in broccoli, demonstrating that the pesticide use patterns are overlapping to a certain extent for these two crops which belong to the same taxonomic family. In 2.2 % of the samples (17 samples), the residue concentration exceeded the MRL. The MRL exceedances were related to five pesticides. Most frequently the MRL was exceeded for dithiocarbamates (RD) (in total five samples, three originating from Poland, one from France and the last one from the Netherlands), dimethoate (RD) (five samples, originating from Germany (three samples) and Poland (two samples)) and chlorpyrifos (five samples, originating from Poland (three samples), Italy (one sample) and Spain (one sample)). The full list of samples exceeding the MRLs can be found in Appendix II (Table B), including information on the measured residue concentrations and the origin of the samples.

In Figure 2-13 all pesticides found in 2012 in cauliflower are listed, ranked according to the frequency of detection below or at the MRL. The results of 2012 were in general comparable with the findings of 2009, except for dimethoate. The MRL exceedances for this pesticide which were only observed in 2012 were probably resulting from illegal uses of dimethoate on this crop. It is noted that in 2009 the MRL for this pesticide was lowered[31] and the authorisation for this use has been withdrawn.

Background information on the most frequently detected pesticides found in cauliflower in 2012 is summarised in Table 2-4. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted in Figure 2-14[32].

[31] Commission Regulation (EC) No 1097/2009 of 16 November 2009 amending Annex II to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for dimethoate, ethephon, fenamiphos, fenarimol, methamidophos, methomyl, omethate, oxydemeton-methyl, procymidone, thiodicarb and vinclozolin in or on certain products. OJ L 301, 17.11.2009, p. 6- 22.

[32] The extreme results beyond the scale are mentioned in a footnote (chlorpyrifos) or on the right side of the figure without reflecting the result in the graph.

Table 2-4: Pesticides most frequently detected in cauliflower in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Dithiocarbamates (RD)	42.3 %	Non-systemic fungicides used for foliar treatment of fruit and vegetables. Probably false positive results arising from natural occurring substances in brassica vegetables mimicking the presence of dithiocarbamates. The following dithiocarbamates pesticides are approved in the EU: maneb, mancozeb, metiram, propineb, thiram and ziram.

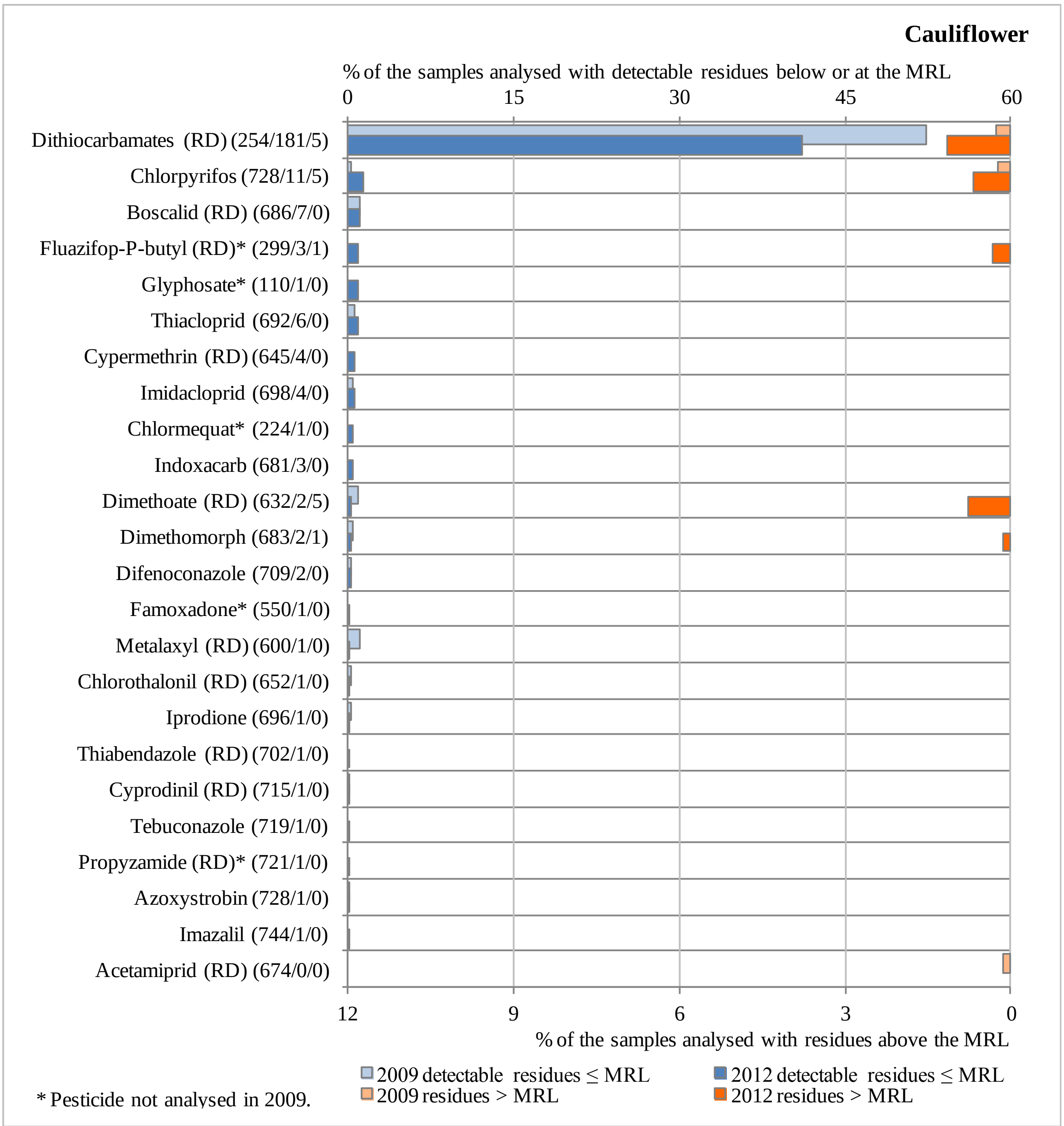

Figure 2-13: Percentage of cauliflower samples with detectable residues below or equal to the MRL and residues above the MRL[25]

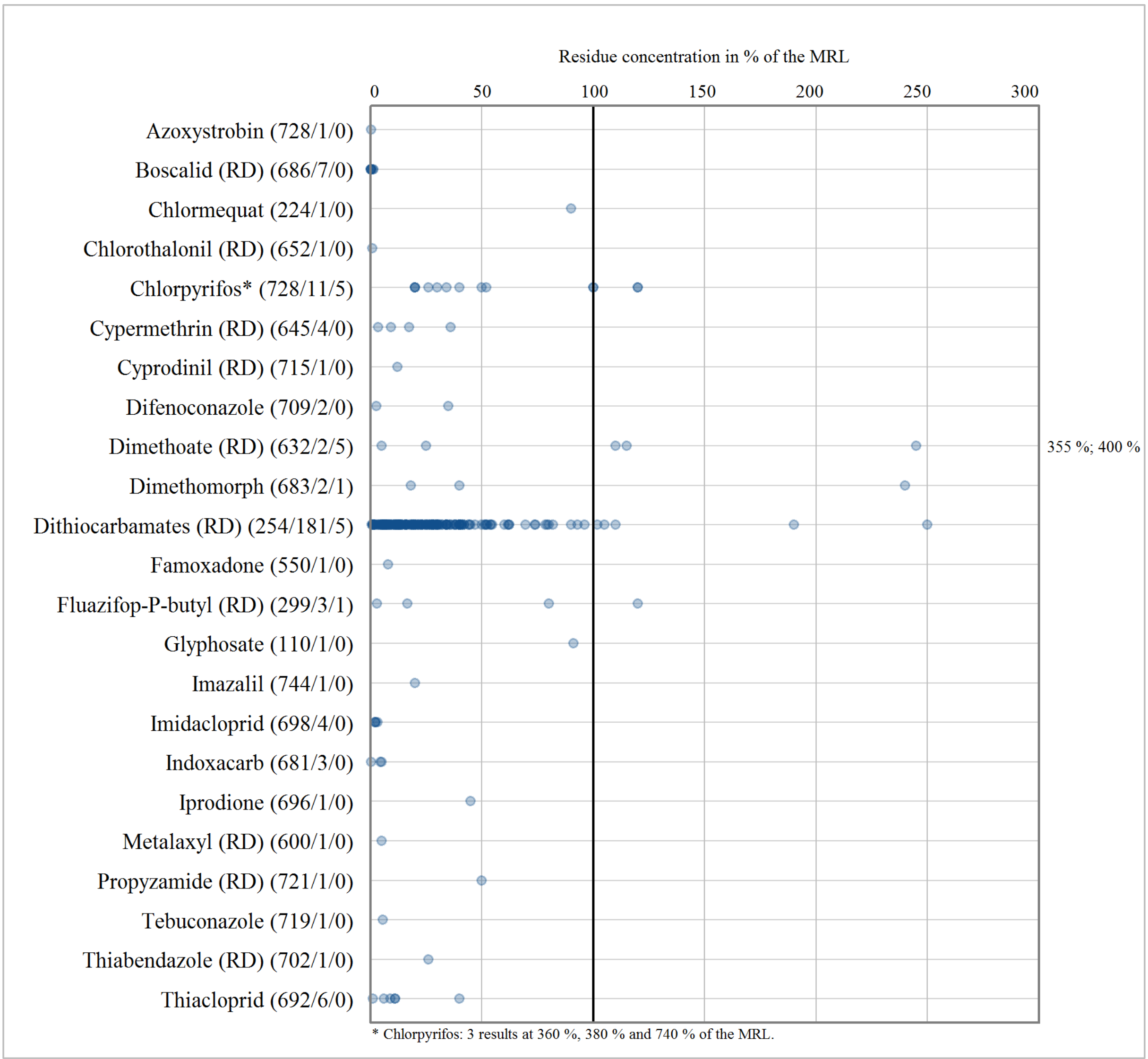

Figure 2-14: Residue concentrations measured in cauliflower, expressed as a percentage of the MRL (only samples with residues > LOQ) [25]

2.3.5. Peas (without pods)

In 2012, 763 samples of peas (without pods) were analysed; no pesticide residues were detected in 599 samples (78.5 %), while 164 samples contained one or several pesticides in measurable concentrations. 67 samples (8.8 %) contained multiple residues; up to six different pesticides were detected in individual samples of peas (without pods) (Figure 2-15).

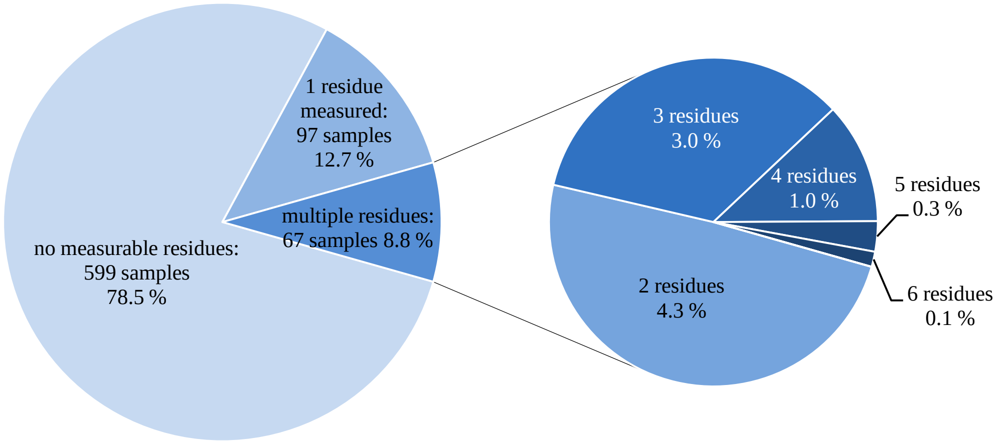

Figure 2-15: Number of detectable residues in individual peas (without pods) samples

In total, 19 different pesticides were detected. The most frequently found pesticides were pyrimethanil (detected in 7.7 % of the tested samples), carbendazim (RD) (7.6 %) and boscalid (RD) (7.4 %). One sample originating from Spain (0.13 % of the samples) exceeded the MRL for dithiocarbamates (RD) (see also Appendix II (Table B)).

In Figure 2-16 all pesticides found in 2012 in peas (without pods) are listed, ranked according to the frequency of detection below the MRL. Compared to 2009, the frequencies of detectable residues were similar or lower in 2012. MRL exceedances were only reported for dithiocarbamates (RD) in 2012, a pesticide for which no MRL exceedances were found in 2009.

Background information on the most frequently detected pesticides found in peas (without pods) in 2012 is summarised in Table 2-5. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted in Figure 2-17.

Table 2-5: Pesticides most frequently detected in peas (without pods) in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Pyrimethanil	7.7 %	Fungicide used to control diseases in a wide range of commodities. Approved in the EU.
Carbendazim (RD)	7.6 %	Carbendazim is a systemic fungicide. Since 2007 the use is restricted to certain cereals, rapeseed, sugar beet and maize only. Carbendazim is also formed as metabolite resulting from the use of thiophanate-methyl, a pesticide which is authorised in the EU or benomyl (no longer approved in the EU).
Boscalid (RD)	7.4 %	Systemic fungicide used to control plant diseases in a wide range of crops. Approved in the EU.

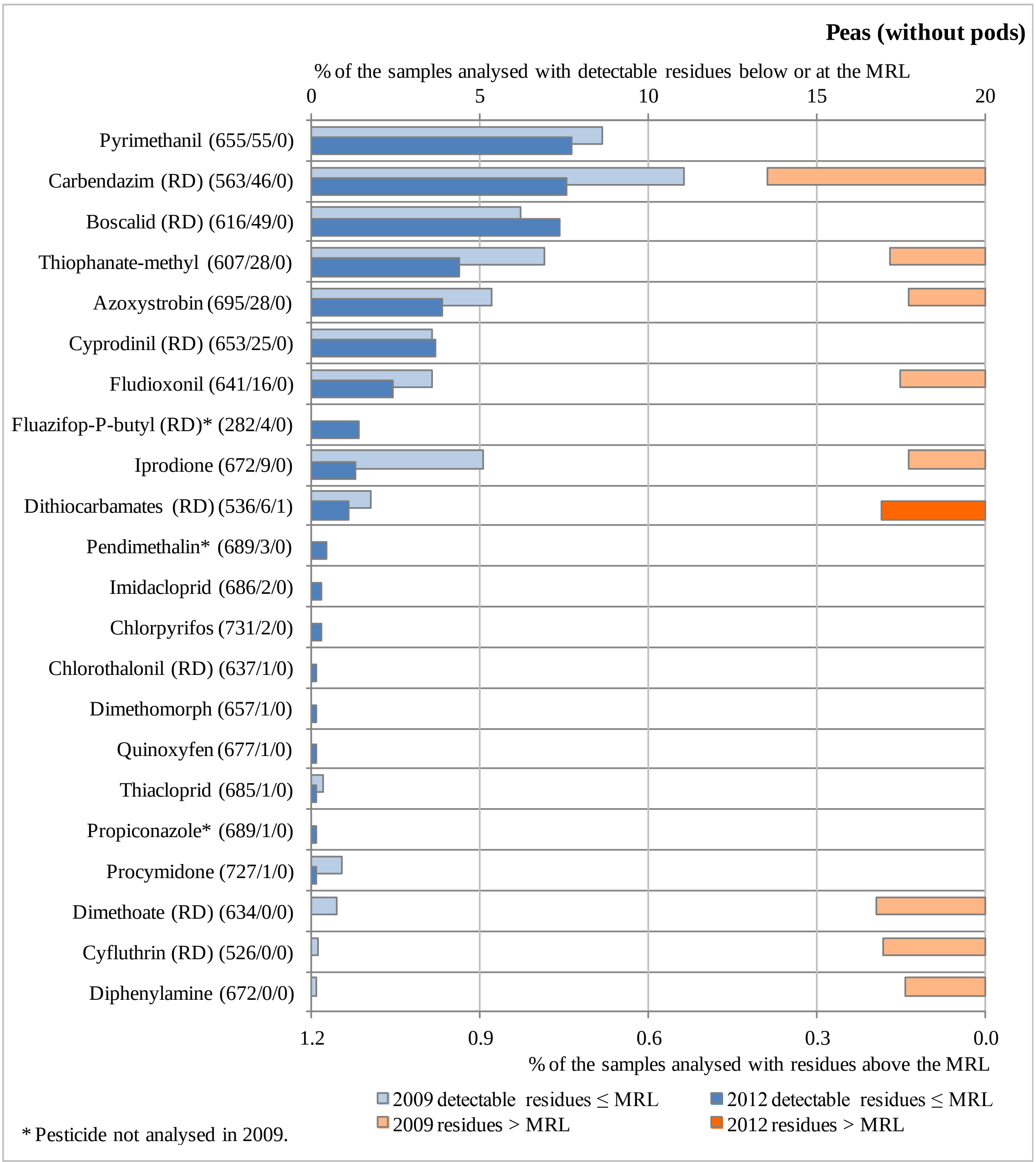

Figure 2-16: Percentage of peas (without pods) samples with detectable residues below or equal to the MRL and residues above the MRL[25]

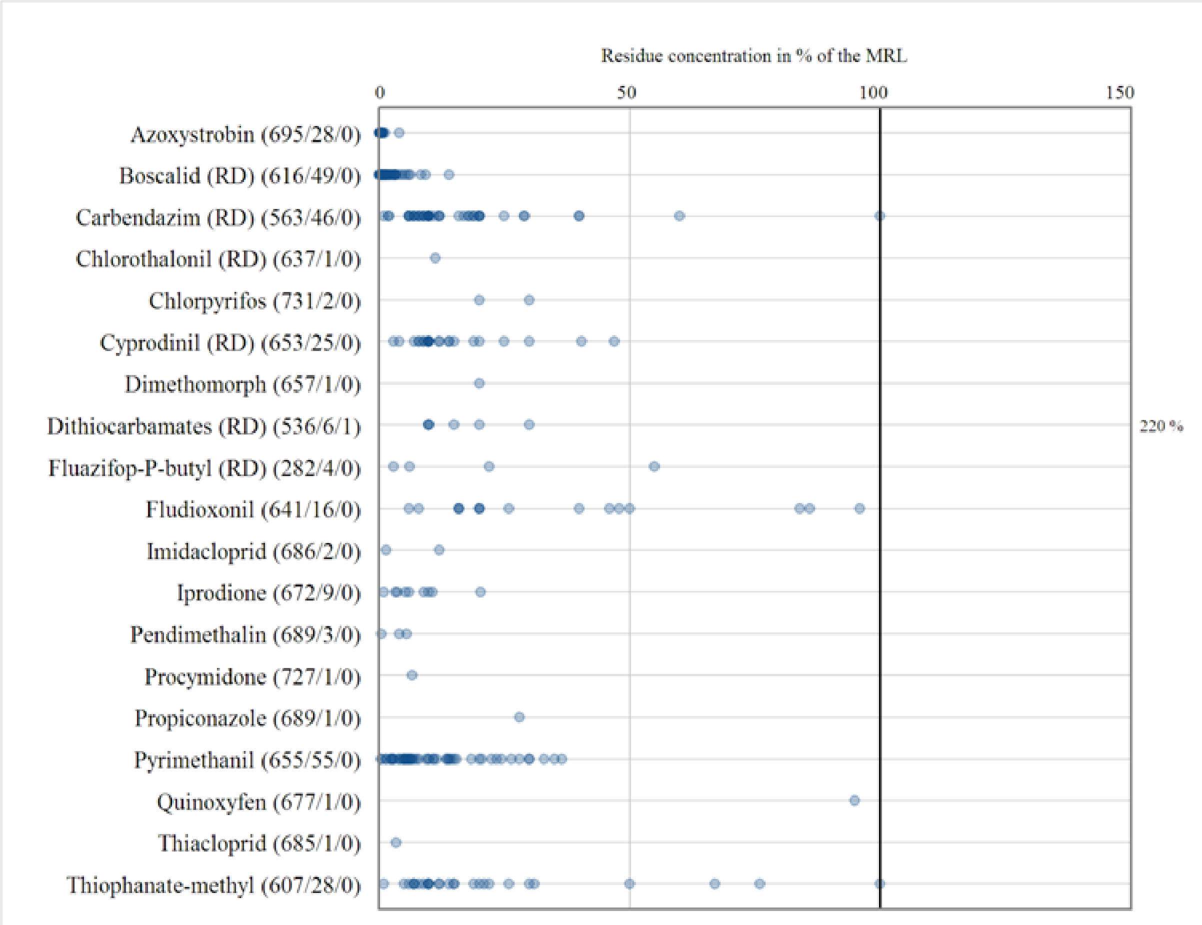

Figure 2-17: Residue concentrations measured in peas (without pods), expressed as a percentage of the MRL (only samples with residues > LOQ) [25]

2.3.6. Peppers (sweet)

In 2012, 1,327 samples of sweet peppers were analysed; no pesticide residues were detected in 698 samples (52.6 %), while 629 samples contained one or several pesticides in measurable concentrations. 285 samples (21.5 %) contained multiple residues; up to 16 different pesticides were detected in the same sweet pepper sample (Figure 2-18).

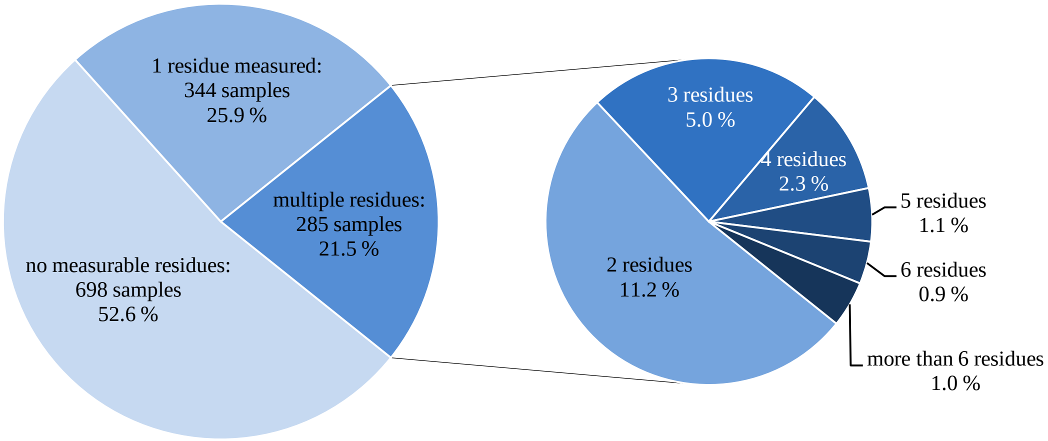

Figure 2-18: Number of detectable residues in individual peppers (sweet) samples

In total, 87 different pesticides were detected. The most frequently found residues were bromide ion (detected in 16.8 % of the analysed samples), flutriafol (15.7 %), fludioxonil (5.6 %), azoxystrobin (5.5 %), imidacloprid (5.2 %) and propamocarb (RD) (5.2 %). In 1.4 % of the samples (19 samples, 27 individual determinations), the residue concentration exceeded the MRL. The MRL exceedances were related to 21 pesticides; most frequently the MRL was exceeded for ethephon (in total four samples, originating from Poland (three samples) and Hungary (one sample)) and methomyl (RD) (three samples, originating from the Dominican Republic (one sample), Hungary (one sample) and one sample with unknown origin). In Appendix II (Table B) the full list of samples exceeding the MRLs can be found, including information on the measured residue concentration and the origin of the sample.

In Figure 2-19 all pesticides with MRL exceedances and pesticides found in more than 3 % of the analysed samples (residues below or at the MRL) are listed, ranked according to the frequency of detection in 2012. Obviously the use pattern of pesticides has shifted: on the one hand for ten pesticides MRL exceedances were observed in 2012 while in 2009 no such events were reported (e.g. lambda-cyhalothrin, formetanate, procymidone, fipronil, tetradifon, quinoxyfen, methamidophos, ethion, acephate and phosalone). On the other hand, a number of pesticides that exceeded the legal limits in 2009 were not detected in 2012 (oxamyl, abamectin (RD), carbofuran (RD), monocrotophos, prochloraz (RD), dimethoate (RD), folpet, flusilazole (RD) and carbaryl).

Background information on the most frequently detected pesticides found in 2012 in sweet peppers is summarised in Table 2-6. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted in Figure 2-20[33].

[33] The extreme results beyond the scale are mentioned on the right side of the figure without reflecting the result in the graph.

Table 2-6: Pesticides most frequently detected in peppers (sweet) in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Bromide ion	16.8 %	Naturally occurring substance and metabolite of the pesticide methyl bromide. Since 2009, methyl bromide is no longer approved at EU level.
Flutriafol	15.7 %	Systemic fungicide used to control plant diseases. Approved in the EU.
Fludioxonil	5.6 %	Systemic fungicide used to control plant diseases in fruit and vegetable crops. Approved in the EU.
Azoxystrobin	5.5 %	Systemic fungicide used to control a wide range of diseases in a wide range crops. Approved in the EU.
Imidacloprid	5.2 %	Systemic insecticide used against different pests in a wide range of crops. Approved in the EU.
Propamocarb (RD)	5.2 %	Systemic fungicide used to control diseases in a wide range of vegetables and other crops. Approved in the EU.

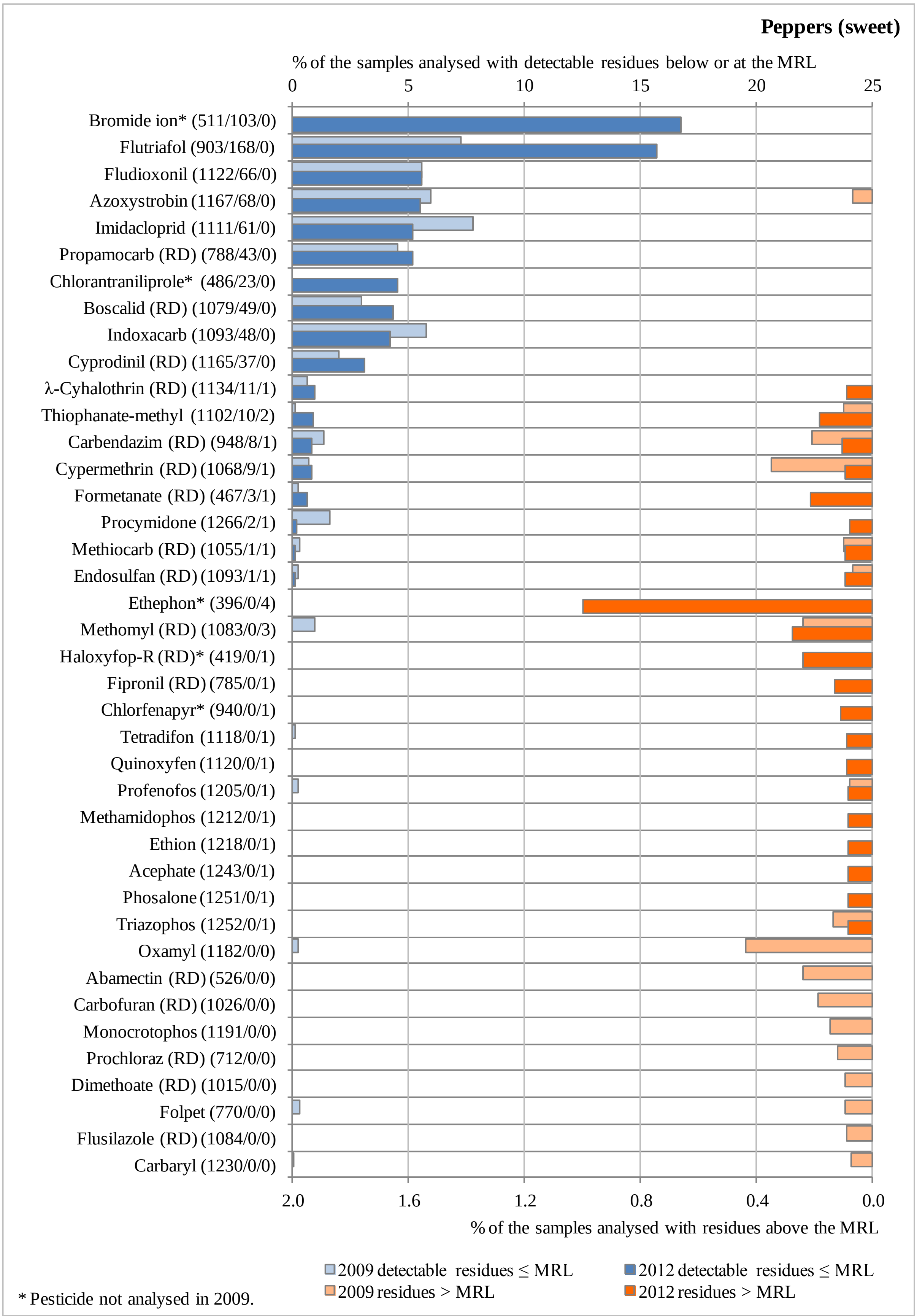

Figure 2-19: Percentage of peppers (sweet) samples with detectable residues below or equal to the MRL and residues above the MRL[25]

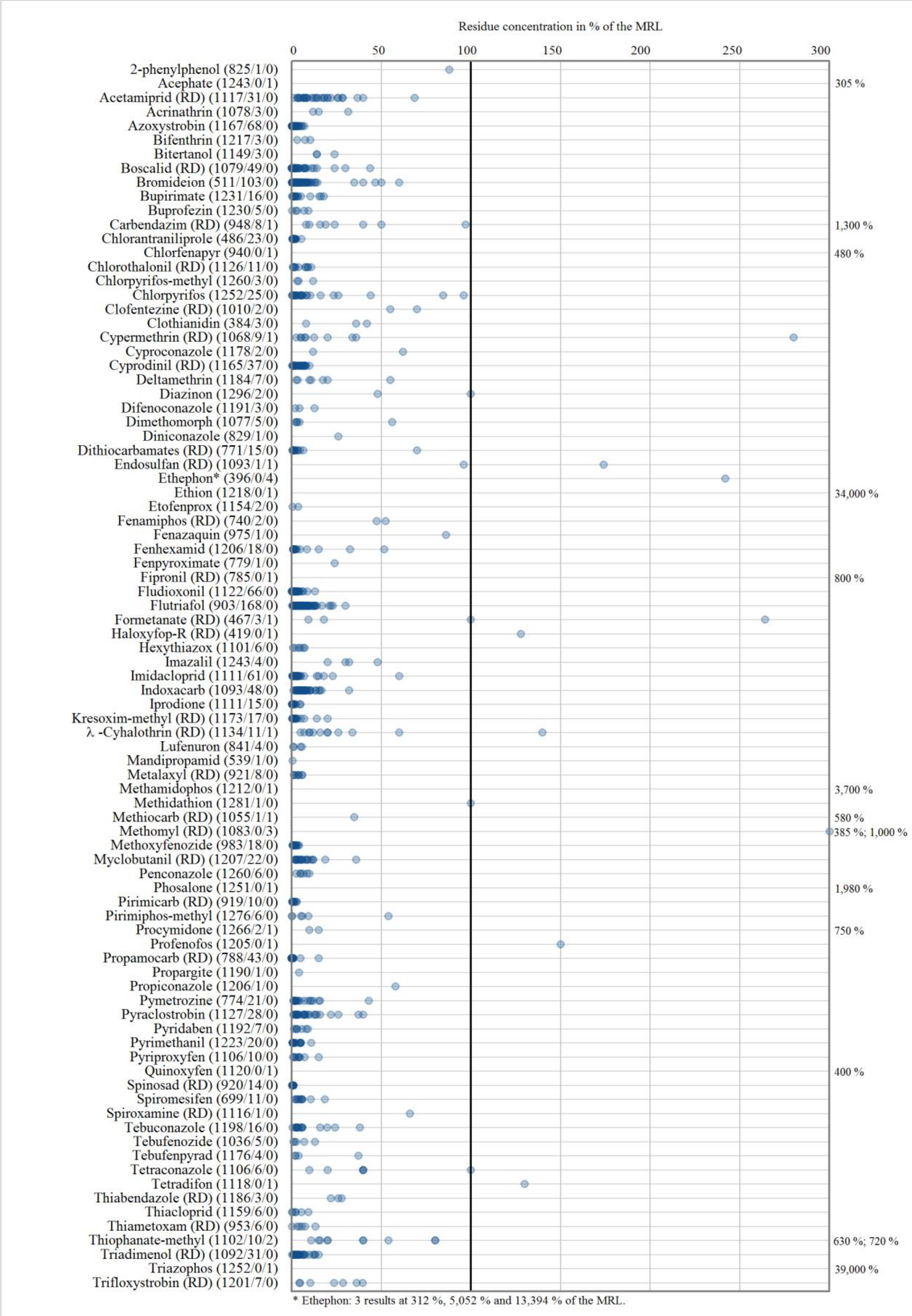

Figure 2-20: Residue concentrations measured in peppers (sweet), expressed as a percentage of the MRL (only samples with residues > LOQ) [25]

2.3.7. Table grapes

In 2012, 1,200 samples of table grapes were analysed; no pesticide residues were detected in 277 samples (23.1 %), while 923 samples contained one or several pesticides in measurable concentrations. 715 samples (59.6 %) contained multiple residues; up to 12 different pesticides were detected in individual table grapes samples (Figure 2-21).

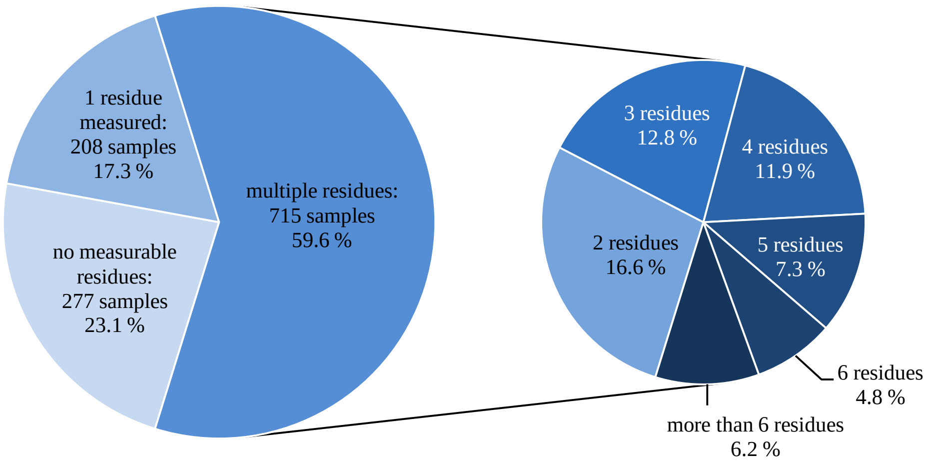

Figure 2-21: Number of detectable residues in individual table grape samples

In total, 90 different pesticides were detected. The most frequently found pesticides were fenhexamid (detected in 26.6 % of the tested samples), boscalid (RD) (26.5 %), ethephon (19.1 %), cyprodinil (RD) (16.5 %), imidacloprid (14.6 %), dithiocarbamates (RD) (13.6 %), fludioxonil (13.4 %), myclobutanil (RD) (12.6 %), iprodione (12.3 %), trifloxystrobin (RD) (10.5 %) and pyraclostrobin (10.2 %). In 1.8 % of the samples (21 samples, 26 determinations), the residue concentration exceeded the MRL. The MRL exceedances were related to 16 pesticides; most frequently the MRL was exceeded for folpet (four samples originating from Hungary and one sample from Italy and South Africa, respectively), chlormequat (two samples from India and one sample from South Africa), ethephon (one sample originated from South Africa and one sample with unknown origin) and procymidone (one sample originating from Italy, France and South Africa, respectively). In Appendix II (Table B) the full list of samples exceeding the MRLs can be found, including information on the measured residue concentration and the origin of the sample.

In Figure 2-22 all pesticides with MRL exceedances and the most frequently detected pesticides (found in more than 3.91 % of the samples) are listed, ranked according to the frequency of detection below or at the MRL in 2012. The detected pesticides not exceeding the MRLs were comparable with the findings of 2009. However, for a number of pesticides occasional MRL exceedances were observed in 2012 which were not detected in 2009 (dithiocarbamates, procymidone, diphenylamine, monocrotophos, ethion, azinphos-methyl), while for some pesticides with MRL exceedances in 2009 no such events were identified in 2012 (captan, phosmet, carbofuran and profenofos).

Background information on the most frequently detected pesticides found in table grapes in 2012 is summarised in Table 2-7. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted in Figure 2-23[34].

[34] The extreme results beyond the scale are mentioned in a footnote (procymidone) or on the right side of the figure without reflecting the result in the graph.

Table 2-7: Pesticides most frequently detected in table grapes in 2012 (in more than 10 % of the samples)

Pesticide	% samples above LOQ	Background information on the pesticides found
Fenhexamid	26.6 %	Non-systemic fungicide used to control fungal diseases in a wide range of crops. Approved in the EU.
Boscalid (RD)	26.5 %	Systemic fungicide used to control plant diseases in a wide range of fruit and other crops. Approved in the EU.
Ethephon	19.1 %	A plant growth regulator with a range of uses including the prevention of lodging in cereals and promotion of pre-harvest ripening of fruit. Approved in the EU.
Cyprodinil (RD)	16.5 %	Foliar fungicide used for control of plant diseases in a range of fruit and vegetables. Approved in the EU.
Imidacloprid	14.6 %	Systemic insecticide used against different pests in a wide range of crops. Approved in the EU.
Dithiocarbamates (RD)	13.6 %	Non-systemic fungicides used for foliar treatment of fruit and vegetables. The following dithiocarbamates pesticides are approved in the EU: maneb, mancozeb, metiram, propineb, thiram and ziram.
Fludioxonil	13.4 %	Systemic fungicide used to control plant diseases in fruit and vegetable crops. Approved in the EU.
Myclobutanil (RD)	12.6 %	Systemic fungicide used to control fungal diseases in a wide range of crops. Approved in the EU.
Iprodione	12.3 %	Contact fungicide used to control plant diseases in a wide range of fruit and other crops. Approved in the EU.
Trifloxystrobin (RD)	10.5 %	Systemic fungicide used to control a wide range of diseases in fruit and other crops. Approved in the EU.
Pyraclostrobin	10.2 %	Fungicide used to control diseases in a wide range of fruit and other crops. Approved in the EU.

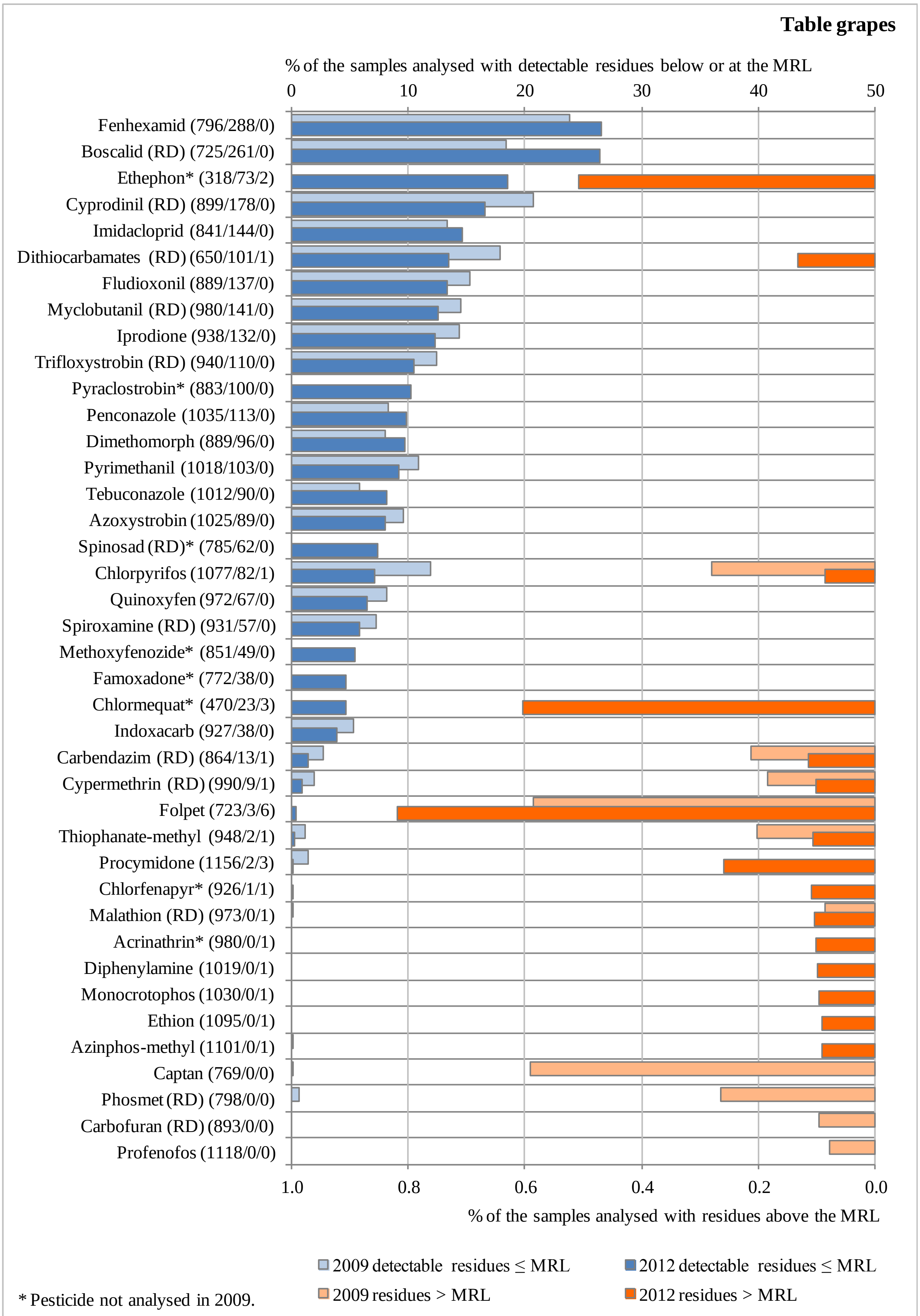

Figure 2-22: Percentage of table grapes samples with detectable residues below or equal to the MRL and residues above the MRL[25]

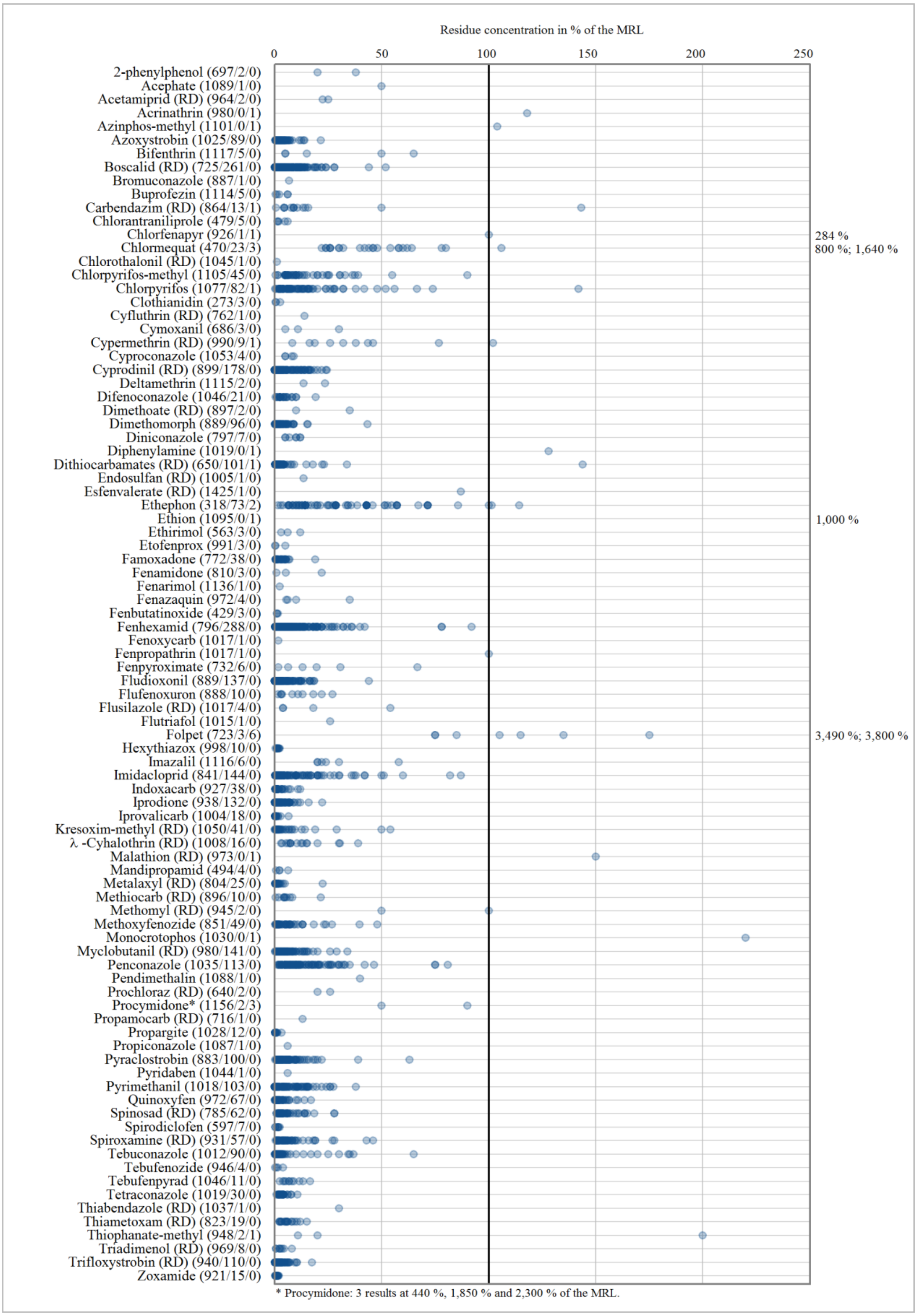

Figure 2-23: Residue concentrations measured in table grapes, expressed as a percentage of the MRL (only samples with residues > LOQ) [25]

2.3.8. Wheat

In 2012, 862 samples of wheat were analysed; no pesticide residues were detected in 520 samples (60.3 %), while 342 samples contained one or several pesticides in measurable concentrations. 148 samples (17.2 %) contained multiple residues; up to five different pesticides were detected in individual wheat samples (Figure 2-24).

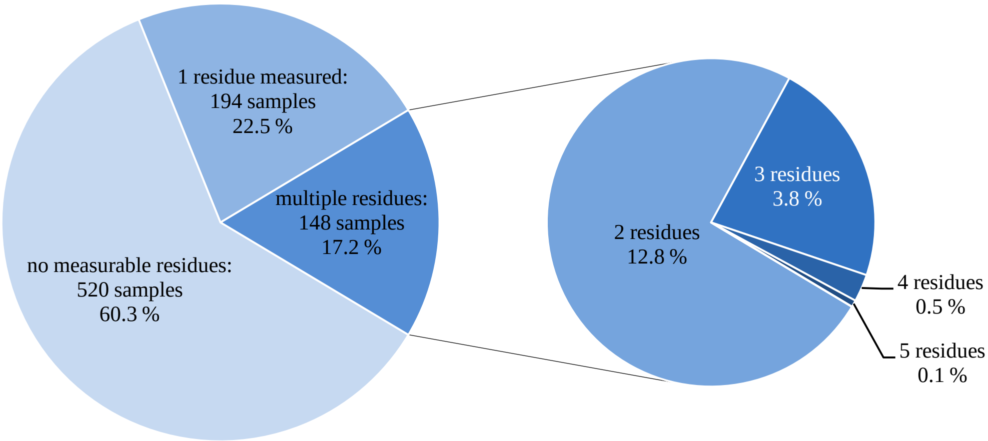

Figure 2-24: Number of detectable residues in individual wheat samples

In total, 34 different pesticides were detected. The most frequently found pesticides were chlormequat (detected in 39.5 % of the tested samples), bromide ion (19.1 %), glyphosate (16.4 %) and pirimiphos-methyl (12.0 %). In 0.7 % of the samples (six samples), the residue concentration exceeded the MRL. The MRL exceedances were related to four pesticides: 2,4-D (RD) (one sample, originating from the Netherlands), chlorpropham (RD) (one sample from the Netherlands and the United Kingdom, respectively), chlorpyrifos (two samples, originating from Hungary) and diflubenzuron (one sample from Greece). In Appendix II (Table B) the full list of samples exceeding the MRLs can be found, including information on the measured residue concentration and the origin of the sample.

In Figure 2-25 all pesticides found in wheat are listed, ranked according to the frequency of detection below the MRL in 2012. Compared to the control programme of 2009, nearly the same pesticides and comparable detection rates were found. In 2012 MRL exceedances were identified for 2,4-D (RD), chlorpropham (RD) and diflubenzuron (RD); chlorpropham was also analysed in the EUCP in 2009, but no MRL exceedance was reported.

Background information on the most frequently detected pesticides found in wheat in 2012 is summarised in Table 2-8. The individual residue concentrations, expressed as a percentage of the respective MRL for the pesticide, are plotted in Figure 2-26.

Table 2-8: Pesticides most frequently detected in wheat in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Chlormequat	39.5 %	Plant growth regulator used in cereals. Approved in the EU.
Bromide ion	19.1 %	Naturally occurring substance and metabolite of the pesticide methyl bromide. Since 2009, methyl bromide is no longer approved at EU level.
Glyphosate	16.4 %	Non-selective systemic herbicide, also used as desiccant for harvest management. Approved in the EU.
Pirimiphos-methyl	12.0 %	Insecticide for post-harvest storage. Approved in the EU.

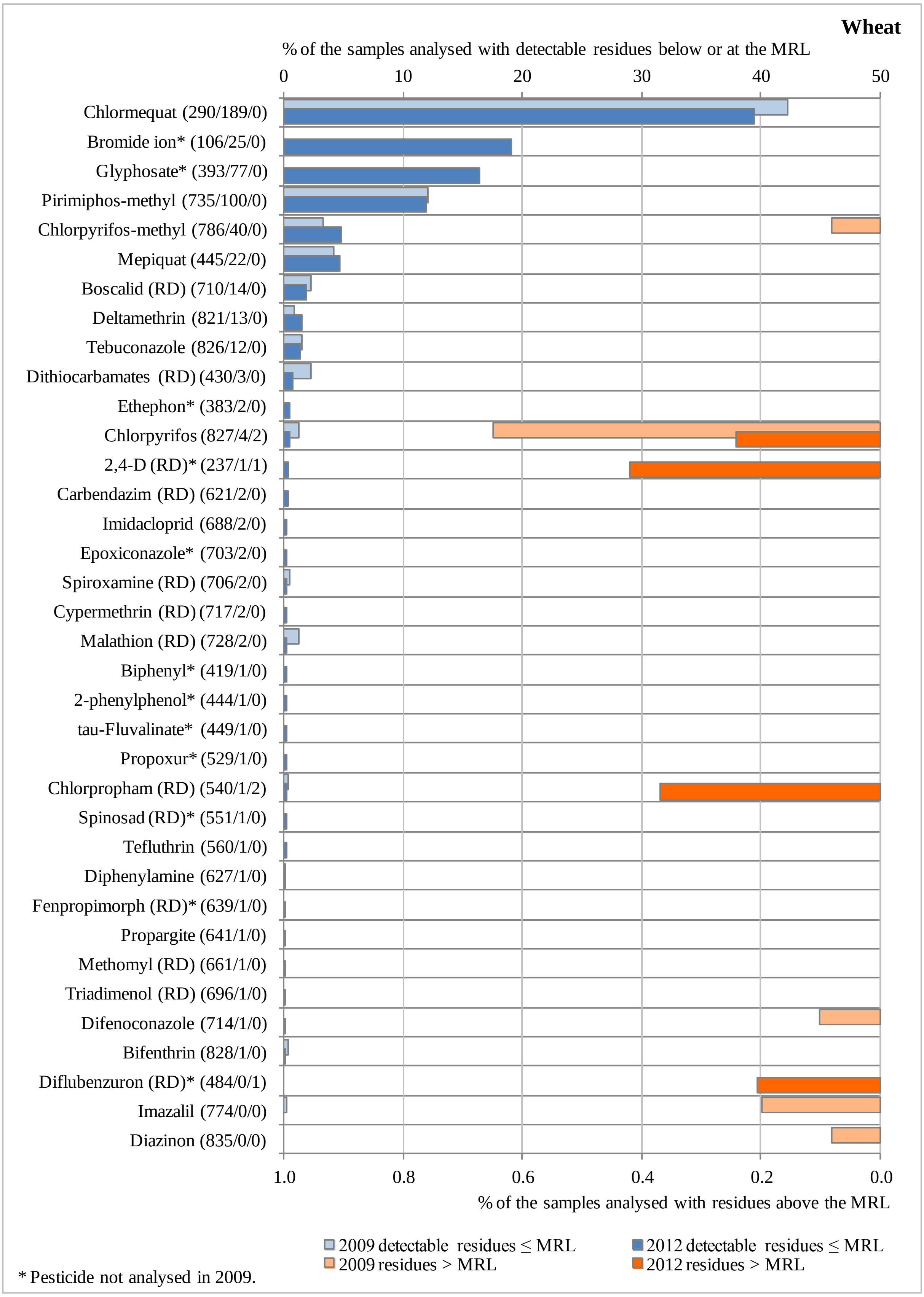

Figure 2-25: Percentage of wheat samples with detectable residues below or equal to the MRL and residues above the MRL[25]

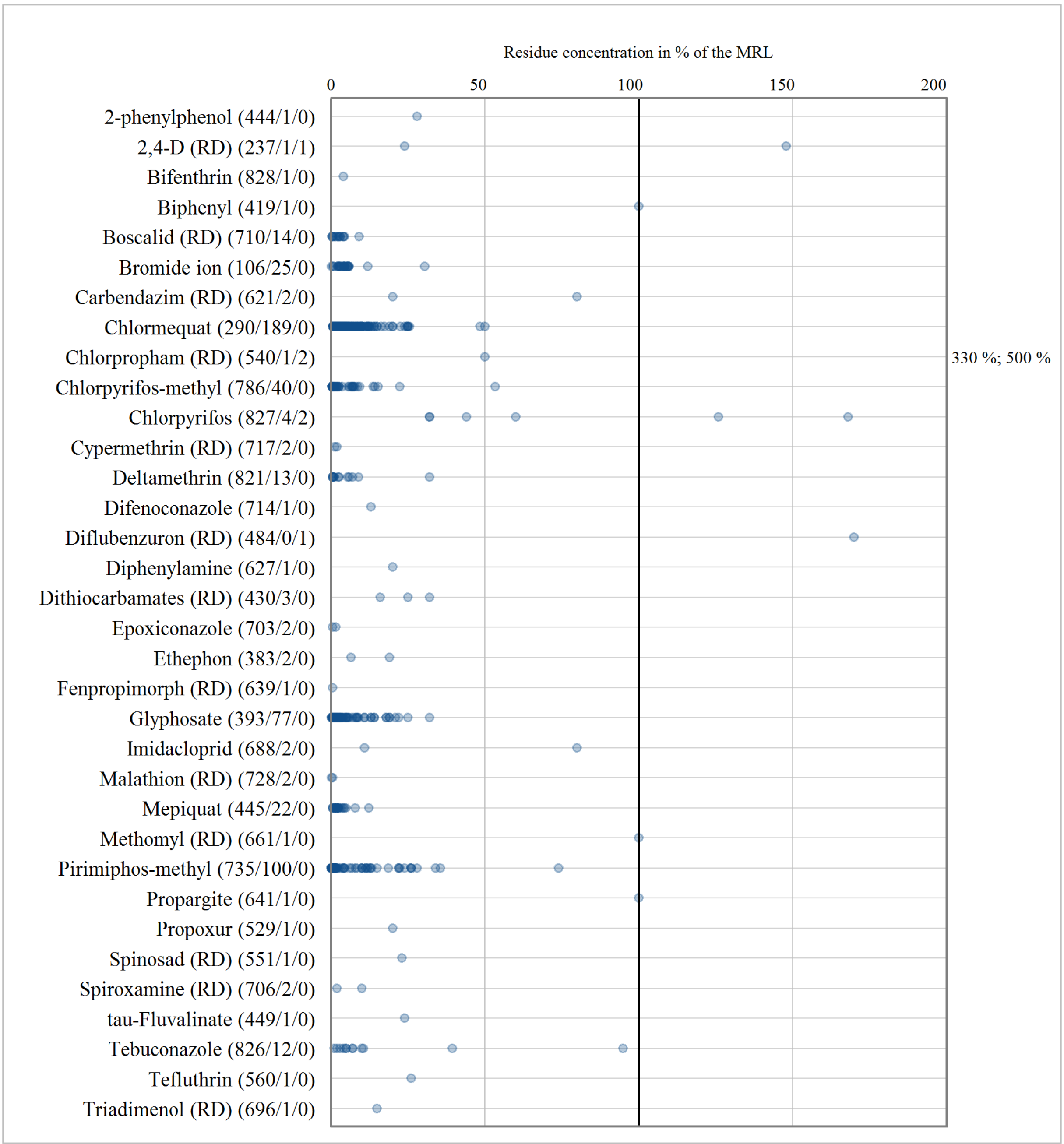

Figure 2-26: Residue concentrations measured in wheat, expressed as a percentage of the MRL (only samples with residues > LOQ) [25]

2.3.9. Olive oil

In 2012, 794 samples of olive oil were analysed; no pesticide residues were detected in 619 samples (78.0 %), while 175 samples contained one or several pesticides in measurable concentrations. 39 samples (4.9 %) contained multiple residues; up to five different pesticides were detected in individual olive oil samples (Figure 2-27).

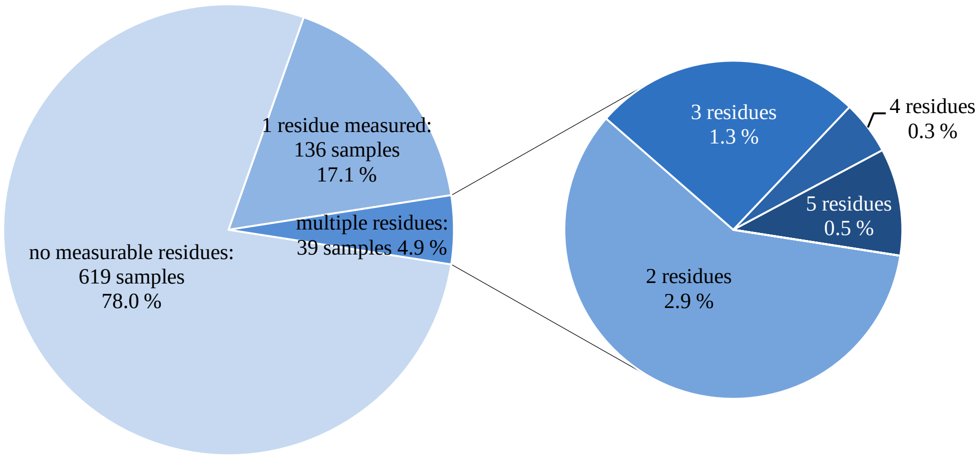

Figure 2-27: Number of detectable residues in individual olive oil samples

In total, 26 different pesticides were detected. The most frequently found pesticides were chlorpyrifos (detected in 14.1 % of the tested samples) and terbuthylazine (12.0 %). According to the assessment performed by the reporting countries, in only one sample originating from Spain the residue concentration for pendimethalin exceeded the MRL. For a number of pesticides, residues above the MRL were detected (terbuthylazine (4 samples), endosulfan (RD) (1 sample), famoxadone (1 sample) and fenthion (RD) (3 samples)). These samples were considered as compliant with the legal limit when the default processing factor of 5 proposed in Regulation (EU) No 1274/2011 is applied. EFSA is of the opinion that a default processing factor should not be used, in particular for non-fat soluble pesticides and for fat soluble pesticides which are not authorised for the use on olives for oil production and where the MRL is set at the LOQ. Thus, some of the samples that were reported as being MRL compliant should be re-considered as possibly exceeding the legal limits, taking into account more appropriate processing factors[35] (see also Appendix II (Table B)). In general EFSA identified the need to give further guidance on how to enforce the legal limits for olive oil to ensure a consistent approach among the Member States.

In Figure 2-28 all pesticides found in olive oil are listed, presenting the frequency of pesticide detection and the frequency of MRL exceedances according to the analysis performed by EFSA. Since olive oil was not included in previous EU-coordinated monitoring programmes, no comparison of the 2012 results with previous years is possible.

Background information on the most frequently detected pesticides found in olive oil in 2012 is summarised in Table 2-9. The individual residue concentrations, expressed as percentage of the respective MRL for the pesticide are plotted in

[35] No processing factor was applied for MRLs established at the LOQ where there is no evidence that the pesticide is authorised for the use on olives for oil production. For pesticides where the legal limit was set at the LOQ, but where EFSA had evidence of authorised uses or where the MRL is set above the LOQ reflecting uses in the EU or in a third country the use of processing factors is considered appropriate. The following processing factors were used to recalculate the MRLs to olive oil: 4.2 for cyfluthrin (EFSA, 2010), 7.5 for cypermethrin (FAO, 2008), 1.5 for deltamethrin (FAO, 2002), 0.73 for lambda-cyhalothrin (FAO, 2008), 5 for buprofezin and chlorpyrifos (default value for fat soluble substances, considering an oil content of olives of 20%). For pesticides that are not fat soluble, a default processing factor of 1 is applied unless specific processing studies are available that demonstrate that a different value is appropriate (i.e. dimethoate: PF 0.3, EFSA, 2006).

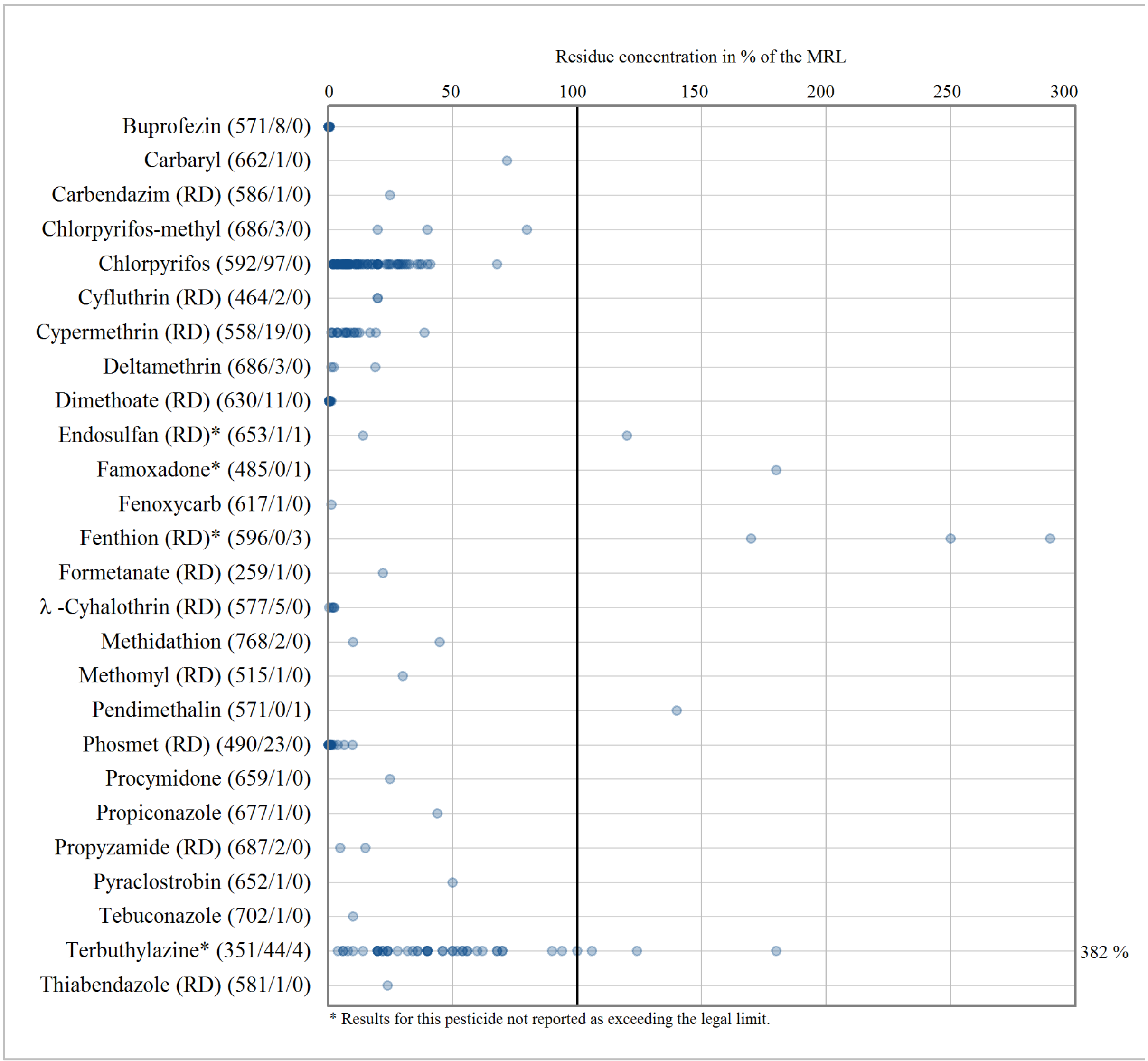

Figure 2-29. It is noted that this analysis reflects the analysis of EFSA, using the most appropriate processing factors for recalculating the legal limits which are set for unprocessed olives to olive oil.

Table 2-9: Pesticides most frequently detected in olive oil in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Chlorpyrifos	14.1 %	Non-systemic insecticide used to control different pests in soil or on foliage of fruit and other crops. Approved in the EU. Spain provided information during Member State consultation that chlorpyrifos is authorised for the use in olives.
Terbuthylazine	12.0 %	Systemic herbicide. Approved in the EU.

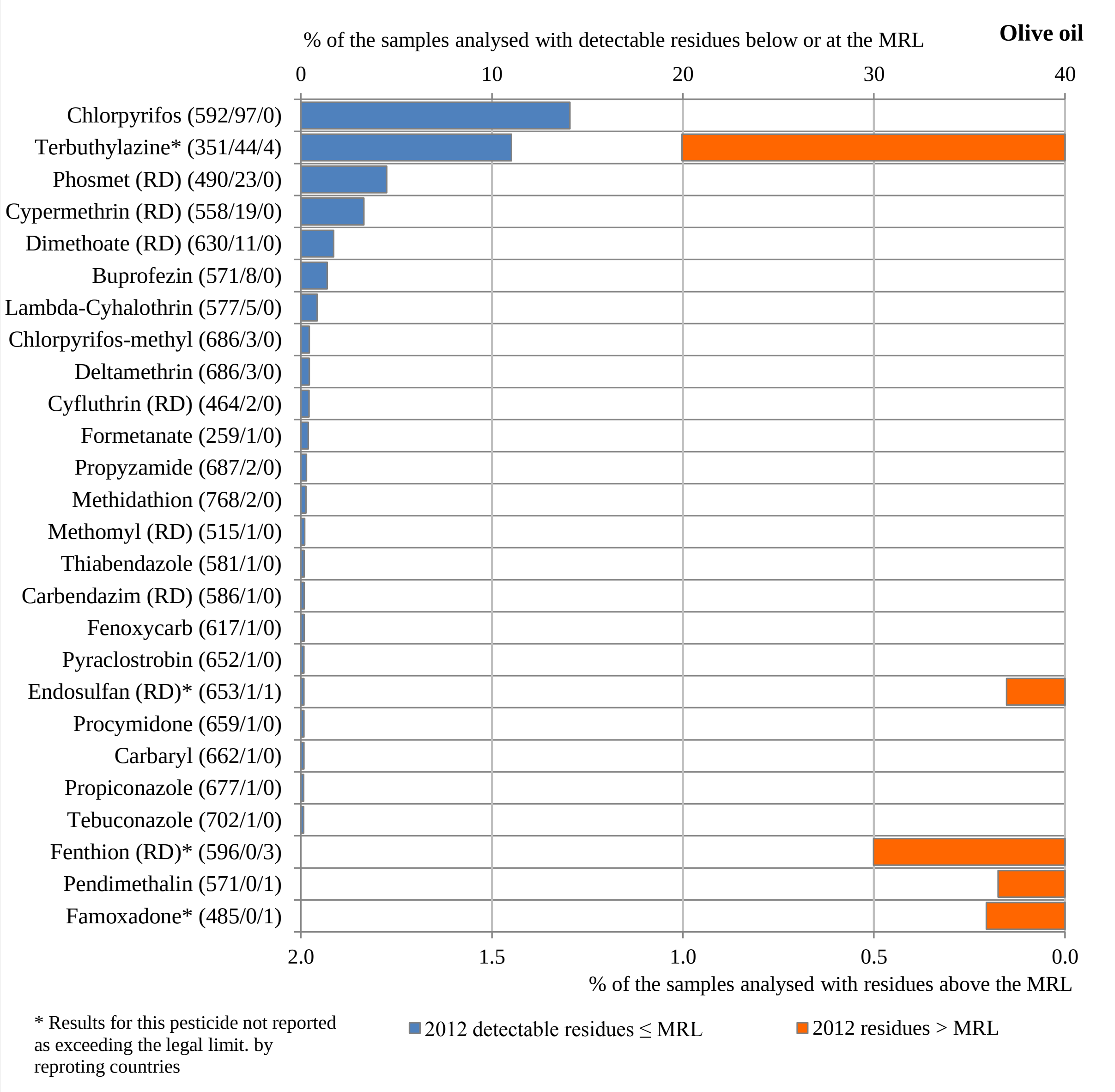

Figure 2-28: Percentage of olive oil samples with detectable residues below or equal to the MRL and residues above the MRL[25]

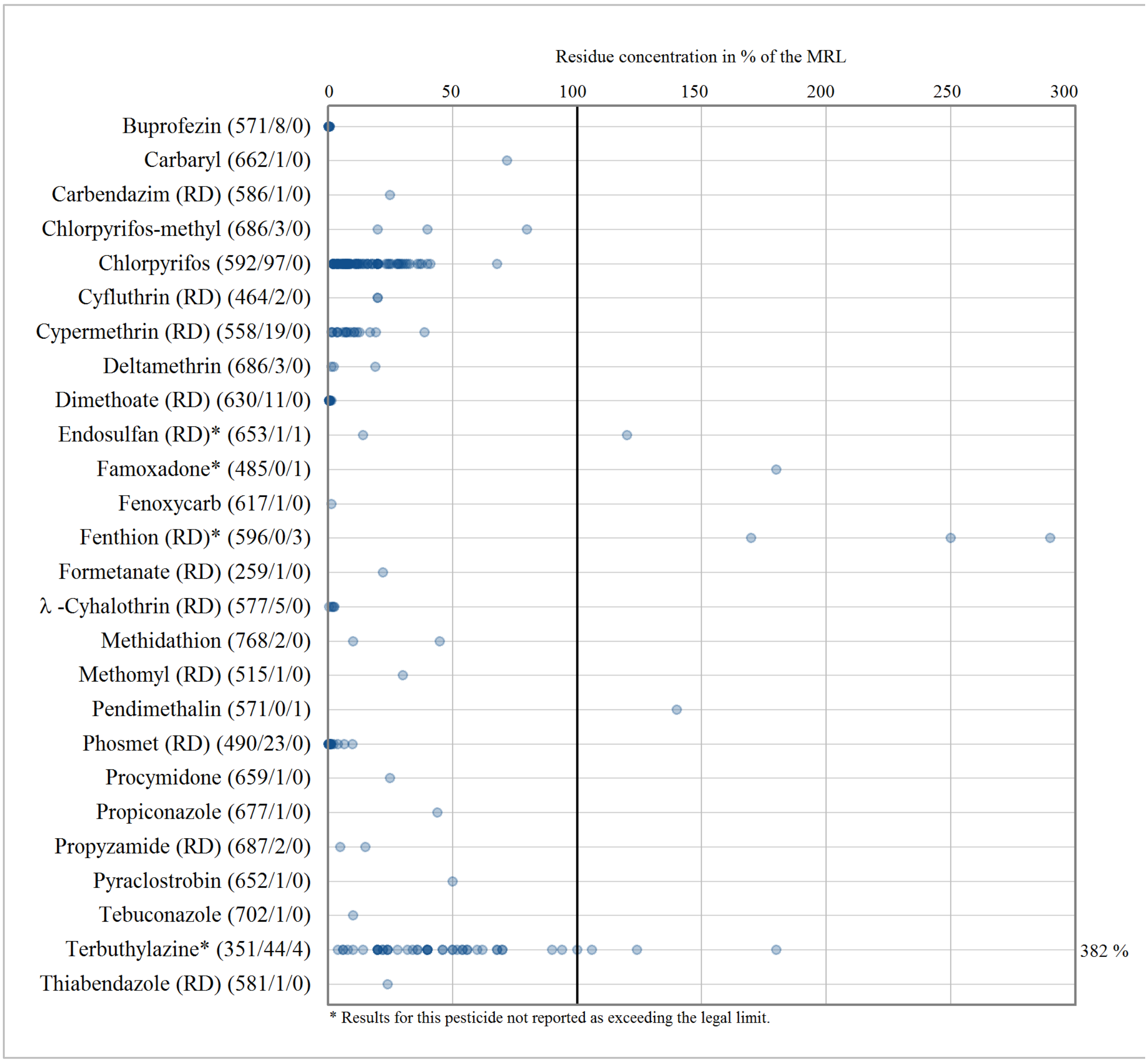

Figure 2-29: Residue concentrations measured in olive oil, expressed as a percentage of the MRL, taking into account the most appropriate processing factors available (only samples with residues > LOQ)[25]

2.3.10. Orange juice

In 2012, 695 samples of orange juice were analysed; no pesticide residues were detected in 478 samples (68.8 %), while 217 samples contained one or several pesticides in measurable concentrations. 37 samples (5.3 %) contained multiple residues; up to three different pesticides were detected in individual orange juice samples (Figure 2-30).

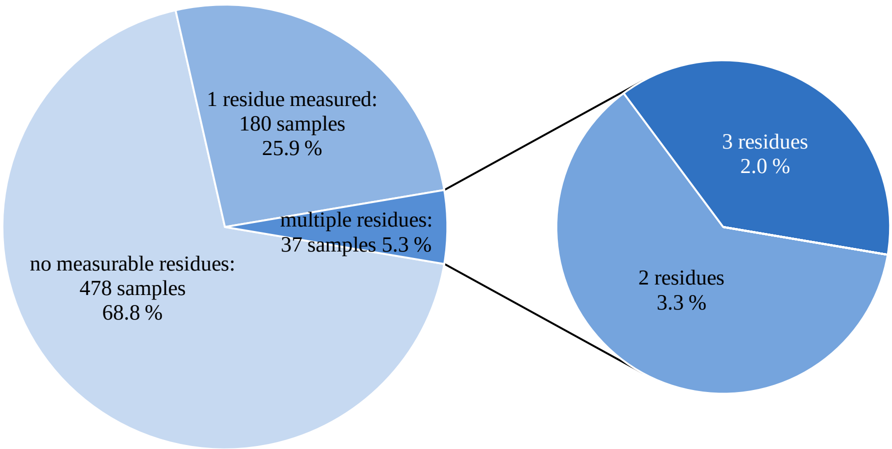

Figure 2-30: Number of detectable residues in individual orange juice samples

In total, 15 different pesticides were detected. The most frequently found pesticides were carbendazim (RD) (detected in 20.5 % of the tested samples) and imazalil (15.1 %). No MRL exceedances were reported for orange juice[36].

In Figure 2-31 all pesticides found in 2012 in orange juice are listed, ranked according to the frequency of detection below or at the MRL. Compared to 2009 the frequencies of detectable residue were slightly higher in most of the cases. Five pesticides (azoxystrobin, boscalid (RD), chlorpyrifos-methyl, cyprodinil (RD) and fludioxonil) were detected in 2012 only, but had not been found in 2009.

Background information on the most frequently detected pesticides found in orange juice in 2012 is summarised in Table 2-10. The individual residue concentrations expressed as a percentage of the respective MRL for the pesticide are plotted In Figure 2-32.

Table 2-10: Pesticides most frequently detected in orange juice in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
Carbendazim (RD)	20.5 %	Carbendazim is a systemic fungicide. Since 2007 the use is restricted to certain cereals, rapeseed, sugar beet and maize only. The use on fruit is not permitted. Carbendazim is also a metabolite of thiophanate-methyl, a pesticide which is authorised in the EU. Benomyl was used as fungicide in the past but is no longer authorised in Europe. Benomyl would also produce carbendazim as metabolite.
Imazalil	15.1 %	Systemic fungicide used to control a wide range of diseases in fruit and other crops. Used as post-harvest treatment on citrus fruit. Approved in the EU.

[36] It is noted that no processing factors were taken into account for comparing the residues found in orange juice with the MRL.

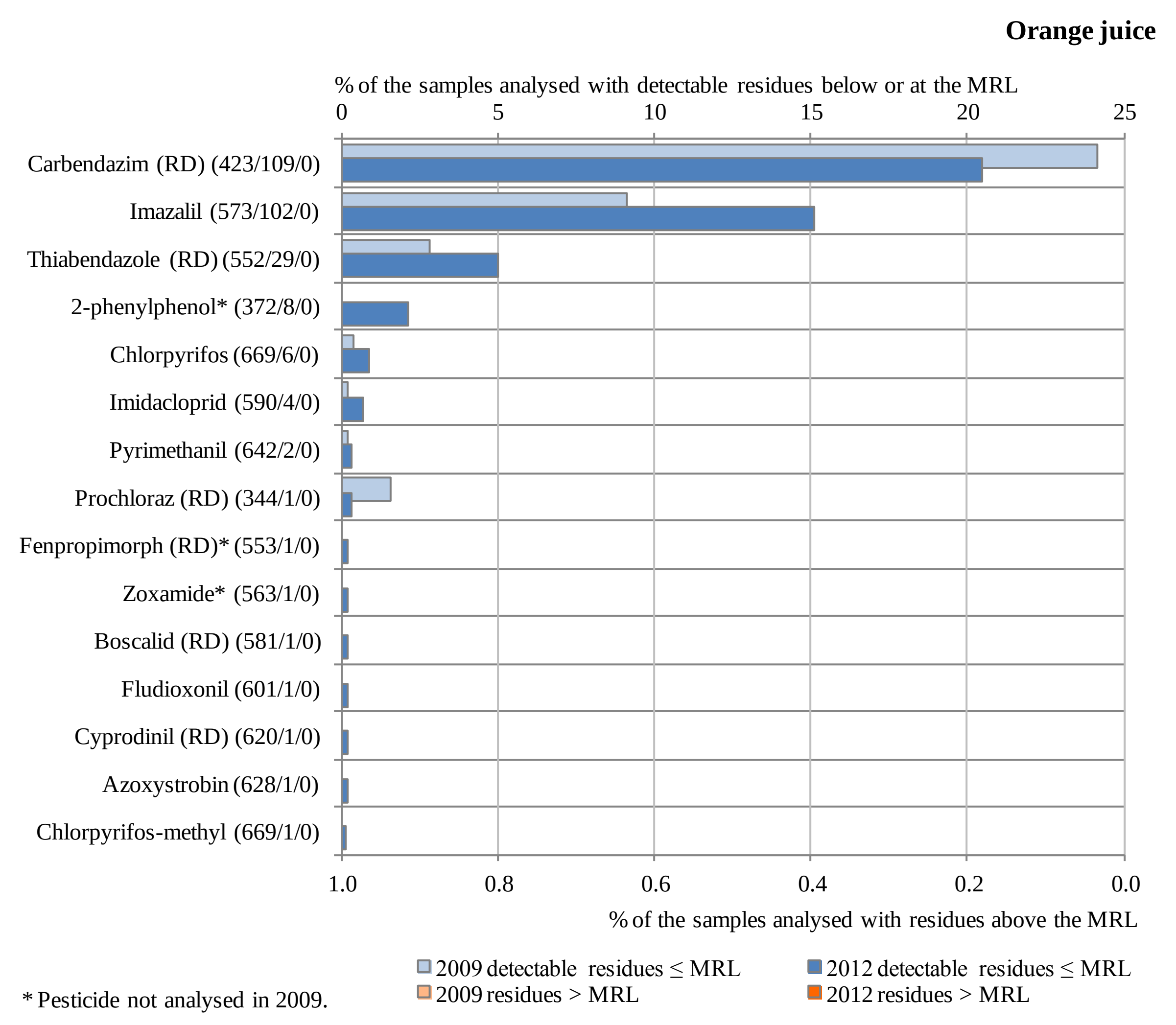

Figure 2-31: Percentage of orange juice samples with detectable residues below or equal to the MRL and residues above the MRL[25]

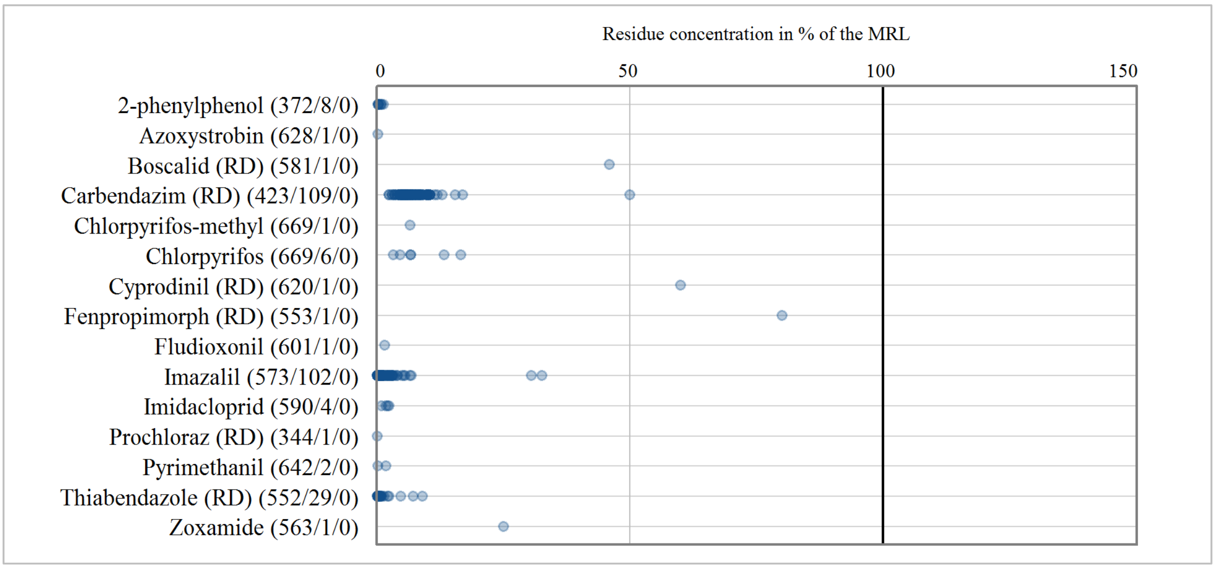

Figure 2-32: Residue concentrations measured in orange juice, expressed as a percentage of the MRL for oranges[37] (only samples with residues > LOQ) [25]

[37] No processing factors were taken into account. The residues measured in juice were directly compared with the MRL established for oranges.

2.3.11. Butter

In 2012, 692 samples of butter were analysed; no pesticide residues were detected in 577 samples (83.4 %), while 115 samples contained one or several pesticides in measurable concentrations. 62 samples (9.0 %) contained multiple residues; up to four different pesticides were detected in individual butter samples (Figure 2-33).

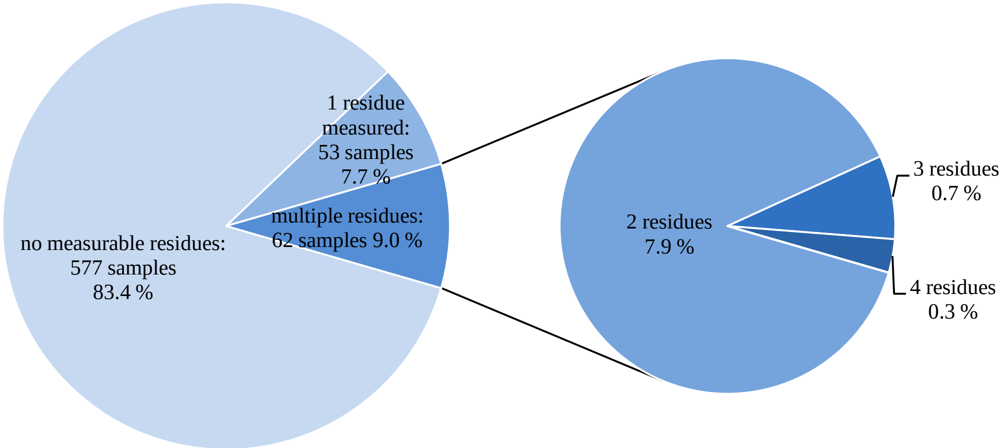

Figure 2-33: Number of detectable residues in individual butter samples

In total, nine different pesticides were detected. The most frequently found pesticides were DDT (RD) (detected in 16.4 % of the tested samples) and hexachlorobenzene (11.5 %). No sample was found to exceed the legal limits, taking into account the most appropriate processing factor.[38]

In Figure 2-34 all pesticides found in 2012 in butter are listed, ranked according to the frequency of detection below or at the MRL. Comparing the 2012 results with 2009 data, a similar pesticide pattern and comparable detection rates are noted. In contrast to 2009, no MRL exceedances were identified in 2012 for endosulfan (RD) and hexachlorocyclohexane (alpha).

Background information on the most frequently detected pesticides found in butter in 2012 is summarised in Table 2-11. In Figure 2-35 the individual residue concentrations expressed as a percentage of the respective MRL for the pesticide are plotted.

Table 2-11: Pesticides most frequently detected in butter in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
DDT (RD)	16.4 %	Persistent organic pollutant, banned in Europe since 1979.
Hexachlorobenzene	11.5 %	Persistent organic pollutant, banned in Europe since 1979.

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

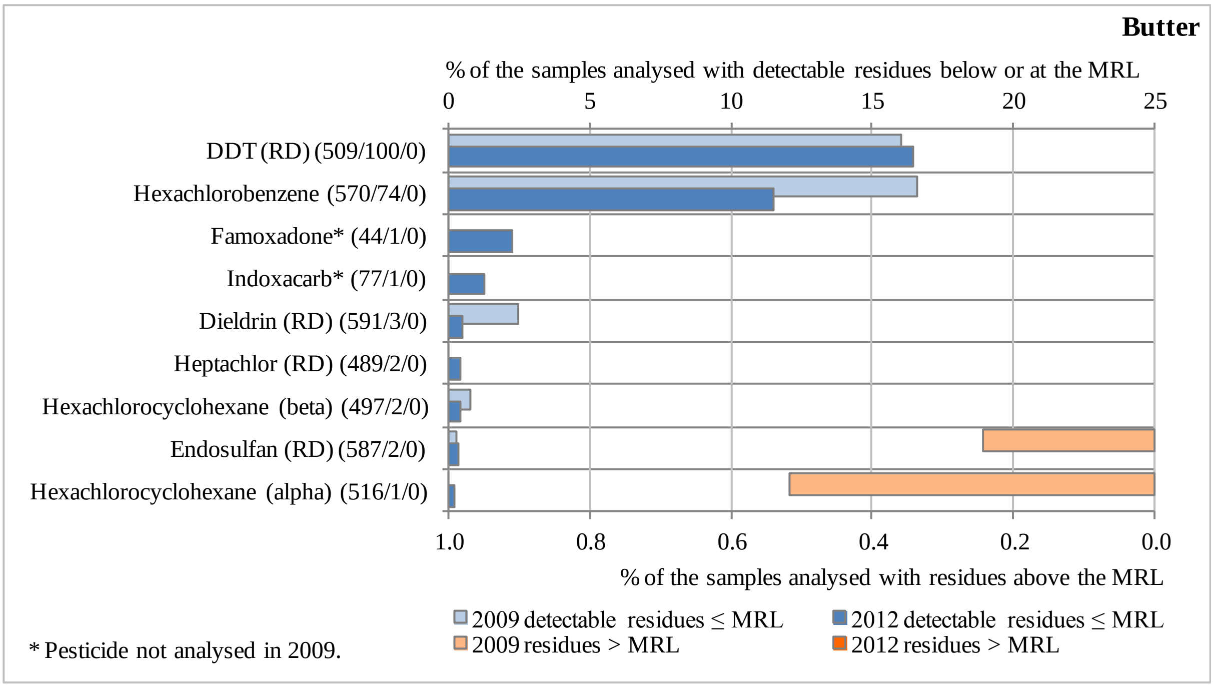

Figure 2-34: Percentage of butter samples with detectable residues below or equal to the MRL and residues above the MRL[25]

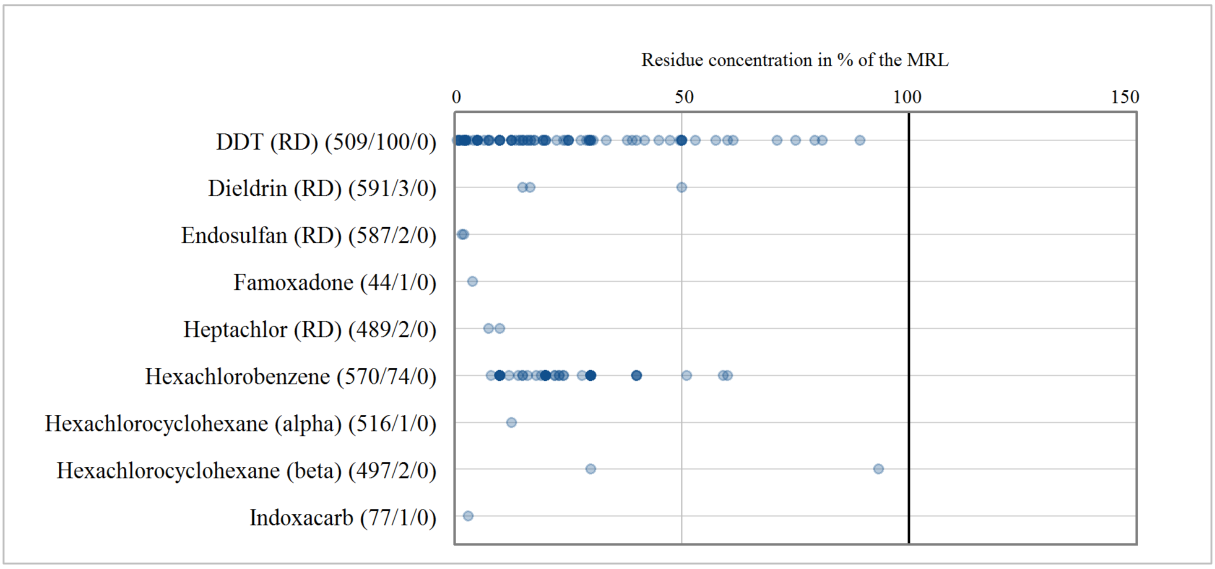

Figure 2-35: Residue concentrations measured in butter, expressed as a percentage of the MRL set for milk (only samples with residues > LOQ)[25,38]

2.3.12. Chicken eggs

In 2012, 727 samples of chicken eggs were analysed; no pesticide residues were detected in 688 samples (94.6 %), while 39 samples contained one or several pesticides in measurable concentrations. 12 samples (1.7 %) contained multiple residues; up to three different pesticides were detected in individual chicken egg samples (Figure 2-36).

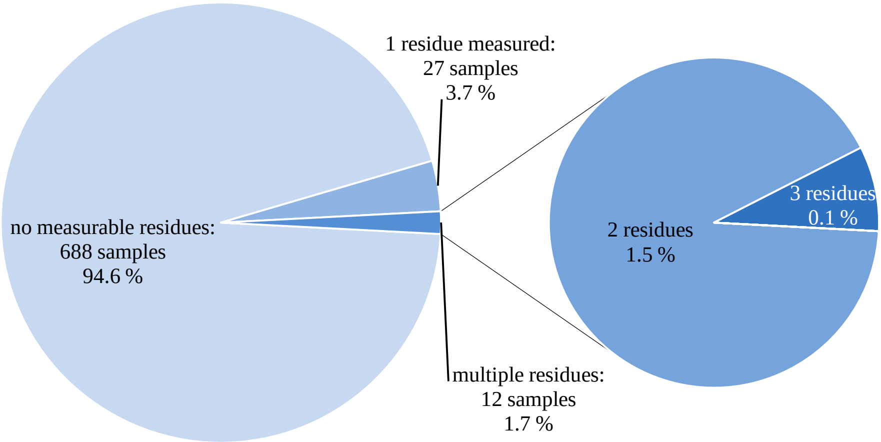

Figure 2-36: Number of detectable residues in individual chicken eggs samples

In total, five different pesticides were detected, all of them substances that were used as pesticides in the past but are still present in the environment due to their persistence. The most frequently found pesticide was DDT (RD) (detected in 5.8 % of the tested samples). No MRL exceedances were identified in chicken eggs.

In Figure 2-37 all pesticides found in chicken eggs are listed, ranked according to the frequency of detection below the MRL in 2012. The pesticide pattern detected and the detection rates found in 2012 were comparable with the findings of 2009.

Background information on the most frequently detected pesticides found in chicken eggs in 2012 is summarised in Table 2-12. The individual residue concentrations expressed as a percentage of the respective MRL for the pesticide are plotted In Figure 2-38.

Table 2-12: Pesticides most frequently detected in chicken eggs in 2012

Pesticide	% samples above LOQ	Background information on the pesticides found
DDT (RD)	5.8 %	Persistent organic pollutant, banned in Europe since 1979.

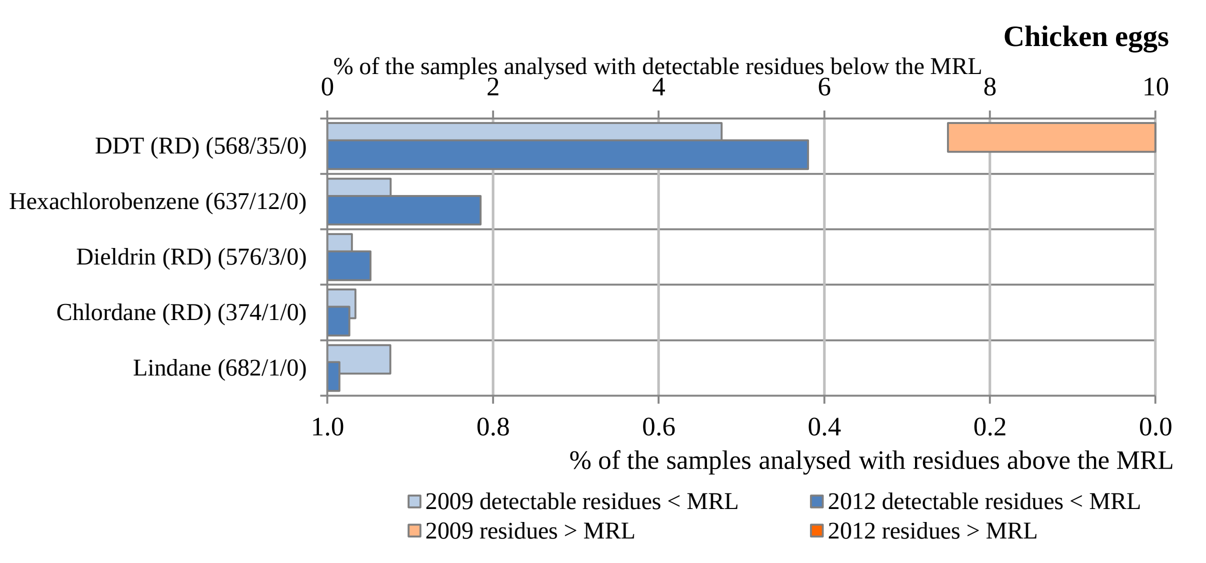

Figure 2-37: Percentage of chicken eggs samples with detectable residues below or equal to the MRL and residues above the MRL[25]

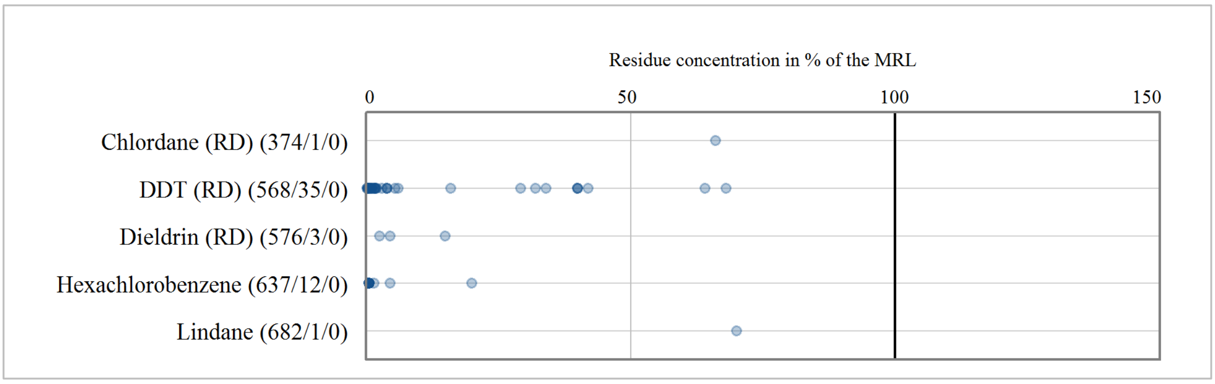

Figure 2-38: Residue concentrations measured in chicken eggs, expressed as a percentage of the MRL (only samples with residues > LOQ)[25]

2.4. Results by country of origin

Figure 2-39 gives an overview of the results of the EUCP regarding the origin of the samples (countries where the food products were produced, as reported by the reporting countries). In the left part of the figure (cells shaded in blue) for each crop of the EUCP the percentage of samples with measurable residues (results above the LOQ including the MRL exceedances) is displayed, while in the right side of the chart (cells shaded in yellow/orange) the MRL exceedance rates can be found. In the upper part of the figure the results for samples originating from EU Member States and EFTA countries are summarised; the results for third countries are presented in the lower part of the figure.

Sample origin	Total samples	% detected													% above the MRL												
		Aubergines	Bananas	Broccoli	Cauliflower	Peas (without pods)	Peppers (sweet)	Table grapes	Wheat	Olive oil	Orange juice	Butter	Chicken eggs	Total (in %)	Aubergines	Bananas	Broccoli	Cauliflower	Peas (without pods)	Peppers (sweet)	Table grapes	Wheat	Olive oil	Orange juice	Butter	Chicken eggs	Total (in %)
EU Member States and EFTA countries																											
Austria	90													15.6													0.0
Belgium	191													35.1													0.0
Bulgaria	122													28.7													0.0
Cyprus	155													30.3													2.6
Czech Republic	86													53.5													0.0
Denmark	124													7.3													0.0
Estonia	31													48.4													0.0
Finland	98													8.2													0.0
France	565													37.2													0.4
Germany	592													40.2													0.5
Greece	391													27.1													0.5
Hungary	160													38.8													5.0
Iceland	7													0.0													0.0
Ireland	106													26.4													0.0
Italy	950													43.3													0.8
Latvia	81													14.8													0.0
Lithuania	69													20.3													0.0
Luxembourg	30													6.7													6.7
Malta	66													27.3													0.0
Netherlands	601													34.3													1.0
Norway	66													7.6													0.0
Poland	464													21.6													3.7
Portugal	176													50.0													2.8
Romania	389													11.6													0.0
Slovakia	52													32.7													0.0
Slovenia	98													24.5													0.0
Spain	1567													41.4													1.0
Sweden	82													1.2													0.0
United Kingdom	479													18.4													0.2
European Union (not specified)	71													16.9													0.0
Total	**7,959**	**31.1**	**71.4**	**31.9**	**28.7**	**15.8**	**45.0**	**68.8**	**40.4**	**22.3**	**30.8**	**15.9**	**5.4**	**32.4**	**0.7**	**2.7**	**2.8**	**2.2**	**0.2**	**1.1**	**2.3**	**0.8**	**0.1**	**0.0**	**0.0**	**0.0**	**0.9**
Third countries																											
Argentina	16													81.3													0.0
Belize	15													100.0													0.0
Brazil	54													66.7													0.0
Cameroon	27													96.3													0.0

Sample origin	Total samples	% detected													% above the MRL												
		Aubergines	Bananas	Broccoli	Cauliflower	Peas (without pods)	Peppers (sweet)	Table grapes	Wheat	Olive oil	Orange juice	Butter	Chicken eggs	Total (in %)	Aubergines	Bananas	Broccoli	Cauliflower	Peas (without pods)	Peppers (sweet)	Table grapes	Wheat	Olive oil	Orange juice	Butter	Chicken eggs	Total (in %)
Chile	154													92.2													0.7
Colombia	175													91.4													0.0
Costa Rica	170													90.0													0.0
Ivory Coast	26													69.2													0.0
Dominican Republic	62													35.5													0.0
Ecuador	264													79.2													0.0
Egypt	24													79.2													0.0
India	56													87.5													5.4
Israel	67													65.7													0.0
Morocco	39													71.8													0.0
Namibia	13													100.0													0.0
New Zealand	14													57.1													0.0
Panama	19													94.7													0.0
Peru	59													57.6													0.0
South Africa	180													82.8													2.8
Suriname	11													90.9													0.0
Turkey	125													53.6													2.4
Other	706													41.2													3.3
Total	**2,276**	**39.2**	**79.4**	**20.0**	**41.2**	**40.8**	**58.3**	**86.7**	**33.3**	**19.7**	**32.4**	**42.1**	**0.0**	**67.0**	**11.8**	**0.2**	**0.0**	**5.9**	**0.0**	**6.2**	**2.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.5**
Overall	**10,235**	**31.6**	**77.8**	**31.8**	**28.9**	**21.5**	**47.4**	**76.9**	**39.7**	**22.0**	**31.2**	**16.6**	**5.4**	**40.1**	**1.0**	**0.7**	**2.8**	**2.2**	**0.1**	**1.4**	**1.8**	**0.7**	**0.1**	**0.0**	**0.0**	**0.0**	**0.9**

Legend (in %)

% detected	% above the MRL
% ≥ 90	% ≥ 3
75 ≤ % < 90	1 ≤ % < 3
25 ≤ % < 75	0.5 ≤ % < 1
5 ≤ % < 25	0.1 ≤ % < 0.5
0 < % < 5	0 < % < 0.1
0	0
No result	No result

Figure 2-39: Detection rate and MRL exceedance rate by country of origin and food product

2.5. Overall results

Overall, 0.9 % of the samples analysed in 2012 in the framework of the EU-coordinated exceeded the MRL (92 samples, 108 determinations). Taking into account the measurement uncertainty, 0.5 % of the samples were considered to be non-compliant (47 samples) while the remaining samples exceeded the MRL numerically but were considered to be compliant. 39.2 % of the samples (4,008 samples) had measurable residues above the reporting level, but within the legally permitted concentrations (above the LOQ but below the MRL). 59.9 % of the samples (6,135 samples) did not contain residues in measurable concentrations (no residues above the limit of quantification) (Figure 2-40).

Compared with 2009, the MRL exceedance rate slightly declined (1.2 % of the samples analysed in 2009 in the framework of the EUCP exceeded the legal limit in place); the percentage of samples with detectable residues was in the same range (37.4 % in 2009 versus 39.2 % in 2012).

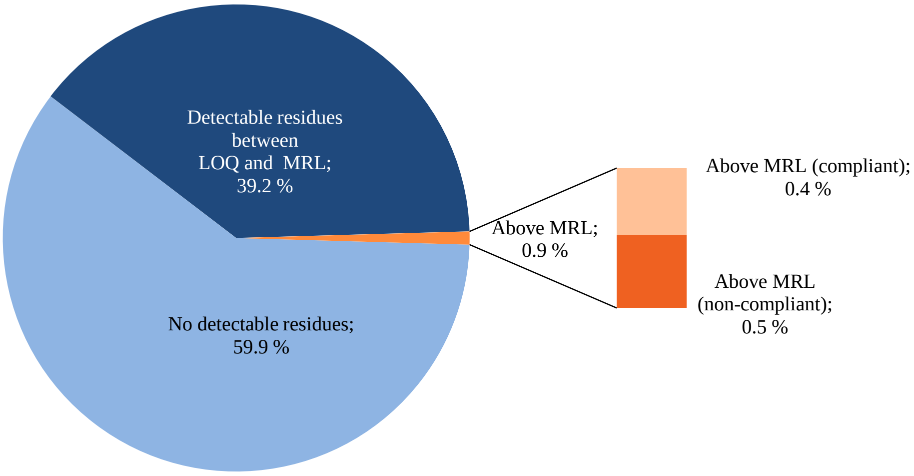

Figure 2-40: Overall percentages of EUCP samples with and without measurable residues, residues exceeding the MRL and non-compliant

Among the plant products (unprocessed) analysed in the 2012 EU-coordinated control programme, peas (without pods) had the lowest percentage of samples exceeding the MRL (0.1 % of the 763 samples analysed), followed by wheat samples (0.7 % of 862 samples) and bananas samples (0.7 % of 1,109 samples). The ascending ranking of samples exceeding the MRL is continued with aubergines (1.0 %), peppers (sweet) (1.4 %), table grapes (1.8 %), cauliflower (2.2 %) and broccoli (2.8 %). In olive oil 0.1 % of all samples were found to exceed the legal limit. However, EFSA spotted several determinations in olive oil samples which were reported as being within the legal limits, using a default processing factor as recommended in Regulation (EU) No 1274/2011. EFSA is of the opinion that the use of a default processing factor for olive oil is not appropriate, in particular for non-fat soluble pesticides and in cases where the MRL is set at the LOQ and where there is no evidence that the pesticide is authorised for the use on olives for oil production. Thus, some of the samples that were reported as MRL compliant should be reconsidered as possibly exceeding the MRLs taking into account impact of processing on the residue levels. In orange juice no exceedances were found. In animal products (1,419 samples of butter and chicken eggs analysed for 42 pesticides), no MRL exceedances were identified.

SUMMARY CHAPTER 2

The 2012 monitoring regulation defined 12 food commodities to be analysed by the reporting countries. The programme covered a total of 205 pesticides, 188 thereof in food of plant origin and 43 in food of animal origin.

Among the unprocessed plant products analysed in the 2012 EU-coordinated control programme, peas (without pods) were the food product with the lowest percentage of samples exceeding the MRL (0.13 % of the 763 samples analysed), followed by bananas (0.7 % of 1,109 samples) and wheat (0.7 % of 862 samples). The ascending ranking of samples exceeding the MRL continues with aubergines (1.0 %), peppers (sweet) (1.4 %), table grapes (1.8 %), cauliflower (2.2 %) and broccoli (2.8 %). In orange juice no exceedances were found while in olive oil in 0.1 % of all samples the MRL was found exceeding the legal limits. Regarding olive oil, EFSA spotted additional samples which should be reconsidered regarding a possible MRL exceedance, taking into account the impact of processing on the residue levels. In animal products (1,419 samples of butter and chicken eggs were analysed for 42 pesticides) and no MRL exceedances were identified.

Aubergines: 944 aubergine samples were analysed and 61 different pesticide residues were measured in quantifiable amounts. The most frequently found compounds were propamocarb (RD), cyprodinil (RD) and imidacloprid.

Bananas: 1,109 banana samples were analysed and 34 different pesticide residues were measured in quantifiable amounts. The most frequently found compounds were thiabendazole (RD), imazalil, azoxystrobin, chlorpyrifos, bifenthrin, myclobutanil (RD) and fenpropimorph (RD).

Broccoli: 362 broccoli samples were analysed and 23 different pesticide residues were measured in quantifiable amounts. The most frequently found pesticide was dithiocarbamates (RD).

Cauliflower: 760 cauliflower samples were analysed and 23 different pesticide residues were measured in quantifiable amounts. The most frequently found active substance was dithiocarbamates (RD).

Peas (without pods): 763 pea (without pods) samples were analysed and 19 different pesticide residues were measured in quantifiable amounts. The most frequently found active substances were pyrimethanil, carbendazim (RD) and boscalid (RD).

Peppers (sweet): 1,327 sweet pepper samples were analysed and 87 different pesticides residues were measured in quantifiable amounts. The most frequently found pesticides were bromide ion, flutriafol, fludioxonil, azoxystrobin, imidacloprid and propamocarb (RD).

Table grapes: 1,200 table grape samples were analysed and 90 different pesticide residues were measured in quantifiable amounts. The most frequently found substances were fenhexamid, boscalid (RD), ethephon, cyprodinil (RD), imidacloprid, dithiocarbamates (RD), fludioxonil, myclobutanil (RD), iprodione, trifloxystrobin (RD) and pyraclostrobin.

Wheat: 862 wheat samples were analysed and 34 different pesticide residues were measured in quantifiable amounts. The most frequently found pesticides were chlormequat, bromide ion, glyphosate and pirimiphos-methyl.

Olive oil: 794 olive oil samples were analysed and 26 different pesticide residues were measured in quantifiable amounts. The most frequently found pesticides were chlorpyrifos and terbuthylazine. EFSA identified the need to harmonise the approach for enforcing MRLs in processed products like olive oil.

Orange juice: 695 orange juice samples were analysed and 15 different pesticide residues were measured in quantifiable amounts. The most frequently found residues were carbendazim (RD) and imazalil.

Butter: 692 butter samples were analysed and nine different pesticide residues were measured in quantifiable amounts. The most frequently found pesticides were DDT (RD) and hexachlorobenzene.

Chicken eggs: 727 chicken egg samples were analysed and five different pesticide residues were measured in quantifiable amounts. The most frequently found pesticide was DDT (RD).

The analysis of the results of the 2012 EU-coordinated programme shows that 0.9 % of the samples exceeded the MRL numerically (92 out of the 10,235 samples); 0.5 % were found to be non-compliant with the legal limit, taking into account the measurement uncertainty. 39.2 % of the samples (4,008 samples) had measurable residues above the reporting level, but within the legally permitted levels. In 59.9 % of the samples (6,135 samples), no quantifiable residues were found (residues below the limit of quantification).

No notable variations in the frequency of MRL exceedances and detection rates were found compared with 2009 where the same food products were analysed under the EU-coordinated programme. However, it seems that the pesticide use patterns in peppers, table grapes and aubergines have changed compared with 2009.

3. National control programmes

In general, the national control programmes are risk based, focussing on products which are likely to contain pesticide residues or for which MRL infringements were identified in previous monitoring programmes. They 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, products with high residue prevalence or non-compliance rates in previous years, the use pattern of pesticides and 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 reported the results of import controls as requested by Regulation (EC) No 669/2009. These specific import controls result from previously observed high incidences of non-compliant products imported from certain countries.

The first part of this chapter 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 3.2) 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 the MRL exceedances since these findings may give indications on agricultural practices that are triggering potential food hazards. However, it should be stressed that since the national programmes are reflecting targeted sampling strategies the identified cases of MRL exceedances should not be considered as being statistically representative for the food available to European consumers.

3.1. Design of the national control programmes

In 2012, in total 78,390 samples were analysed for pesticide residues in the reporting countries. Compared with the previous reporting year, where results for 79,035 samples were reported, this is a slight decrease (minus 0.8 %). The majority of samples (70,870 samples, 90.4 %) were classified as surveillance samples, meaning that the samples were taken without targeting for samples from specific growers/producers/importers or consignments which are likely to be non-compliant. It should be highlighted that in contrast to all other reporting countries, the vast majority of samples taken in Bulgaria (91.3 %) were reported as enforcement samples, thus resulting from a control plan targeted towards products which are expected to be non-compliant with the legal limits. Also for the Netherlands, Belgium and Romania, all countries with an increased rate of import controls (see also Figure 3-3), the percentage of enforcement samples was above the EU average (the Netherlands 30.9 %, Belgium 14.7 % and Romania 9.8 %).
The total number of samples per reporting country and the number of samples normalised by the number of inhabitants per reporting country are illustrated in Figure 3-1 and Figure 3-2. More than 50 % of the total number of samples were analysed in Germany, Italy, France, the Netherlands and the United Kingdom. Considering the number of samples per inhabitant, Iceland, Cyprus, Luxembourg and Slovenia were the countries with the highest sampling frequency.

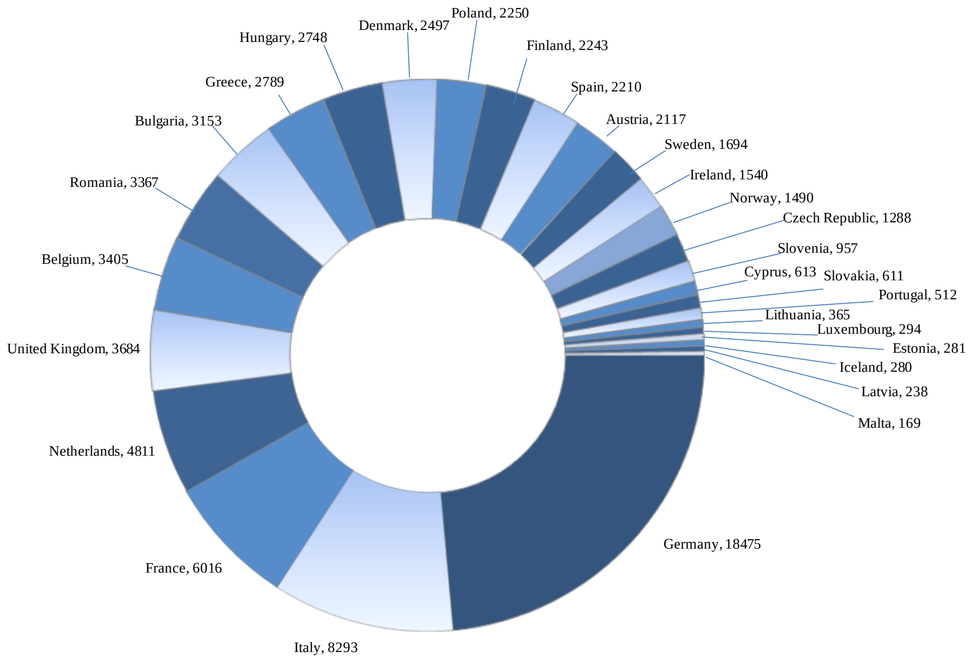

Figure 3-1: Number of samples analysed by each reporting country (surveillance and enforcement samples)

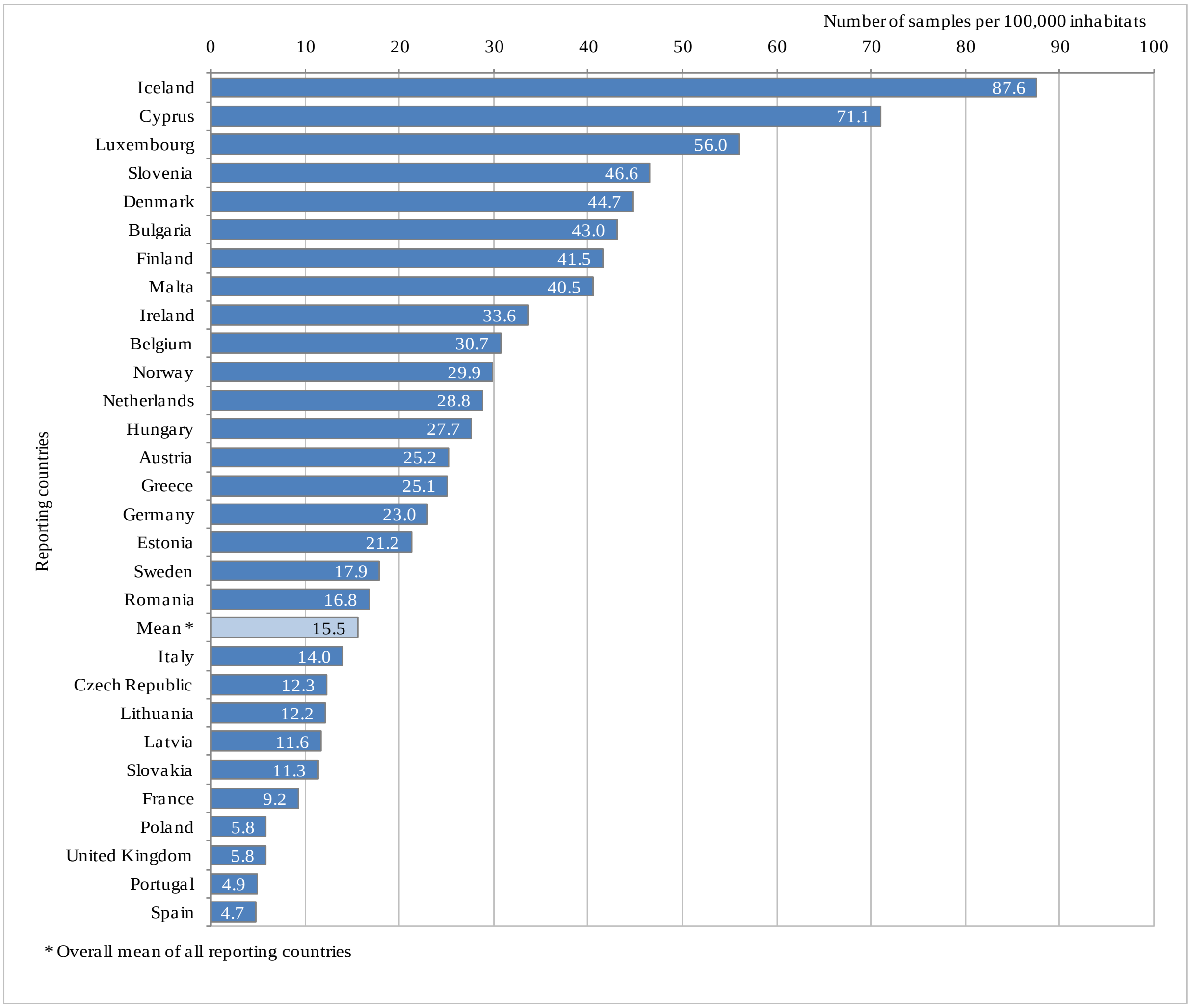

Figure 3-2: Number of samples normalised by number of inhabitants (surveillance and enforcement samples)

Figure 3-3 illustrates the ratio of samples analysed by the 29 reporting countries originating from domestic production, other EEA countries and third countries. The countries with the highest rate of samples of imported products are Bulgaria (91.8 %), the Netherlands (61.7 %) and Lithuania (57.8 %), while countries like Greece, Spain, Portugal, Italy, Cyprus and Poland focussed the national control programmes mainly on domestic products with more than 70 % of samples analysed produced domestically.

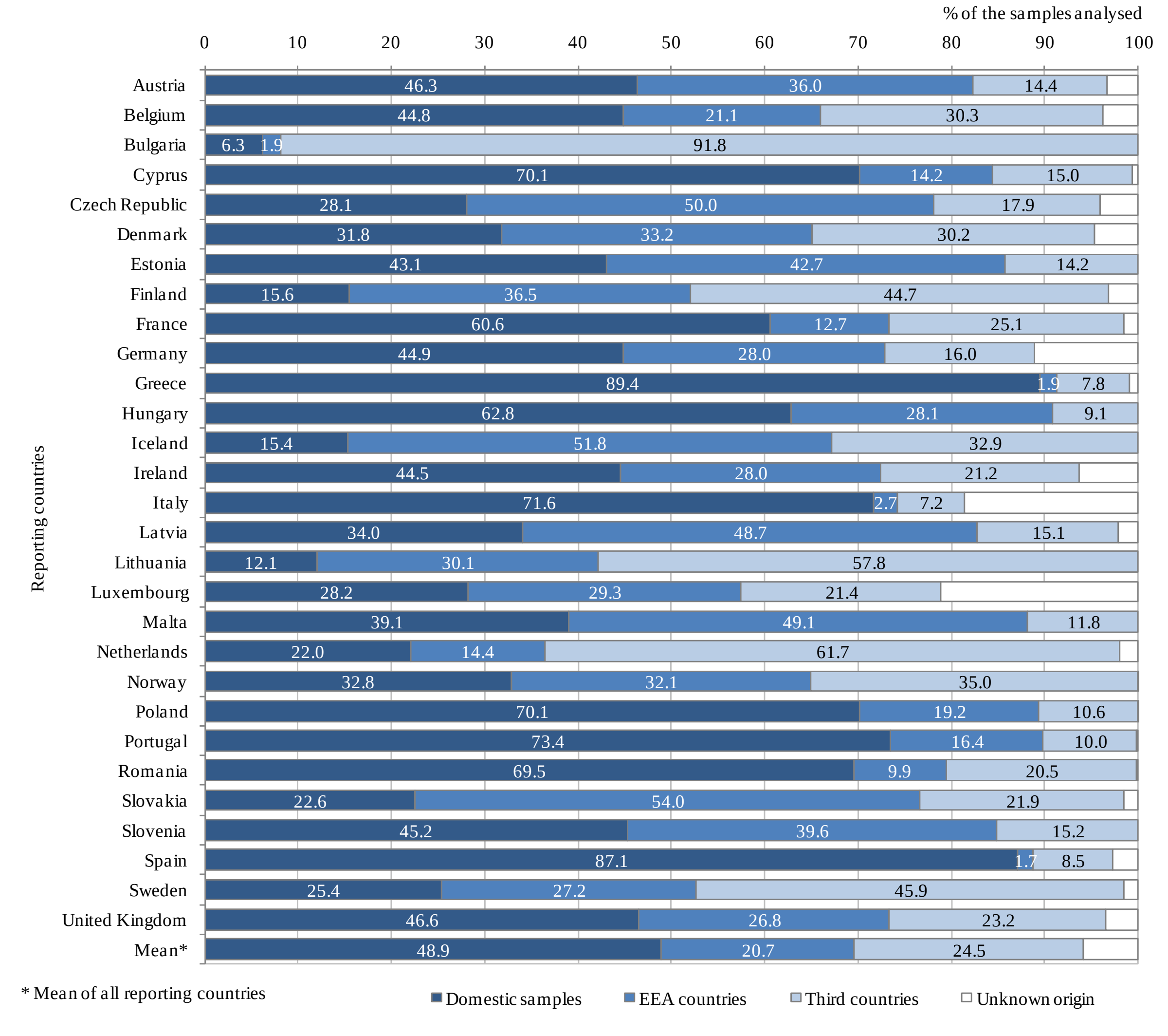

Figure 3-3: Comparison of sample origin analysed by reporting countries (surveillance and enforcement samples)

A more detailed analysis of the origin of the samples is presented in Figure 3-4. 54,487 samples analysed in the framework of the national control programmes were originated from one of the 29 reporting countries (69.5 %), 19,257 samples (24.6 %) concerned products imported from one of 123 third countries; circa one third of these samples of imported products (6,472) were taken for products subject to increased level of official controls under Regulation (EC) No 669/2009 (see Section 3.2.3). For 4,646 samples (5.9 %) the origin of the sample was not reported.

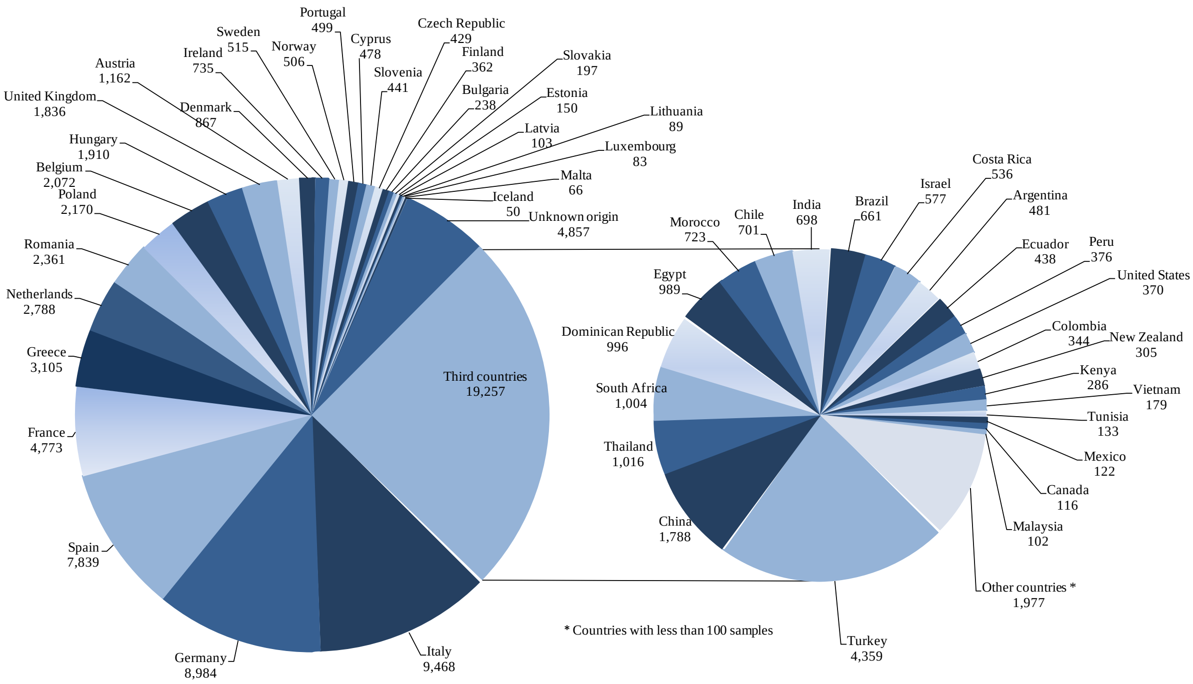

Figure 3-4: Distribution of samples originating from reporting countries and third countries (surveillance ad enforcement samples)

Figure 3-5 illustrates where the samples originating from one of the EU/EEA countries or third countries were analysed. (For reasons of readability only the top 15 reporting countries (see Figure 3-1) are displayed in colour, while the reporting countries with less than 2,000 samples are presented as white bars). From this presentation it becomes evident that samples originating from Turkey were mainly analysed in Bulgaria and Romania; other third country products were mainly analysed by the Netherlands, Germany, France, and to a certain extent also in the United Kingdom, Denmark and Italy. Products produced in the EU Member States, Norway and Iceland were in most cases analysed in the producing country itself. However, a substantial number of products from Spain, the Netherlands, Italy, Greece and France was analysed by another reporting country, predominantly Germany.

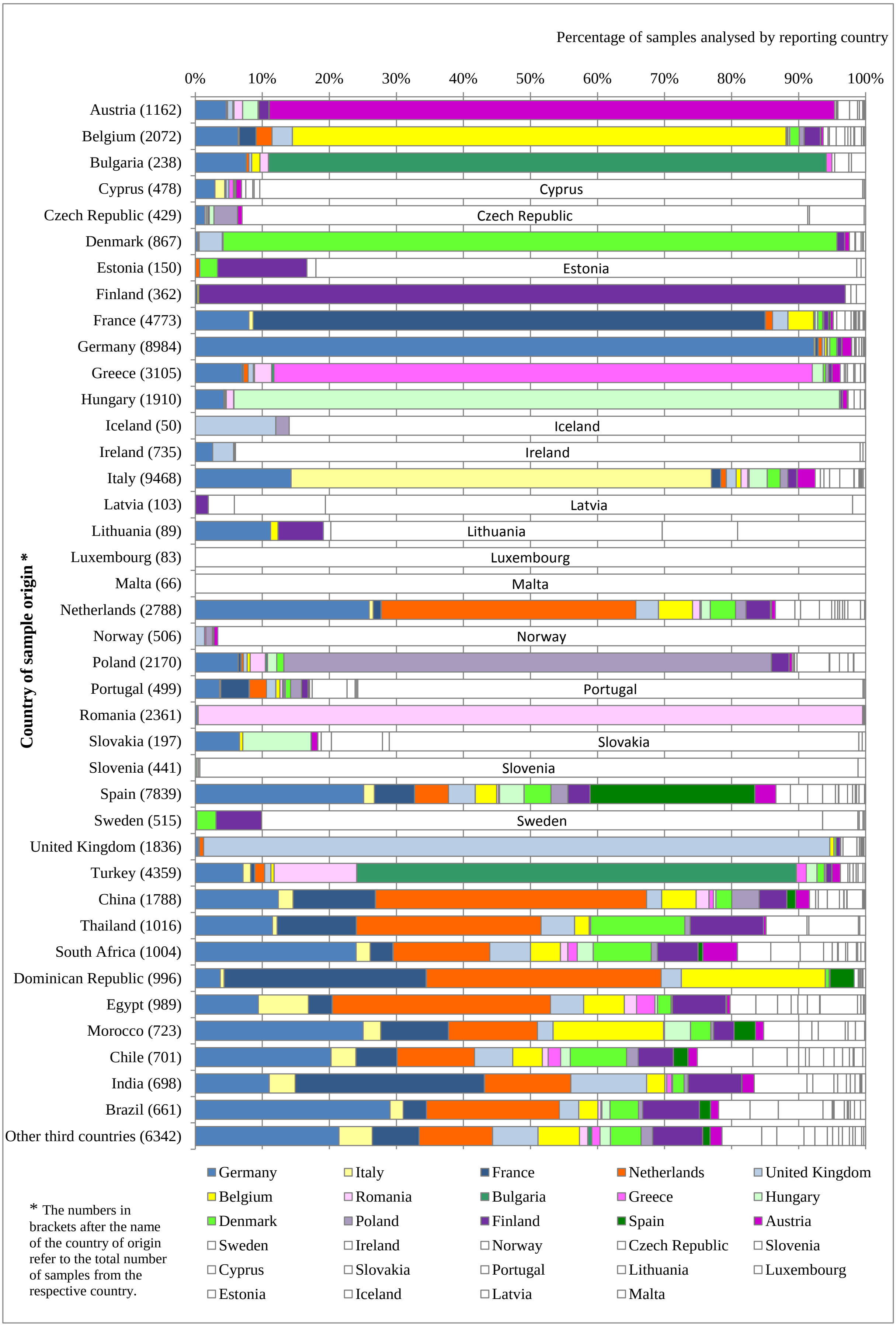

Figure 3-5: Samples originating from EU/EEA and third countries versus countries where the samples were analysed

The scope of the national monitoring programmes differed significantly with regard to the number of pesticides analysed by the control laboratories (analytical scope) and the number of different food products analysed. The analytical methods used in Iceland cover a total of 61 different pesticides, while the German control laboratories reported in total 843 different pesticides[39]. Overall the national control programmes covered almost 800 legal residue definitions. On average, a sample was analysed for 203 different pesticides in the framework of a national control programme; Ireland, Luxembourg, Sweden and Germany analyse on average for more than 270 pesticides per sample. The complete picture regarding the analytical scope of the national control programmes can be found in Figure 3-6.

The variety of food products analysed in the different reporting countries is presented in Figure 3-7. The highest number of different types of food were analysed in Italy, Finland, France, Germany, the Netherlands, Denmark and Austria where more than 150 different product types (processed products and unprocessed raw agricultural commodities) were covered by the control programmes; the national programmes of Malta, Latvia and Bulgaria were restricted to less than 30 food product types, mostly unprocessed products. All reporting countries covered in total 222 unprocessed agricultural food commodities[40] and approximately 450 products of processed food, such as canned fruits and vegetables, fruit or vegetable juices, dried products, processed cereal products like bread, flour etc., vegetable oils, fermented products, wine, pickled vegetables.

The analysis of some of the features of the national control programmes illustrates the diversity of the national approaches. There are additional elements, such as the proportion of organic and conventional product samples, the type of food products (e.g. products which are more likely to exceed the legal limits like certain fruits or vegetables, or products with a lower probability of MRL exceedance such as animal products or cereals) that are contributing to the overall variability of national control programmes. When the findings of the national control programmes are analysed, it needs to be borne in mind that the national control programmes implemented different control strategies.

[39] The number of pesticides counted comprises not only the legal residue definitions, but also to a certain extent metabolites. Therefore the number of reported pesticides is not fully comparable.

[40] The unprocessed food products are defined in Annex I of Regulation (EC) No 396/2005. The products subsumed under one food code are not counted separately.

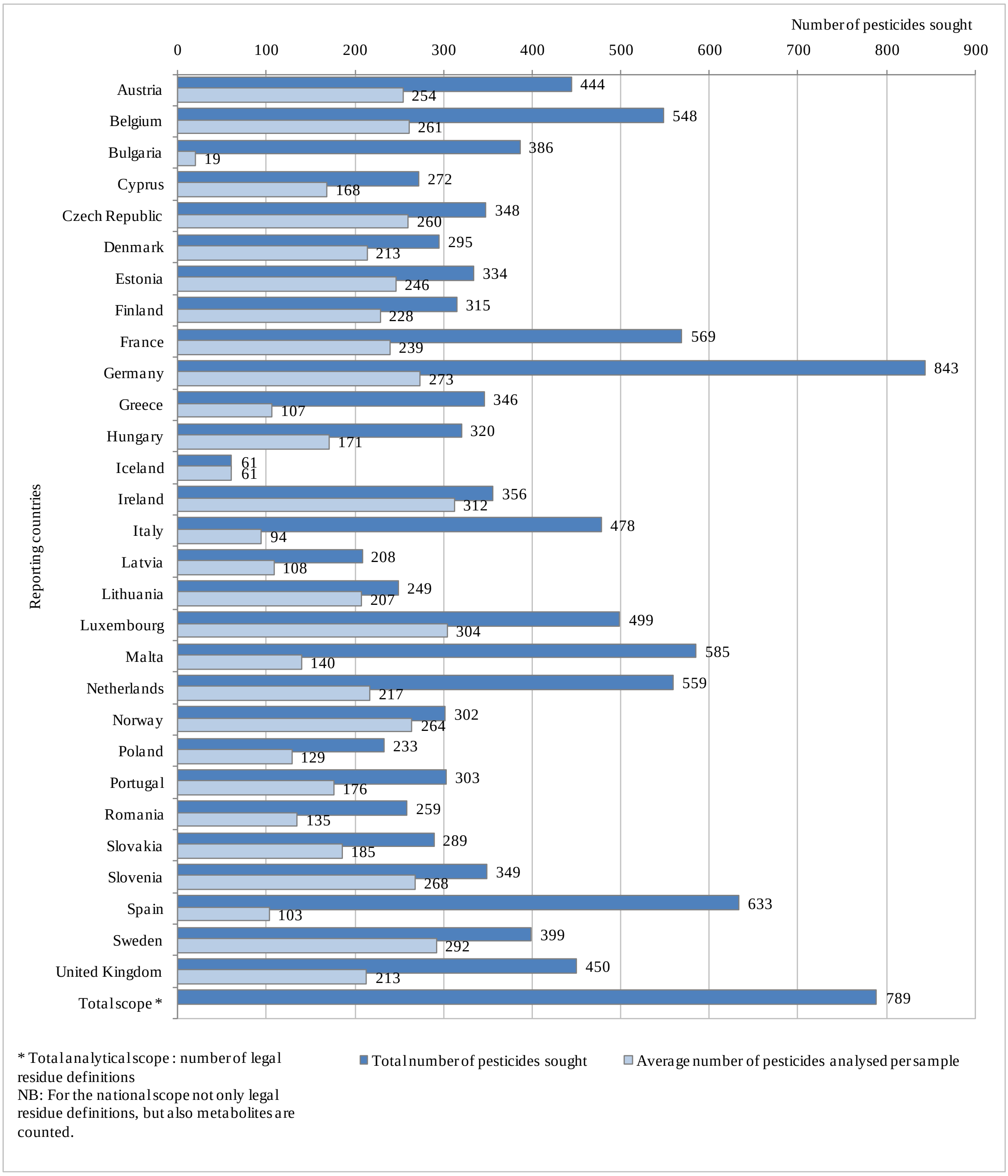

Figure 3-6: Comparison of the analytical scope (number of pesticides analysed) in reporting countries

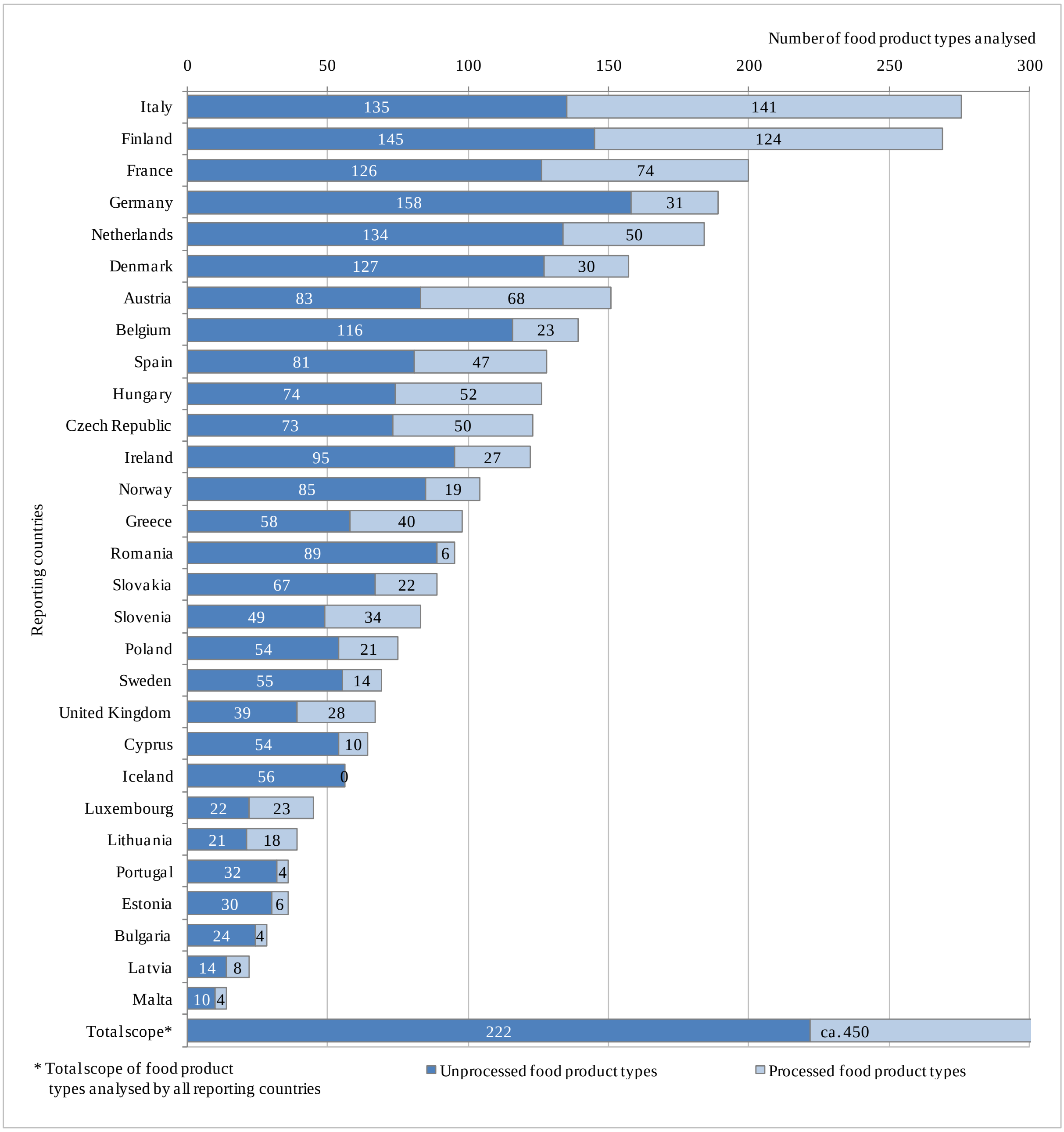

Figure 3-7: Comparison of the scope of food product types analysed in reporting countries

3.2. Results of the national control programmes

Overall, 2.9 % of all the samples analysed in 2012 exceeded the MRL (Figure 3-8). Thus, the MRL exceedance rate did not change significantly compared with 2011, when 3.0 % of the samples had exceeded the legal limit. 54.9 % of the samples were free of detectable residues. Taking only surveillance samples (samples taken without targeting towards samples which are expected to be non-compliant) into account, 2.2 % of the samples analysed in 2012 contained residues exceeding the limits set in the MRL legislation. This result is slightly lower than the result for 2011 (2.5 % of the samples above the MRL) but still in the same range.

It is normal practice that before legal or administrative sanctions are imposed on food business operators because of infringements of the MRL legislation, the analytical measurement uncertainty is taken into account[41]. The percentage of samples that clearly exceeded the MRL taking into account the

[41] A measurement uncertainty of ± 50 % of the measured residue concentration is usually applied.

measurement uncertainty is displayed in orange in Figure 3-8. These samples are referred to as 'non-compliant with the legal limit'. Overall, national competent authorities identified an infringement for 1.7 % of the samples (enforcement and surveillance samples) analysed in 2012. In 2011 the results were comparable (1.8 %).

In Figure 3-8 the results for the different sampling strategies (surveillance and enforcement samples) are presented separately for sample originating from EU/EEA countries, third countries and samples where the origin was not reported.

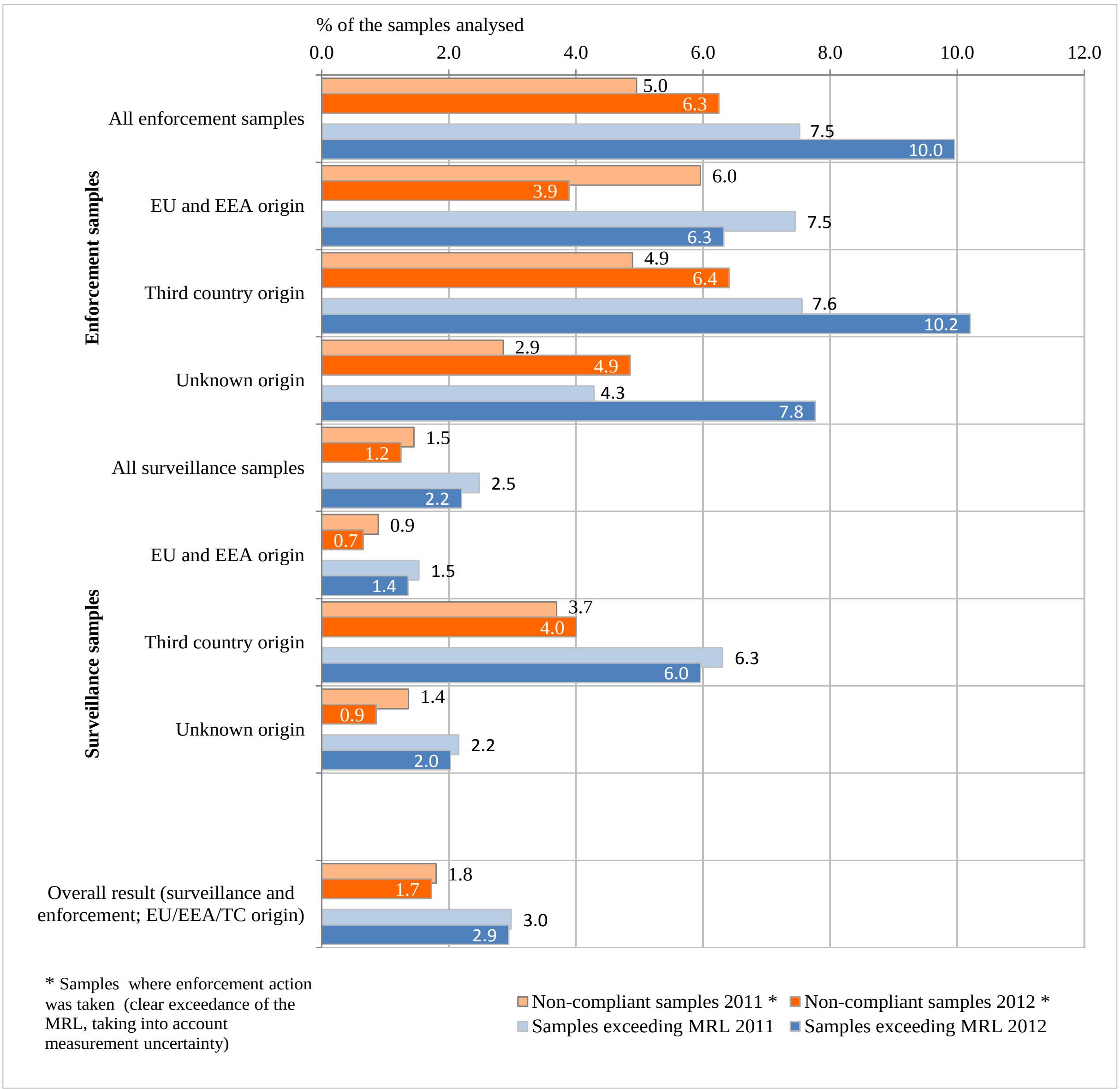

Figure 3-8: Percentage of samples compliant and non-compliant with the MRL

Samples originating from third countries were found to have a significantly higher MRL exceedance rate and non-compliance rate compared to food produced in the EU and EEA countries (MRL exceedance rate of surveillance samples produced in third countries: 6 % versus 1.4 % for products originating from one of the 29 reporting countries). In the case of enforcement samples, the difference between EU/EEA countries and third countries is less pronounced (6.3 %versus 10.2 %). It is noted that in 2012 the non-compliance rate and the MRL exceedance rate were found to be higher compared to 2011. These increases are seen as an indication that import controls have become more targeted in 2012.

The MRL exceedance rate and the percentage of samples containing measurable residues originating from the different reporting countries and from third countries are presented in Figure 3-9 and Figure 3-10. Among the reporting countries, the highest MRL exceedance rates were reported for products originating from Cyprus, Portugal, Bulgaria and Luxemburg. However, in general, it should be borne in mind that the results for countries with a low number of samples are affected by a higher uncertainty. Thus, also some of the results for countries with very low MRL exceedance rates such as Iceland, Latvia and Malta are statistically less reliable. Overall, 41.3 % of the samples originating from EU/EEA countries contained residues above the LOQ but below the MRL, 1.4 % of the samples exceeded the legal limit while 57.3 % of the samples were free of measurable residues.

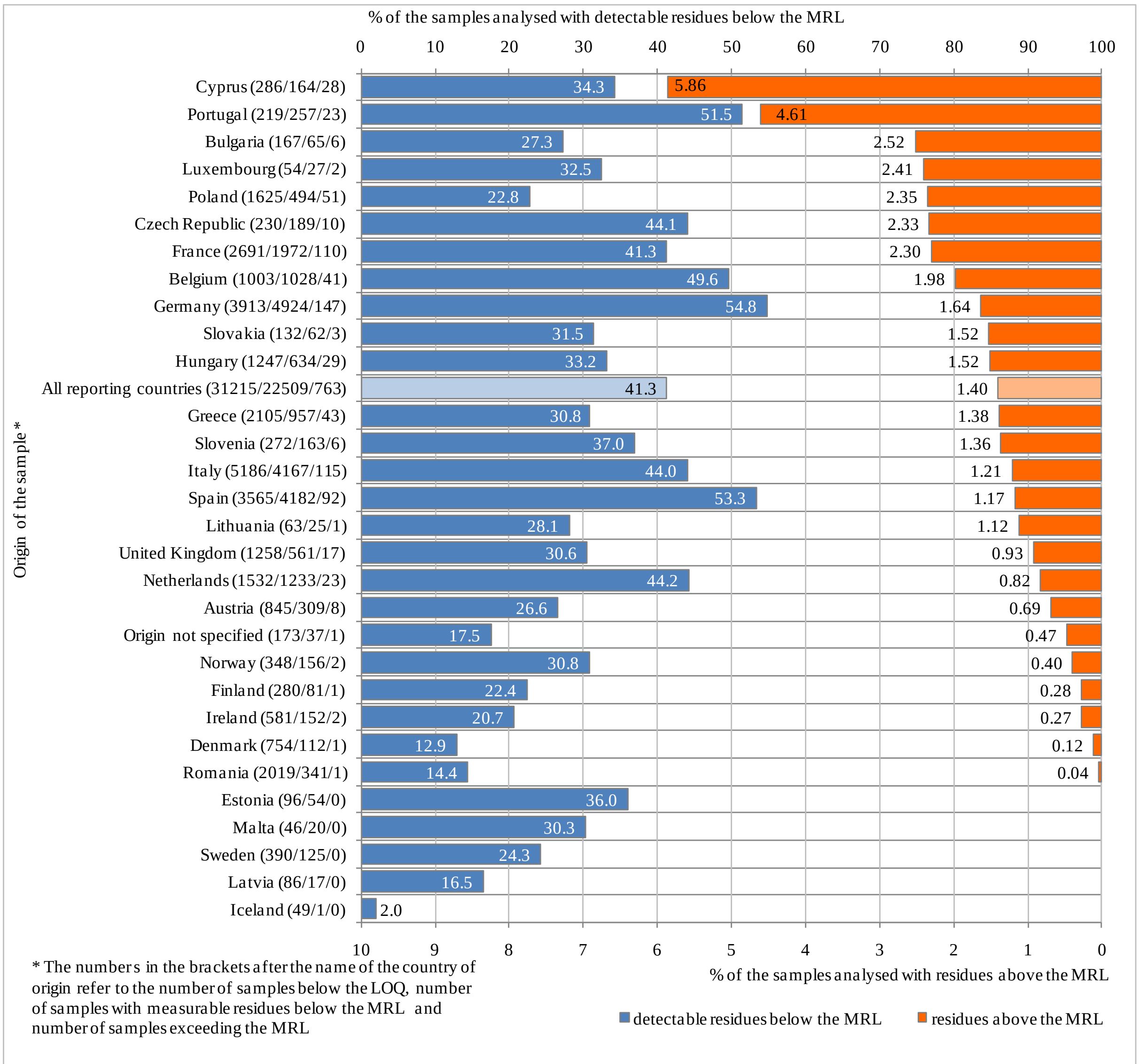

Figure 3-9: EU and EEA countries: MRL exceedance rate and residue detection rate by country of origin (surveillance and enforcement samples)

The highest MRL exceedance rates for samples originating from third countries were found for Malaysia, Laos and Cambodia (all above 25 %). Other countries with a substantial number of samples (more than 100 samples) and MRL exceedances above the average for third countries were Vietnam, Kenya, India, China, Morocco, Thailand and the Dominican Republic. The comparatively higher number of samples for some third countries results from increased import controls in the framework of Regulation (EC) No 669/2009 (see Section 3.2.3). Overall, 45.9 % of the samples originating from third countries contained residues above the LOQ; 7.5 % of the samples exceeded the legal limit while 46.6 % of the samples were free of measurable residues.

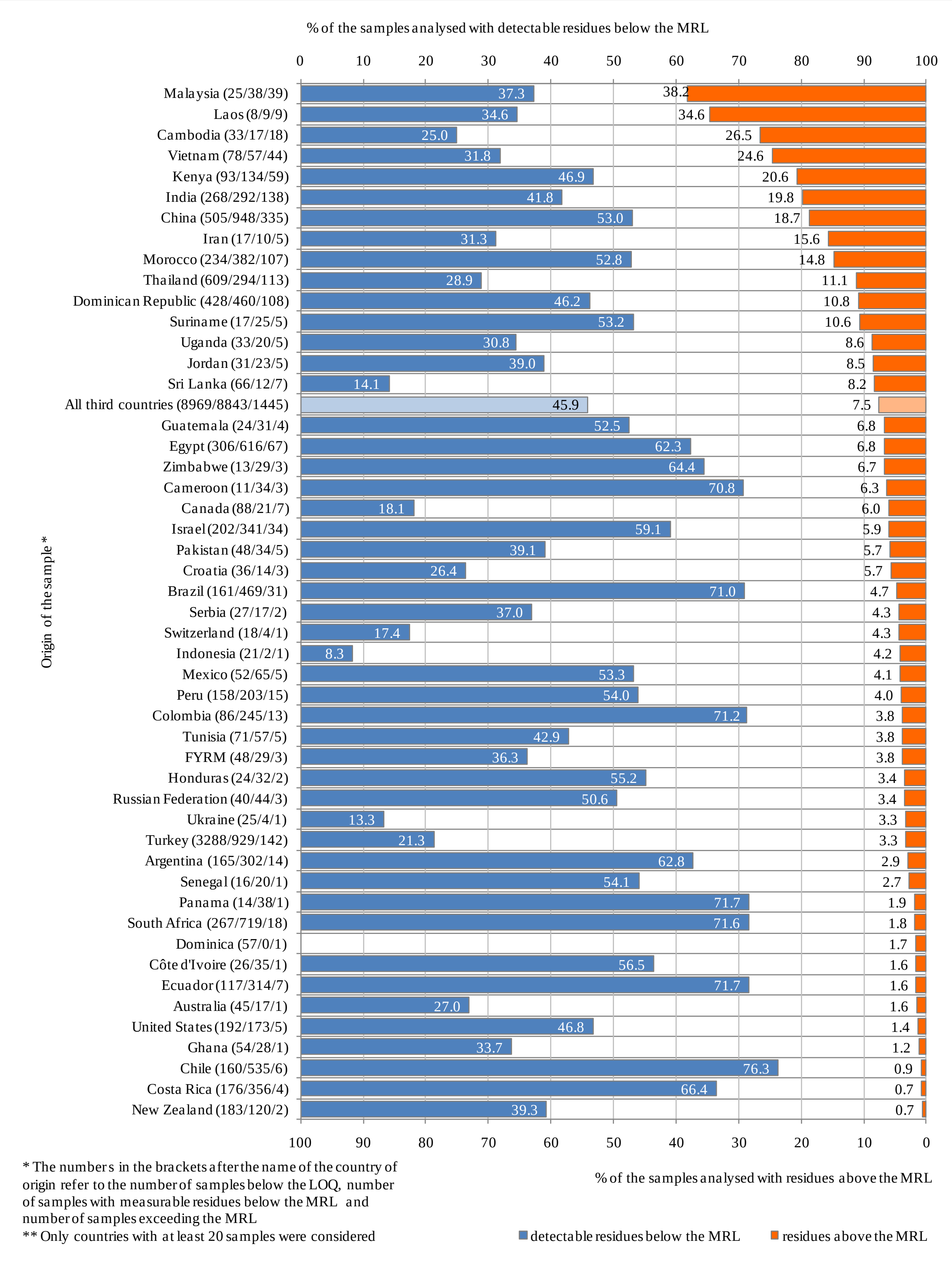

Figure 3-10: Third countries: MRL exceedance rate and residue detection rate by country of origin (enforcement and surveillance samples)

3.2.1. Results by food products

EFSA analysed for which food products most frequently MRL exceedances were reported, taking into account all unprocessed[42] and processed products, including enforcement and surveillance samples. In Figure 3-11 the results for the unprocessed products are presented, while the results for processed products are depicted in Figure 3-12.

An MRL exceedance rate above the average for unprocessed products was mainly noted for products that were subject to increased import control levels such as basil, okra, grapefruit, celery leaves and tea leaves. (More details on the results of import controls under Regulation (EC) No 669/2009 can be found in Section 3.2.3). In addition to the commodities in focus of import controls, MRL exceedance rates above the average were observed for leafy vegetables and fresh herbs (e.g. parsley, rucola, chard, lamb's lettuce), legume vegetables like peas with pods and beans with pods, but also certain tropical fruits and vegetables (papaya, pomegranates, mangoes, yams, pineapples).

[42] Samples that comply with the description of the food product in Annex I of Regulation (EC) No 396/2005 are considered as unprocessed (e.g. fermented dried tea leaves).

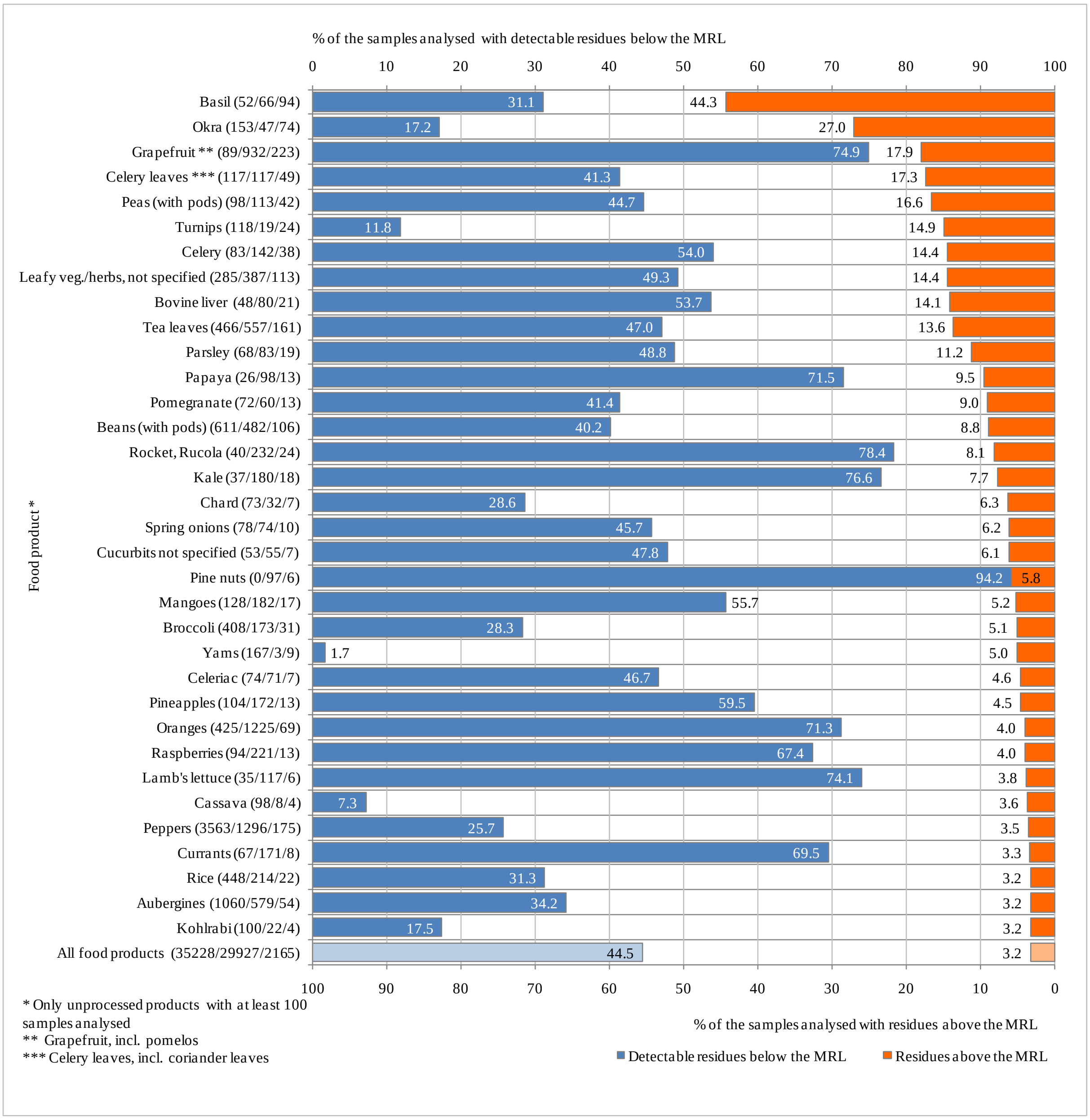

Figure 3-11: MRL exceedance rate and residue detection rate for unprocessed food products (surveillance and enforcement samples)

The overall MRL exceedance rate for processed products was in general lower (0.9 %) compared with unprocessed products. The processed products with an MRL exceedance rate above the average are presented in Figure 3-12. Among the top ranked processed products, spices, vine leaves, lentils, poppy seeds, tea leaves[43], gherkins and herbal infusions are found. Also dehydrated products like dried apples, apricots, grapes (raisins) and peppers exceeded the legal limit in more than 1 % of the cases. It is noted that for processed products a specific processing factor needs to be taken into account to reflect changes in the levels of pesticide residues caused by processing, e.g. by dehydration.

[43] Some reporting countries coded tea leaves as processed products. Clear instructions for coding of samples should be provided.

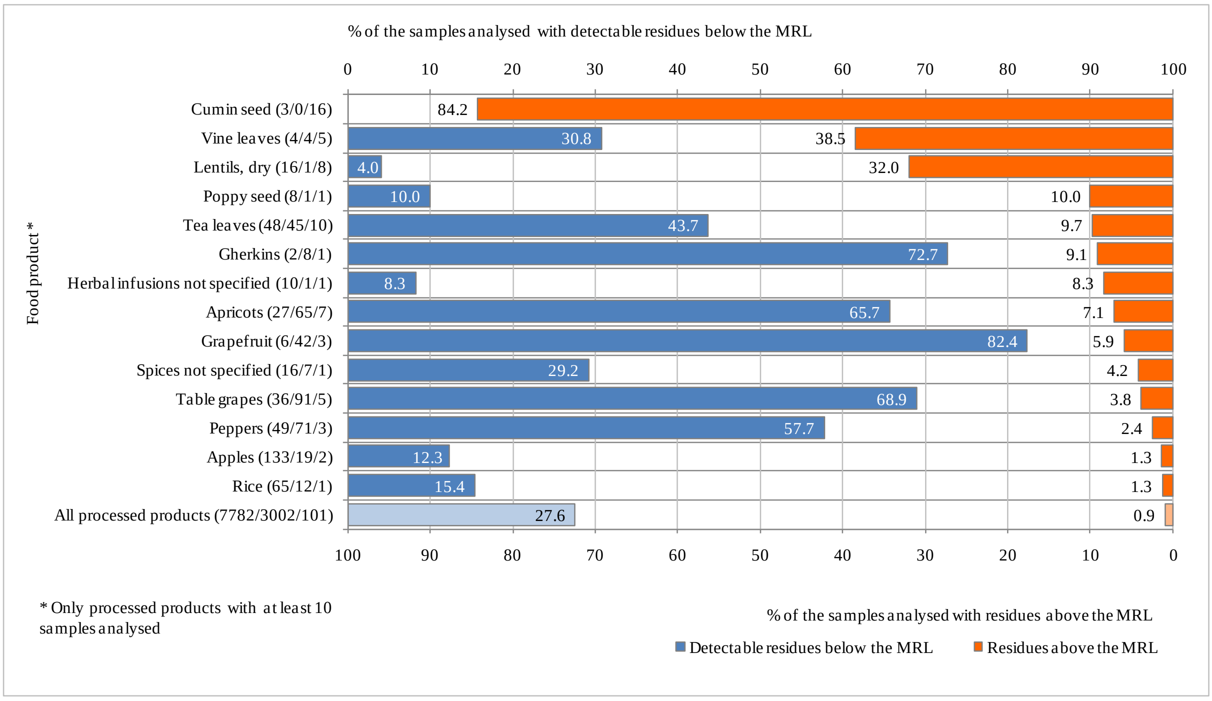

Figure 3-12: MRL exceedance rate and residue detection rate for processed food products (surveillance and enforcement samples)

3.2.2. Results by pesticides

The pesticides found most frequently exceeding the MRL, presented separately by the origin of the samples, are reported in Figure 3-13. MRL exceedances for food produced in one of the reporting countries were observed for chlorpyrifos, dimethoate, dithiocarbamates, acetamiprid, iprodione, carbendazim, copper[44], cypermethrin and imidacloprid (more than 20 MRL exceedances). The top ranked pesticides on products from third countries (with more than 20 MRL exceedances) are methidathion, acetamiprid, dimethoate, carbendazim, chlorpyrifos, triazophos, imidacloprid, endosulfan, profenophos, acephate, methomyl, buprofezin, methamidophos, imazalil, ethion malathion, flubendiamide, formethanate, hexaconazole, monocrotophos, fipronil, myclobutanil, bifenthrin, carbofuran, propargite, diazinon. In total, 1,122 MRL exceedances were reported for pesticides no longer approved in the EU. In most cases these MRL exceedances for non-approved pesticides were related to imported products (897 cases) while for products produced in the EU and EFTA countries, the majority of MRL exceedances was resulting from approved pesticides (744 cases) with a lower frequency of non-approved pesticides (188 results).

[44] The residue definition in Regulation (EC) No 396/2005 is “copper compounds”. EFSA noted that this residue definition should be revised, to avoid uncertainties how the result of the analysis has to be expressed (the results have to be recalculated to “total copper”).

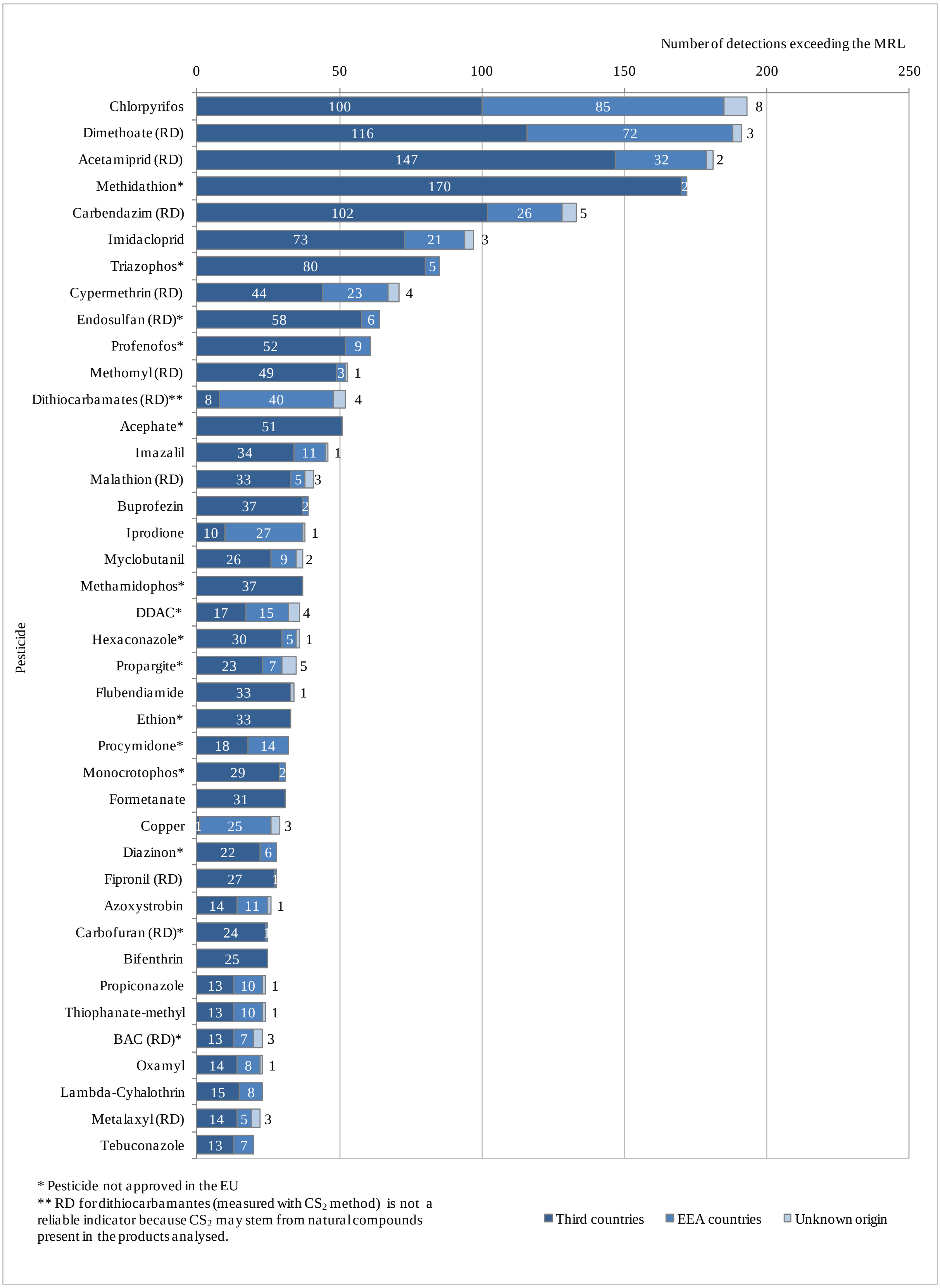

Figure 3-13: Pesticides detected in concentrations exceeding the MRL by sample origin (surveillance and enforcement samples)

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

In 2012, some food products specified in the Annex of Regulation (EC) No 669/2009 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, the type of hazard[45] and the frequencies of controls) relevant for the calendar year 2012 can be found in Appendix III, Table A.

In total, 6,472 samples were analysed for the products in focus for import controls. The number of samples for each product and each country are reported in Table 3-1.

Overall, 637 samples (9.8 %) exceeded the legal limit for one or several pesticides with 860 residues above the legal limit. It should be highlighted that usually, when non-compliant products are identified in the framework of import controls, the products are rejected at the border and are not placed on the market. More details on the pesticides found in concentrations exceeding the legal limit are summarised in Table 3-1. In tea leaves and grapefruit/pomelos from China the highest number of MRL exceedances was detected with 213 and 207 determinations, respectively, followed by okra from India (103 determinations) and peppers from the Dominican Republic (45 residues).

It is noted that almost half of the MRL exceedances were related to pesticides which are no longer approved in the EU, with the highest percentage for Turkish peppers, where 100 % of the MRL exceedances were observed for non-approved pesticides, followed by Chinese grapefruits/pomelos (93.7 %), Indian okras (72.8%) and peppers from Egypt and Thailand (66.7 % respectively).

Table 3-1: Results of import controls in the framework of Regulation (EC) No 669/2009

Product/country of origin	Number of samples analysed [(a)]	Number of determinations exceeding the MRL	Pesticides most frequently exceeding the MRL / MRL (mg/kg)	Number of detections above the MRL	Residue concentrations measured (mg/kg)
China[(b)]	**1309**	**446**			
Broccoli[(c)]	17	24	Dimethomorph / 0.05*	8	0.055 – 0.7
			Chlorfenapyr / 0.05*	3	0.066 – 0.4
			Others / -	13	
Chinese cabbage	1	2	Dimethomorph / 0.05*	1	7.0
			Acetamiprid / 0.01*	1	0.041
Grapefruit[(d)]	795	207	Methamidophos / 0.01*	163	0.021 – 0.22
			Triazophos / 0.01*	20	0.011 – 0.045
			Phenthoate / 0.01*	10	0.011 – 0.072
			Carbendazim (RD) / 0.2	6	0.24 – 0.46
			Others / -	8	
Tea leaves	496	213	Acetamiprid (RD) / 0.1	63	0.106 – 2.4
			Imidacloprid / 0.05*	43	0.052 – 0.32
			Buprofezin / 0.05*	28	0.051 – 0.59
			Triazophos / 0.02*	14	0.022 – 0.5
			Fipronil (RD) / 0.005*	8	0.012 – 0.72
			Carbendazim (RD) / 0.1*	7	0.014 – 0.39
			Chlorpyrifos / 0.1*	7	0.11 – 0.62
			Pyridaben / 0.05*	7	0.067 – 0.41
			Others / -	36	

[45] Regulation (EC) No 669/2009 does not give an exhaustive list of pesticides that have to be checked; instead it describes the analytical methods that should be used for controls (usually multi-residue methods based on GC-MS and LC-MS). A list of pesticides which were found previously in concentrations exceeding the MRL is also provided to give further indications which pesticides should be covered by the analytical methods used for import control.

Product/country of origin	Number of samples analysed [(a)]	Number of determinations exceeding the MRL	Pesticides most frequently exceeding the MRL / MRL (mg/kg)	Number of detections above the MRL	Residue concentrations measured (mg/kg)
Dominican Republic	**686**	**97**			
Aubergines	229	15	Acetamiprid (RD) / 0.15	4	0.17 – 0.21
			Methomyl (RD) / 0.02*	3	0.022 – 0.13
			Others / -	8	
Beans with pods[(e)]	241	37	Endosulfan (RD) / 0.05*	13	0.057 – 0.55
			Cypermethrin (RD) / 0.7	7	0.75 – 1.0
			Dimethoate (RD) / 0.02*	5	0.022 – 0.24
			Others / -	12	
Courgette[(f)]	-	-	-	-	
Peppers	216	45	Carbendazim (RD) / 0.1*	6	0.15 – 1.3
			Endosulfan (RD) / 1[(j)]	5	0.051 – 0.32
			Others / -	34	
Egypt	**625**	**66**			
Oranges	424	40	Malathion (RD) / 0.02*	11	0.021 – 0.14
			Diazinon / 0.01*	9	0.011 – 0.052
			Dimethoate (RD) / 0.02*	5	0.027 – 0.64
			Others / -	15	
Peaches	-	-	-	-	
Peppers	25	9	Fenarimol / 0.02*	3	0.038 – 0.077
			Flusilazole / 0.02*	1	0.11
			Others / -	5	
Pomegranate	18	2	Lambda-cyhalothrin / 0.02*	1	0.06
			Imazalil / 0.05*	1	0.149
Strawberries	158	15	Methomyl (RD) / 0.02*	6	0.026 – 0.42
			Carbendazim (RD) / 0.1*	3	0.15 – 0.46
			Others / -	6	
India	**195**	**103**			
Basil[(g)]		-	-	-	
Okra	195	103	Monocrotophos / 0.01*	18	0.013 – 1.6
			Acephate / 0.02*	17	0.03 – 3.2
			Acetamiprid (RD) / 0.01*	15	0.011 – 0.68
			Triazophos / 0.01*	11	0.011 – 0.46
			Methamidophos / 0.01*	9	0.011 – 0.074
			Endosulfan (RD) / 0.05*[(j)]	6	0.062 – 0.9
			Profenofos / 0.05*	5	0.054 – 1.3
			Others / -	22	
Thailand	**545**	**81**			
Aubergines	214	20	Dimethoate (RD) / 0.02*	8	0.031 – 0.17
			Methomyl / 0.02*	5	0.027 – 0.036
			Others / -	7	
Basil[(g)]	26	9	Profenofos / 0.05*	2	0.31 – 0.4
			Imidacloprid / 2	1	3.9
			Chlorpyrifos / 0.05*	1	2.6
			Ethofenprox / 3	1	6.4
			Tetradifon / 0.02*[(j)]	1	0.032
			Others / -	3	
Beans with pods[(e)]	129	18	Indoxacarb (RD) / 0.02*	4	0.031 – 0.041
			Metalaxyl (RD) / 0.05*	2	0.085 – 0.21
			Others / -	12	

Product/country of origin	Number of samples analysed (a)	Number of determinations exceeding the MRL	Pesticides most frequently exceeding the MRL / MRL (mg/kg)	Number of detections above the MRL	Residue concentrations measured (mg/kg)
Celery leaves[i]	119	10	Chlorpyrifos / 0.05*	5	0.093 – 0.23
			Malathion (RD) / 0.02*	1	0.021
			Others / -	4	
Peppers	57	24	Triazophos / 0.01*	4	0.015 – 1.1
			Prochloraz (RD) / 0.05*	4	0.06 – 0.17
			Dicofol / 0.02*	2	0.022 – 1.2
			Others / -	14	
Turkey	**3112**	**67**			
Peppers	2559	62	Formetanate / 0.05*	29	0.054 – 1.41
			Tetradifon / 0.02*[j]	7	0.013 – 0.043
			Clofentezine (RD) / 0.02*	5	0.037 – 0.14
			Others / -	21	
Tomatoes	553	5	Procymidone / 0.02*	4	0.071 – 0.48
			Tetradifon / 0.02*[j]	1	0.021

*: Limit of quantification
(a): Since some of the products on the import control list are not very common in the EU (e.g. yardlong beans, Chinese broccoli, bitter melons, curry leaves, sweet holy basil), some reporting countries probably did not use the correct food codes for reporting the results. This deficiency hampers the overall analysis. Possibilities to improve clarity on the coding of results should be discussed with reporting countries.
(b): Samples from Hong Kong were not included in this analysis.
(c): Broccoli, including Chinese broccoli
(d): Grapefruit including pomelos
(e): Beans with pods including yardlong beans
(f): Courgette including bitter melons
(g): Basil including curry leaves
(h): Basil including holy basil
(i): Celery leaves including comprising coriander leaves
(j): MRL in place on 01/01/2012. MRL changed during the year.

Based on these findings risk management decisions should be taken for which products and countries of origin the increased level of import control should be maintained.

3.2.4. Results on specific food product groups

3.2.4.1. Baby food

Reporting countries analysed 1,659 samples of baby food; 604 samples of cereal based formulae, 138 samples of follow on formulae and 81 samples of infant formulae. For the majority of the samples (836 samples) the type of product was not specified. Most of the samples were surveillance samples (1,648 samples, 99.3 %).

1,520 of the baby food samples (91.6 %) were free of measurable residues; in 139 samples (7.8 %) detectable pesticide residues below the MRL were found. Multiple residues were detected in nine samples; in three samples[46] multiple MRL exceedances were identified. For a total of ten samples (0.61 % of the analysed baby food samples) the reporting countries noted MRL exceedances. Compared with the overall results for other products the detection and MRL exceedance rate was significantly lower in baby food samples (detection rate: 7.8 % in baby food versus 42.1 % for all food groups, MRL exceedance rate all product types: 0.61 % in baby food versus 2.9 % in all food groups).

In total, 29 different pesticides were detected in concentrations above the LOQ. These pesticides and further details on these samples are compiled in Table 3-2. Most of the pesticides were found only in

[46] Multiple MRL exceedances related to chlormequat (0.16 mg/kg), chlorpyrifos-methyl (0.069 mg/kg) and pirimiphos-methyl (0.27 mg/kg) in a French sample, chlorpyrifos-methyl (0.041 mg/kg) and pirimiphos-methyl (1.1 mg/kg) in another French sample and DDAC (0.111 mg/kg) and BAC (0.092 mg/kg) in a German sample.

traces which are not likely to result from illegal uses, but rather from contaminations. In 2012 the biocidal products DDAC and BAC – both are widely used as disinfectants, but which also fall under the MRL legislation due to their use as a pesticide in the past – were analysed more systematically by Germany. Residue concentrations above the default MRL were detected for both substances most likely resulting from their use for food hygiene purposes. The analysis also demonstrated that for some naturally occurring substances (e.g. copper, sulphur, CS_2 reported as dithiocarbamates) the default MRL for baby food (0.01 mg/kg) is repeatedly exceeded. Thus, for these substances an adaptation of the existing default MRLs should be discussed by risk managers. Specific attention should be also paid to possible contaminations of baby food with products that are used for post-harvest treatment of cereals like pirimiphos-methyl and in particular dichlorvos. Since dichlorvos is extremely toxic, specific efforts should be made to identify the source of this residue and to take corrective measures to avoid any dichlorvos contaminations of baby food in future.

Table 3-2: Details on baby food containing measurable residues/exceeding the MRL

Pesticide	Number of detections above LOQ	Number of detections above MRL	Origin of the products exceeding MRL	Range of measured residue levels (mg/kg)	Comment
Copper	75	1[(a)]	DE	0.3 – 5.41	Copper is a naturally occurring substance. The current MRL of 0.01 mg/kg should be reconsidered, taking into account the natural background concentrations.
Pirimiphos-methyl	11	2[(b)]	BG	0.004 – 1.1	The pesticide is used for post-harvest treatment of cereals.
BAC (RD)	11	3[(c)]	DE	0.013 – 0.119	BAC is used as a biocide (disinfectant).
Hexachlorobenzene (HCB)	8	-	-	0.0001 – 0.0004	Environmental contaminant resulting from use of HCB as pesticide in the past.
Carbendazim (RD)	5	-	-	0.002 – 0.01	
Cyfluthrin (RD)	5	-	-	0.0038 – 0.0072	
Phenthoate	4	-	-	0.002 – 0.004	Pesticide not approved in the EU.
Azoxystrobin	3	-[(d)]	-	0.01 – 0.013	
Methomyl (RD)	3	-	-	0.0027 – 0.0029	
Ethoprophos	2	-	-	0.002 – 0.0033	
Spinosad (RD)	2	-	-	0.004	
DDAC	2	2	DE	0.019 – 0.111	See comment on BAC
Chlorpyrifos-methyl	2	- [(d)]	-	0.041 – 0.069	
Cypermethrin (RD)	2	-	-	0.0052 – 0.0068	
DDT (RD)	2	-	-	0.0002	Environmental contaminant resulting from pesticide use in the past.
Tebuconazole	2	-	-	0.002 – 0.003	
Tebufenozide	1	-	-	0.003	
Sulphur	1	- [(e)]	-	20.5	Naturally occurring substance
Iprodione	1	-	-	0.0031	
Pirimicarb (RD)	1	-	-	0.004	

Pesticide	Number of detections above LOQ	Number of detections above MRL	Origin of the products exceeding MRL	Range of measured residue levels (mg/kg)	Comment
Lindane	1	-	-	0.0001	Environmental contaminant resulting from pesticide use in the past.
Cyprodinil	1	-	-	0.002	
Chlorpyrifos	1	-	-	0.002	
Chlormequat	1	- [(e)]	-	0.16	
Mevinphos (RD)	1	-	-	0.0003	
Trifloxystrobin	1	-	-	0.002	
Dichlorvos	1	1	unknown	0.014	Sample analysed in BE. Pesticide no longer approved in the EU; very toxic substance with extremely low toxicological reference values.
Dithiocarbamates	1	1	unknown	0.072	Possible false positive result resulting from sulphur containing natural compounds in plants.
Fluazifop-P-butyl (RD)	1	-	-	0.01	

(a): In all 75 samples where copper was detected the residue concentration exceeded the default MRL; only for 1 sample the reporting country reported the sample as exceeding the legal limit.
(b): In additional 2 samples the residue concentration was higher than the default MRL, but the samples were not reported as exceeding the legal limit.
(c): In all 11 samples where BAC was detected the residue concentration exceeded the default MRL; only for 3 samples the reporting countries reported the sample as exceeding the legal limit.
(d): In 2 samples the residue concentrations were higher than the default MRL, but the samples were not reported as exceeding the legal limit.
(e): Although the reported residue concentration exceeded the default MRL, the sample was not reported as exceeding the legal limit.

3.2.4.2. Organic food

In total 4,576 samples of organic food were taken (5.8 % of the total number of samples). For all food groups except 'other products'[47] and baby food, the detection rate and MRL exceedance rate was lower for organic products compared to conventionally produced food (Figure 3-14).

136 different pesticides were found in measurable concentrations (above the LOQ) in products produced organically; 37 thereof were found only in traces (less than 0.01 mg/kg). The pesticides detected most frequently (found in at least 5 samples) are presented in Figure 3-15. It is noted that copper and spinosad are allowed in organic farming. Thus, the presence of residues of these compounds is not linked to agricultural practices not permitted in organic farming. Residues of hexachlorobenzene, DDT and dieldrin are most likely resulting from environmental contaminations in soil, due to the use of these persistent compounds in the past. Detections of bromide ion and dithiocarbamates in certain commodities[48] result from naturally occurring plant products and are not necessarily related to the use of pesticides. DDAC and BAC are quaternary ammonium compounds that nowadays are widely used as disinfectants. The detection of the remaining pesticides reported in Figure 3-15 give an indication that pesticides not allowed for organic farming were used or that

[47] Due to the low number of organic samples in the group of 'other products', the statistical significance of the result is limited.
[48] Dithiocarbamates were reported for broccoli, cauliflower, kale, rucola, apricots, bananas, parsley and wheat. Brassica vegetables are known to contain certain sulphur compounds that give a positive result in the analysis for dithiocarbamates. The positive results for organically produced brassica vegetables are thus most likely not the result of the use of dithiocarbamates.

contaminations of organic products occurred during handling, packaging or processing of organic products.

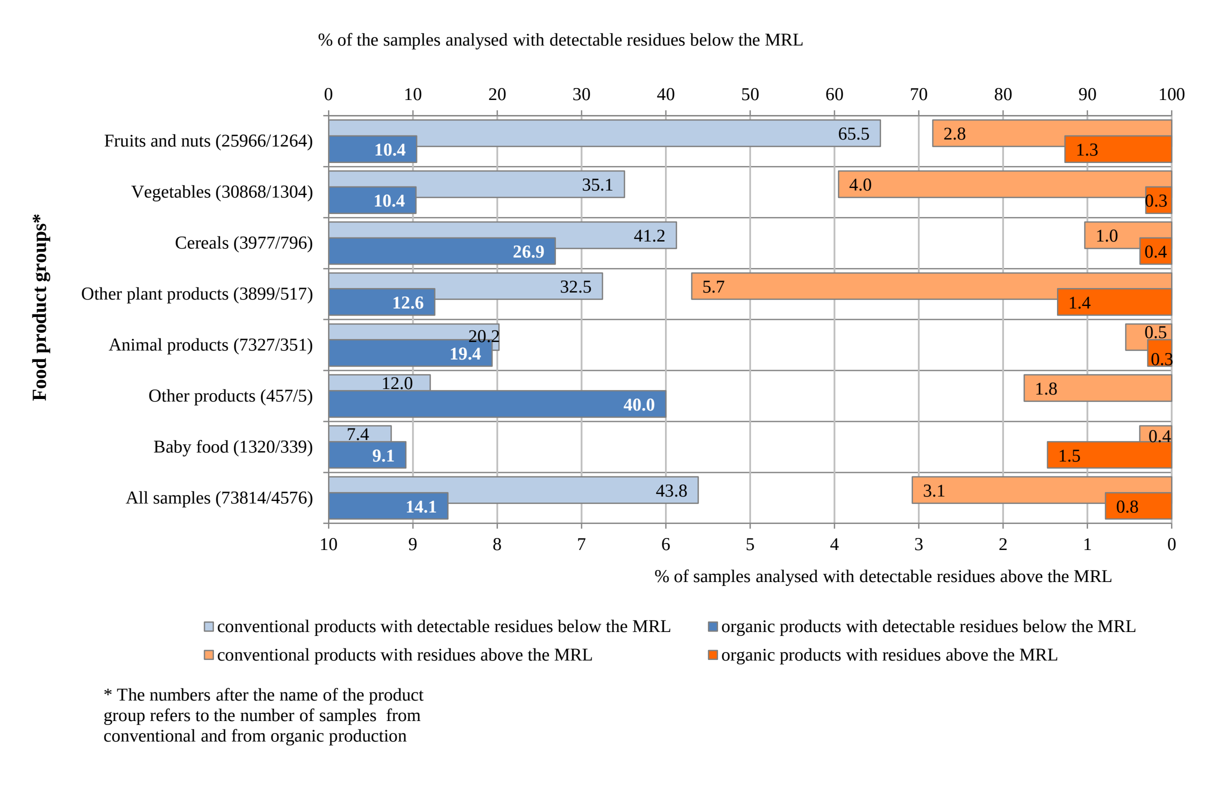

Figure 3-14: Comparison of organic and conventional food: MRL exceedance rate and samples containing measurable residues

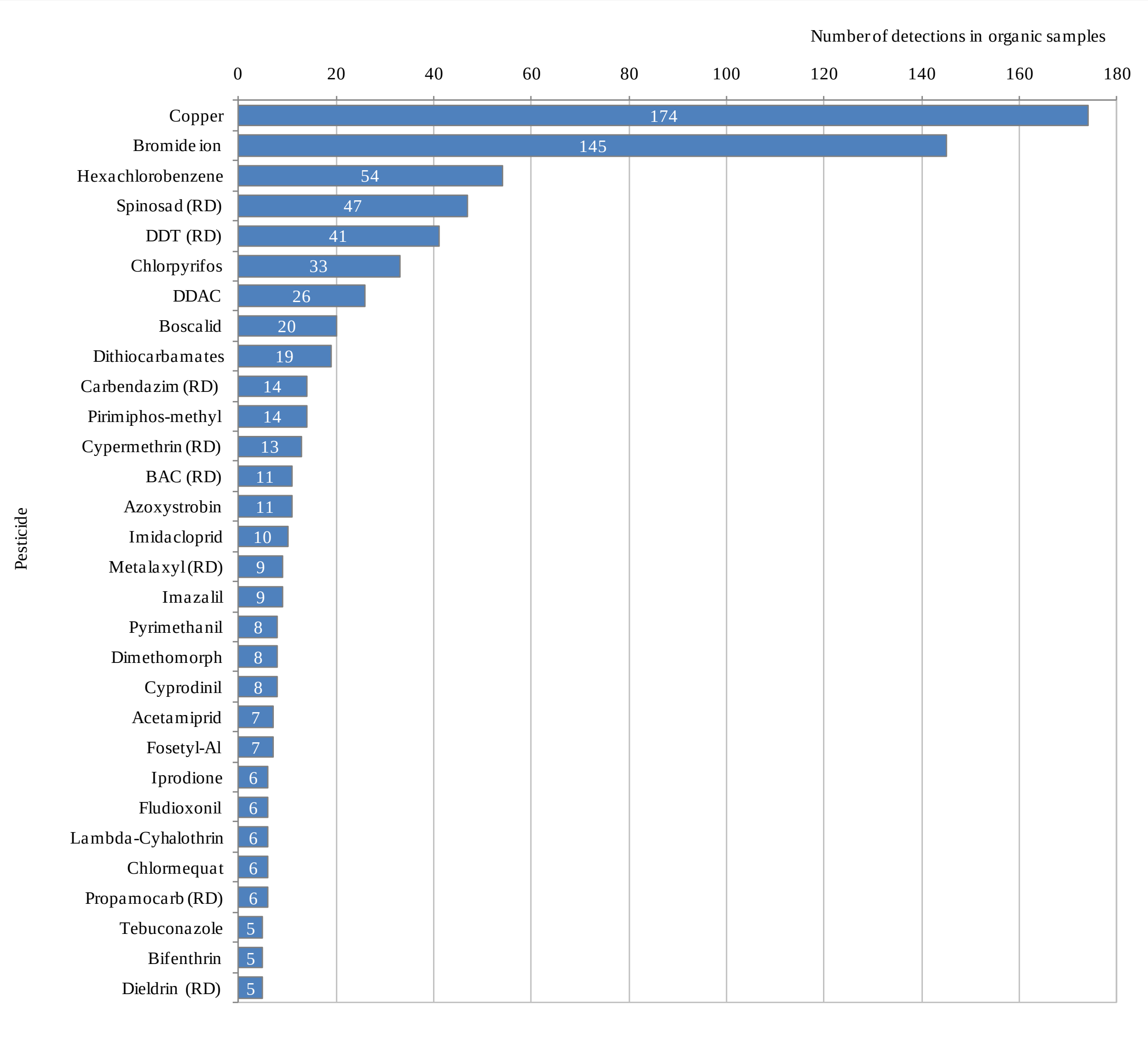

Figure 3-15: Pesticides detected most frequently in organic samples (at least 5 detections)

35 samples of organic products contained residues above the MRL; in two samples multiple MRL exceedances were identified.[49] In Table 3-3 more details on organic samples that exceeded the legal limit are reported. The most frequent MRL exceedances were reported for DDAC and BAC (RD).[50] For both compounds the default MRL of 0.01 mg/kg is applicable. In 2014, an amendment of the legal limit for these two compounds was discussed at EU level, to allow marketing of food that contained residues of these biocidal products.

[49] One sample of herbal infusions exceeded the MRL for imidacloprid and bromide ion and one sample of baby food contained BAC and DDAC in concentrations above the legal limit.

[50] DDAC and BAC are substances that were previously used as pesticide. They are widely used at present as a biocide for disinfection of machineries, surfaces or equipment leading to residues in food. In July 2012 the Standing Committee on the Food Chain and Anima1 Health (SCoFCAH) has agreed on guidelines regarding the enforcement of DDAC and BAC MRLs (residues below 0.5 mg/kg were considered as acceptable). Recently a decision was taken to revise the MRLs based on monitoring data (Commission Regulation (EU) No 1119/2014 of 16 October 2014 amending Annex III to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for benzalkonium chloride and didecyldimethylammonium chloride in or on certain products. OJ L 304, 23.10.2014, p. 43–74.)

Table 3-3: Details on organic samples exceeding the MRL

Pesticide/commodity	Origin of the products	Number of detections exceeding the MRL	Range of measured residue levels (mg/kg)	MRL (mg/kg)
DDAC		**12**		
Apricots (dried)	unknown	1[(b)]	0.094	0.01*[(d)]
Baby food	DE	2[(c)]	0.019 - 0.111	0.01*
Bananas	Dominican Republic	7	0.073 - 0.292	0.01*
Fresh herbs	DE	1	0.28	0.01*
Rocket, Rucola	DE	1	0.041	0.01*
Imidacloprid		**3**		
Dried herbal infusions	AT, unknown	2	0.44 - 0.493	0.05*
Tea leaves	AT	1[(b)]	0.067	0.05*
Dimethoate (RD)		**2**		
Apples	DE	1	0.11	0.02*
Guava	Thailand	1[(b)]	0.0204	0.02*
BAC (RD)		**3**		
Baby food	DE	3	0.029 - 0.119	0.01*
Bromide ion		**2**		
Dried herbal infusions	unknown, RO	2[(c)]	118.39 - 212.8	50 – 250[(a)]
Copper		**2**		
Pine nuts	IT	2[(b)]	30.1 - 33.6	30
Acetamiprid		**1**		
Honey	CZ	1[(b)]	0.097	0.05*
Biphenyl		**1**		
Grapefruit	IT	1[(b)]	0.016	0.01*
Propargite		**1**		
Table olives	GR	1	0.04	0.01*
Dinotefuran		**1**		
Tea leaves	Japan	1	0.041	0.01*
Cyfluthrin (RD)		**1**		
Wheat	unknown	1[(b)]	0.026	0.02*
Naphthoxyacetic acid, 2-		**1**		
Tomatoes	IT	1[(b)]	0.015	0.01*
Cypermethrin (RD)		**1**		
Passion fruit	Thailand	1[(b)]	0.056	0.05*
Quintozene (RD)		**1**		
Tea leaves	India	1	0.11	0.1*
Thiophanate-methyl		**1**		
Dried herbal infusions	Egypt	1[(b)]	0.11	0.1*
Dichlorvos		**1**		
Barley	DE	1[(b)]	0.014	0.01*
Diflubenzuron		**1**		
Wheat	GR	1[(b)]	0.17	0.1

*: Limit of quantification
(a): Different MRLs for the individual commodities classified as dried herbal infusions
(b): None of the samples was considered as non-compliant with the MRL, taking into account the measurement uncertainty
(c): Only one of the samples was considered as non-compliant with the MRL, taking into account the measurement uncertainty
(d): MRL for fresh apricots: default MRL of 0.01 mg/kg

3.2.4.3. Animal products

In total, 7,678 samples of animal products were analysed. The majority of these samples (79.3 %) was free of measurable residues; 0.5 % of the samples exceeded the MRL. 48 different pesticides were found in concentrations above the LOQ; the most frequently detected pesticides in at least 20 samples were copper, DDT (RD), hexachlorobenzene, mercury compounds, hexachlorocyclohexane (alpha and beta-isomer), thiacloprid, dieldrin (RD), pirimiphos-methyl, dimoxystrobin, BAC (RD), heptachlor (RD) and DDAC. 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. Copper which was the most frequently detected pesticide in animal commodities is used as a feed supplement in animal nutrition. Thus, it is likely that the copper residues are not directly linked to the use of copper containing pesticides but are related to the use feed additives. In addition, certain pesticides such as acetamiprid, boscalid, amitraz, haloxyfop, fluazifop and azoxystrobin were detected repeatedly in honey. In general, residues resulting from currently used pesticides and also for so-called ‘dual use substances’ – these are substances that are not only used as active substance in pesticides but also in veterinary medicinal products or biocides like DDAC, BAC, were found only sporadically.

In Figure 3-16 the pesticides detected most frequently in the different animal products are presented while in Table 3-4 details on the pesticide/commodity combinations are reported which were found to exceed the legal limits.

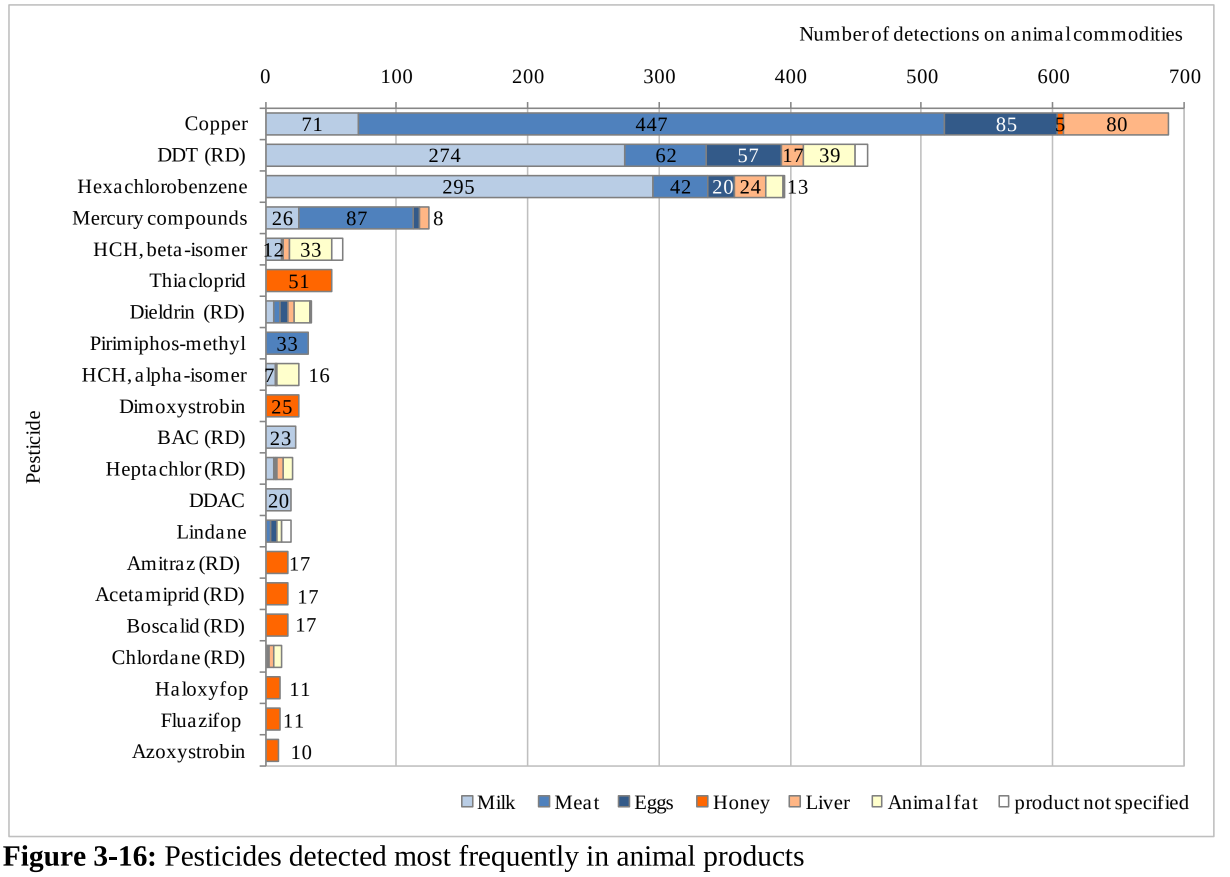

Figure 3-16: Pesticides detected most frequently in animal products

Table 3-4: Details on samples of animal products exceeding the MRL

Product/pesticide	Origin of the products	Number of detections exceeding the MRL	Range of measured residue levels (mg/kg)	MRL (mg/kg)
Bovine liver		**21**		
Copper	DE	20	40 - 454	30
Mercury compounds (RD)	DE	1	0.012	0.01*
Honey		**10**		
Acetamiprid (RD)	ES, DE, China, CZ	7	0.01 – 0.52	0.05*
Carbaryl	China	1	0.52	(a)
Amitraz	AT	1	0.062	0.01*
Azoxystrobin	DE	1	0.14	0.01*
Fat of swine, sheep, bovine		**3**		
Chlorpyrifos (in swine fat)	ES	1	0.011	(b)
Lindane (in sheep fat)	ES	1	0.53	0.02
Heptachlor (in bovine fat)	ES	1	0.08	0.2
Bovine meat		**1**		
Copper	DE	1	21 - 23	5
Poultry meat		**2**		
Mercury compounds	Indonesia, Brazil	2	0.017 – 0.023	0.01*
Chicken eggs		**2**		
DDT (RD)	DE	1	0.82	0.05
Hexachlorobenzene	DE	1	0.44	0.02
Meat of other farm animals		**1**		
Mercury compounds(RD)	DE	1	0.013	0.01*

*: MRL set at the limit of quantification (LOQ)

(a): For carbaryl no MRL is established for honey. According to the reporting country the sample was considered as non-compliant with the legal limit.

(b): For chlorpyrifos no MRLs are established under Regulation (EC) No 396/2005 for food of animal origin. According to the reporting country the samples was considered as non-compliant with the legal limit.

3.2.5. Multiple residues in the same sample

Residues of more than one pesticide (multiple residues) were found in 26.1 % of the samples (20,471 samples); multiple MRL exceedances were found in 438 samples (0.56 %).

Excluding food products that were analysed only seldom (less than 20 samples), multiple residues were found most frequently in grapefruit (82.1 % of all grapefruit samples analysed), rocket/rucola (72.6 %) and gooseberries (72.6 %), followed by mandarins, other citrus fruit (not specified), papaya, table grapes, oranges, strawberries and limes (more than 60 % of the samples with multiple residues). In Figure 3-18 the results for the top 40 food products with multiple residues are presented, broken down by the number of detected residues.

Multiple residues in one single sample may result from the application of different types of pesticides on a crop or from pesticides formulations that contain more than one active substance. Besides the agricultural practices mentioned, multiple residues may also be due to mixing of lots with different treatment history, 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. However, the presence of multiple residues in food should be assessed with regard to possible associated consumer health risks. Dietary risk assessments for multiple residues present on individual samples can be found in Section 4.3.

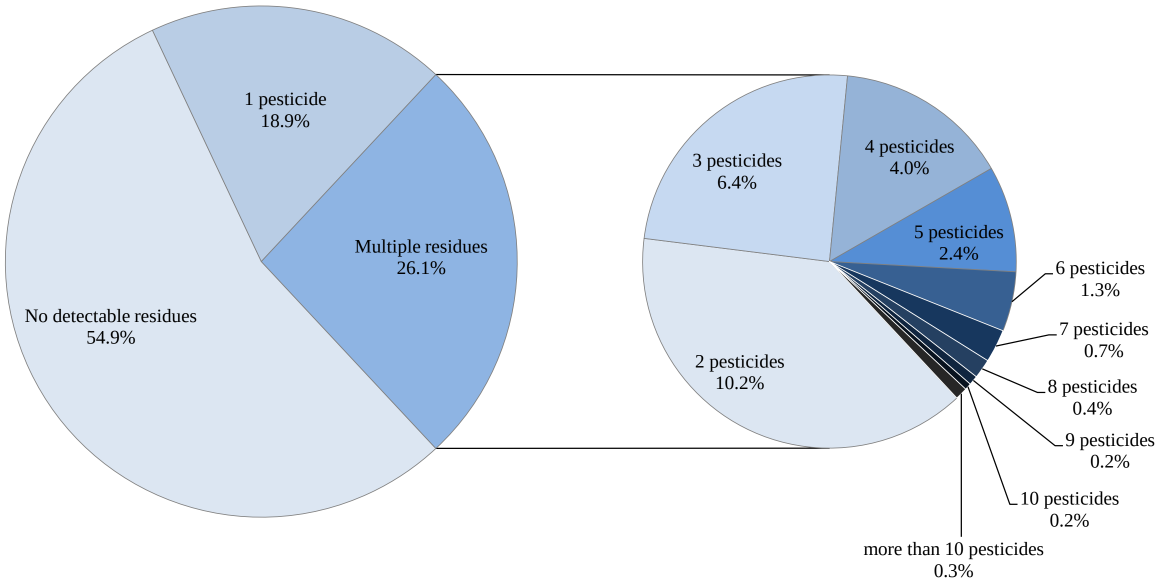

Figure 3-17: Multiple residues detected in surveillance samples – surveillance samples only

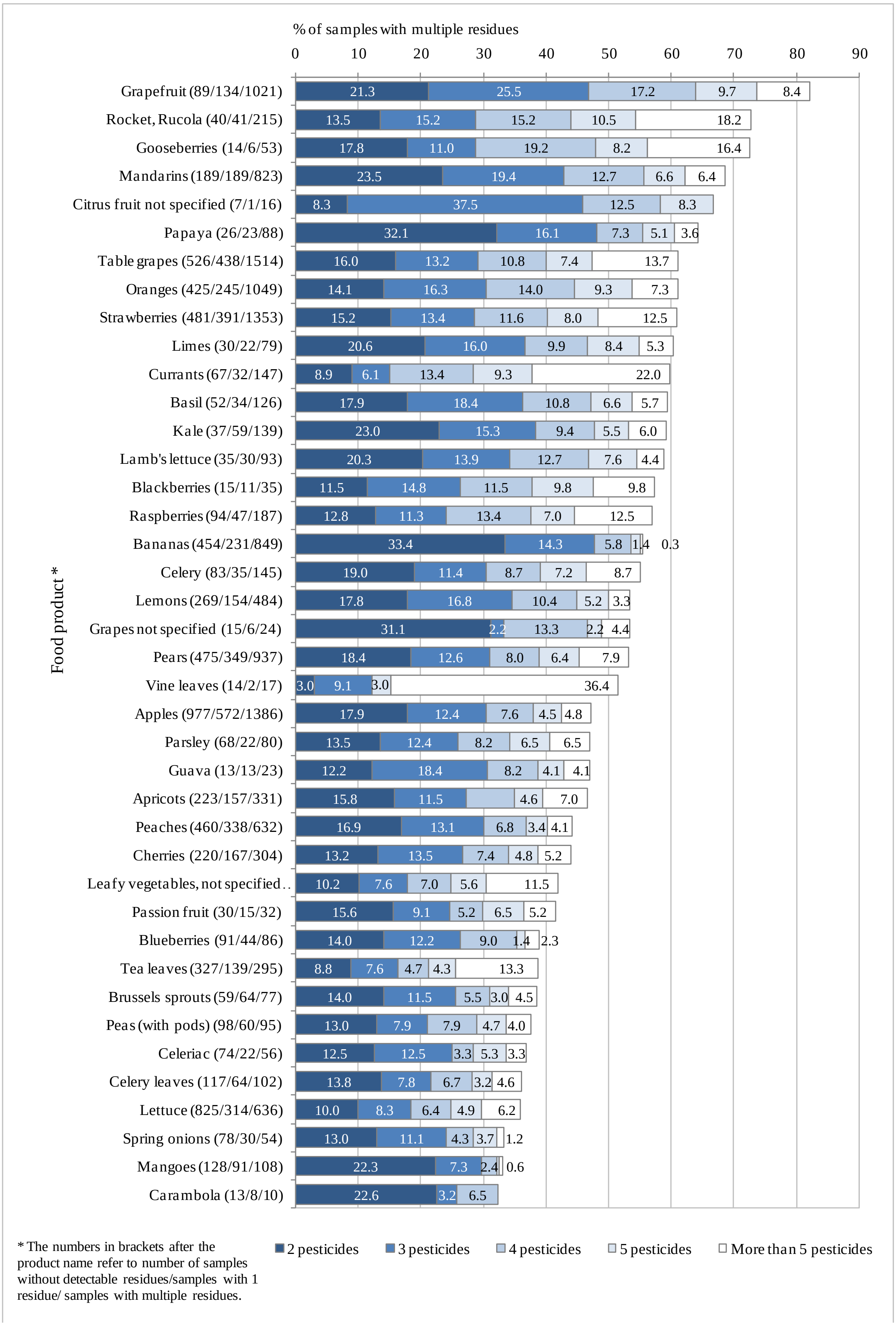

Figure 3-18: Food products containing most frequently multiple residues

3.3. Reasons for MRL exceedances

In total, 2,308 samples exceeded the legal limit. Considering samples with multiple MRL exceedances, the MRL breaches were reported for 3,224 individual determinations. The possible reasons for MRL exceedances were not reported systematically by the reporting countries. Based on a detailed analysis of the results regarding the type of product, pesticide, country of origin and approval status of the pesticide a tentative classification of possible reasons for the most frequent MRL breaches was derived by EFSA to provide risk managers some background information to discuss strategies for reducing the level of food non-compliant with EU pesticide legislation.

2,169 MRL exceedances were detected for products imported from third countries; almost 40 % of these MRL exceedances (860 determinations) were related to samples taken in the framework of import controls under Regulation (EC) No 669/2009 (see Section 3.2.3).

932 MRL exceedances concerned products produced in one of the reporting countries[51], 188 of these cases were linked to active substances that are not approved in the EU while the majority of the MRL breaches (744 determinations) concerned pesticides that are approved or are in the approval process.

More details on pesticide/crop combinations with a high frequency of MRL exceedances are compiled in Appendix III, Table B.[52]

The analysis of the reported results demonstrate that for food products imported from third countries MRL exceedances are mainly due to the use of pesticides on crops for which no import tolerances are set. Many of the MRL exceedances refer to pesticides that are no longer approved in the EU and for which the EU MRLs are set at the limit of quantification.

As regards MRL exceedances on crops grown in the EU, the following possible reasons for MRL exceedances were identified:

- Use of approved pesticides but not respecting the Good Agricultural Practices (i.e. use of the plant protection products on crops for which no authorisation was granted, use of the pesticides not respecting the application rate, pre-harvest interval, number of applications or method of application);
- To a lesser extent the use of pesticides that are not approved or no longer approved;
- MRL exceedances because the natural background concentrations exceed the existing MRLs;
- MRL exceedances because residues related to environmental contaminations exceed the existing MRLs;
- The MRLs set under Regulation (EC) No 396/2005 do not reflect other sources of residues for certain substances that fall under the pesticide legislation that are used for other purposes (e.g. biocides/disinfectants, feed additives, veterinary medicinal products).
- In addition, cases of MRL exceedances were also identified for products that are not directly treated with the pesticide, but where the legally permitted uses result in contaminations of non-target food products (e.g. residues in honey resulting from treatment of crops attractive for bees, residues in vine leaves resulting from treatment of table or wine grapes).

[51] In 2012 a high number of MRL exceedances (79 determinations) was detected in cumin seed samples which were reported as originating from EU Member States, probably because the products were processed in the EU.

[52] The results related to import control samples are not included in this table. Details on this subset of samples with MRL exceedances can be found in Table 3-1.

- It needs to be borne in mind that MRLs are established on the basis of supervised residue trials. The level of the MRL is calculated using statistical methodologies; the MRL usually is established to cover at least the upper 95 % confidence interval of the 95^{th} 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.

Risk management options on how to avoid that MRLs are exceeded are presented in the Recommendations section at the end of the report.

SUMMARY CHAPTER 3

In 2012, in total 78,390 samples were analysed for pesticide residues under the national control programmes. The majority of samples (70,870 samples, 90.4 %) were classified as surveillance samples. In contrast to all other reporting countries, the majority of samples analysed in Bulgaria were reported as enforcement samples (91.3 %), thus, targeting towards products which are expected to be non-compliant with the legal limits.

54,487 samples were analysed originating from one of the 29 reporting countries (69.5 %). 19,257 samples (24.5 %) concerned products imported from third countries. The countries with the highest rate of samples of imported products are Bulgaria (91.8 %), the Netherlands (61.7 %) and Lithuania (57.8 %), while countries like Greece, Spain, Portugal, Italy, Cyprus and Poland focussed the national control programmes mainly on domestic products with more than 70 % of samples analysed produced domestically.

The samples of imported products were originated mainly from Turkey (4,359 samples), China (1,768 samples), Thailand (1,016 samples) South Africa (1,004 samples) and Dominican Republic (996 samples). Circa one third of the samples of imported products (6,472 samples) were taken for products subject to increased level of official controls under Regulation (EC) No 669/2009.

In total, all reporting countries covered almost 800 pesticides. On average, a sample was analysed for 203 different pesticides; Ireland, Luxembourg, Sweden and Germany analysed on average for more than 270 pesticides per sample.

The 2012 EU control programme covered 222 unprocessed agricultural food commodities and approximately 450 products of processed food. The highest number of different types of food were analysed in Italy, Finland, France, Germany, the Netherlands, Denmark and Austria where more than 150 different product types (processed products and unprocessed raw commodities) were analysed by the control programmes; the national programmes of Malta, Latvia and Bulgaria were restricted to less than 30 food product types, mostly unprocessed products.

Overall, 2.9 % of all the samples analysed exceeded the MRL while 54.9 % of the samples were free of detectable residues; for 1.7 % of the samples the reporting countries took legal or administrative actions against the responsible food business operators because of infringement of the MRL legislation, taking into account the measurement uncertainties. Focussing on surveillance samples only and excluding enforcement samples which are likely to bias the result, the MRL exceedance rate and non-compliance rate was 2.2 % and 1.2 % of the samples analysed, respectively.

Of the samples originating from EU/EEA countries, 41.3 % contained residues above the LOQ but within the MRL, 1.4 % of the samples exceeded the legal limit while 57.3 % of the samples were free of measurable residues. As regards samples originating from third countries, 45.9 % of the samples contained measurable residues within the MRL; 7.5 % of the samples exceeded the legal limit while 46.6 % of the samples were free of measurable residues.

MRL exceedance rates for unprocessed products above the average of 3.2 % calculated for this subset of samples were noted mainly for products subject to increased import controls, such as basil, okra, grapefruit, celery leaves and tea leaves. In addition, also for leafy vegetables and fresh herbs (e.g. parsley, rucola, chard, lamb’s lettuce), legume vegetables like peas with pods and beans with pods, and certain tropical fruits and vegetables (e.g. papaya, pomegranates, mangoes, yams, pineapples) the MRL exceedance rate was above the average.

The overall MRL exceedance for processed products was lower than in unprocessed products (0.9 % of the samples analysed); above-average findings were identified for certain spices, vine leaves, lentils, poppy seeds, tea leaves, gherkins and herbal infusions.

In food produced in one of the reporting countries the pesticides most frequently exceeding the MRLs were chlorpyrifos, dimethoate, dithiocarbamates, acetamiprid, iprodione, carbendazim, copper, cypermethrin and imidacloprid, whereas on imported products MRL exceedances were most frequently related to methidathion, acetamiprid, dimethoate, carbendazim, chlorpyrifos, triazophos, imidacloprid, endosulfan, profenophos, acephate, methomyl, buprofezin, methamidophos, imazalil, ethion malathion, flubendiamide, formethanate, hexaconazole, monocrotophos, fipronil, myclobutanil, bifenthrin, carbofuran, propargite and diazinon. In total, 1,122 MRL exceedances were reported for pesticides no longer approved in the EU, most of these MRL exceedances (897 cases) were found on imported products while for products produced in the EU and EFTA countries, the majority of MRL exceedances was resulting from approved pesticides (744 cases); 188 MRL exceedances concerned non-approved pesticides.

6,472 of the samples analysed were products in focus for an increased level of import controls under Regulation (EC) No 669/2009. Overall, 637 of these samples (9.8 %) exceeded the legal limit for one or several pesticides with 860 residues above the legal limit. The most frequent MRL exceedances were reported for tea leaves and grapefruit/pomelos from China with 213 and 207 determinations above the legal limits, respectively, followed by okra from India (103 determinations) and peppers from the Dominican Republic (45 residues).

Overall, 1,659 samples of baby food were analysed by the reporting countries. 1,520 of the baby food samples (91.6 %) were free of measurable residues; in 139 samples (7.8 %) pesticide residues between the LOQ and the MRL were found; these detectable residues were related to 29 different pesticides. Multiple residues were detected in nine samples; in three samples multiple MRL exceedances were identified. For ten samples (0.6 %) the reporting countries noted MRL exceedances for the following substances: copper, pirimiphos-methyl, BAC (RD), DDAC dichlorvos and dithiocarbamates.

In total 4,576 samples of organic food were analysed, 35 samples contained residues above the MRL. 136 different pesticides were found in measurable concentrations. Among the most frequently detected pesticides were copper and spinosad, two compounds which are allowed to be used in organic farming. In addition, the detectable residues are related to naturally occurring substances (e.g. bromide ion), environmental contaminants (e.g. DDT, hexachlorobenzene) or substances which are used not only as plant protection products but also for other purposes (e.g. biocides like DDAC or BAC) and to a number of synthetic chemical pesticides. MRL exceedances on organic products were identified for 17 different pesticides, most frequently compounds such as DDAC, imidacloprid, dimethoate, BAC, bromide ion, copper.

7,678 samples of animal products were analysed. 79.3 % of the samples were free of measurable residues; 0.5 % of the samples exceeded the MRL. 48 different pesticides were found in concentrations above the LOQ; the most frequently detected pesticides found in at least 20 samples were copper, DDT (RD), hexachlorobenzene, mercury compounds, hexachlorocyclohexane (alpha and beta-isomer), thiacloprid, dieldrin (RD), pirimiphos-methyl, dimoxystrobin, BAC (RD), heptachlor (RD) and DDAC.

Multiple pesticide residues present in individual samples were found in 26.1 % of the samples analysed (20,471 samples); multiple MRL exceedances were found in 438 samples (0.56 %). Multiple residues were found most frequently in grapefruit (82.1 % of all grapefruit samples analysed), rocket/rucola (72.6 %) and gooseberries (72.6 %), followed by mandarins, other citrus fruit (not specified), papaya, table grapes, oranges, strawberries and limes.

Overall, 2,308 samples analysed in 2012 exceeded the legal limit. Considering samples with multiple MRL exceedances, the MRL breaches were reported for 3,224 individual determinations. A detailed analysis of the MRL exceedances was performed to identify the most likely reasons for MRL exceedances. This analysis revealed that for imported food products MRL exceedances are most frequently the result of pesticides for which no import tolerances are established; in many cases these MRL exceedances referred to pesticides that are no longer authorised in the EU. For products produced in EU/EFTA countries MRL exceedances were noted mainly for approved pesticides, probably resulting from practices not respecting the Good Agricultural Practices. To a minor extent non-approved pesticides were detected in concentrations above the legally permitted limits. In addition, the observed MRL exceedances gave indications that the legal limits for so-called dual use substances (i.e. substances that are not exclusively used as pesticides but also in other areas which can lead to residues in food) might not sufficiently reflect other sources of residues. Furthermore existing MRLs for some naturally occurring substances or environmental contaminants should be reconsidered to avoid a situation in which unavoidable residues lead to MRL exceedances.

4. Dietary exposure and dietary risk assessment

As in the previous years, EFSA calculated the short-term and long-term dietary exposure for estimating the consumer health risks resulting from pesticide residues[53] in and on food.

In the acute or short-term exposure assessment the uptake of pesticide residues via food consumed within a short period of time, 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 acceptable daily intake (ADI) and the Acute Reference Dose (ARfD)), respectively, gives an indication if 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. However, if the calculated exposure exceeds the toxicological reference values, a more refined calculation should be performed to verify that the food poses a health concern (e.g. more realistic estimations of residues in edible part of the crop such as exposure to residues present in the edible part of oranges without peel). In case the refined exposure calculation still exceeds the ARfD or the ADI, possible adverse effects on the consumer health cannot be ruled out.

For estimating the actual acute and chronic exposure to pesticide residues measured in monitoring programmes, EFSA used the deterministic risk assessment methodology that was originally developed for the risk assessment in the context of pesticide authorisations (EFSA PRIMo) (EFSA, 2007). The model implements the principles of the WHO methodologies for short-term and long-term risk assessment (FAO, 2009), taking into account the food consumption data available for the European population. The methodologies are risk assessment screening methodologies which are considered to be conservative, meaning that the calculations are likely to overestimate the actual exposure. The calculation tool (adapted version of EFSA PRIMo revision 2) is available on the EFSA website[54] to recalculate the dietary exposure assessments presented in this report. This calculation tool comprises all the relevant input values required for acute and chronic risk assessment.

4.1. Short-term (acute) exposure assessment – individual pesticides

The methodology used to calculate the short-term exposure is described in detail in the 2010 European Union report on Pesticide Residues (EFSA, 2013b). It should be highlighted that the calculations were performed with assumptions which are likely to overestimate the real exposure of European consumers.[55] Thus, the results should be understood as a risk screening exercise which might require more detailed assessments in case a consumer health risk was identified with the screening methodology.

The short-term assessment was carried out separately for each pesticide/crop combination as it is considered unlikely that a consumer will eat two or more different food products in large portions within a short period of time and that all of these food products contain residues of the same pesticide at the highest level observed during the reporting year. In addition to the single pesticide risk assessment, EFSA assessed the risks related to the presence of more than one pesticide on the same sample (see Section 4.3).

[53] According to Article 32 (1)(d) of Regulation (EC) No 396/2005 the consumer exposure should be calculated on the basis of the monitoring results reported for pesticides, and for dual use substances which are used also as veterinary medicinal products, also taking into account the residue concentrations reported in the framework of Council Directive 96/23/EC. However, since the results on residues of veterinary medicinal product residues in animals are not available in a format suitable for dietary exposure calculations, this source of information cannot be used.

[54] Provided as Annex to the EFSA Journal

[55] Coincidence of the following events: 1) consumption of a large portion of the pertinent food (normally the 97.5th percentile of the daily food consumption reported in food surveys, considering only persons who have consumed the food product in focus, 2) exposure resulting from the sample with the highest residue measured, 3) assumption that the residues are not evenly distributed on the individual units analysed in the composite sample, 4) no reduction of the residues e.g. by washing, peeling, cooking.

The short-term exposure assessments were performed for the pesticides covered by the 2012 EU-coordinated programme, considering the 12 food products (i.e. aubergines, bananas, broccoli, cauliflower, peas without pods, peppers, table grapes, wheat, olive oil, orange juice, butter, and eggs)

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

- For each pesticide/crop combination the highest residue (HRM) was identified considering all the results reported in the framework of the 2012 EU-coordinated and the national programmes (surveillance samples only).
- For samples with residues below the LOQ, no acute exposure assessment was performed, assuming a no residue/no exposure situation.
- The exposure calculation for the unprocessed products (aubergines, bananas, broccoli, cauliflower, peas without pods, sweet peppers, table grapes, wheat and eggs) was based on the large portion food consumption implemented in the EFSA PRIMo (EFSA, 2007).
- For processed products covered by the EU-coordinated monitoring programme the following food consumption data were used:
    - Orange juice: EFSA used the food consumption data available for orange juice[56] to estimate the short-term exposure resulting from residues measured in orange juice. No variability factor was used.
    - Olive oil: as in the EFSA PRIMo the consumption for olives (used for oil consumption, code 402010) is reported on the basis of unprocessed olives, the EFSA PRIMo was adapted by recalculating the olive consumption to olive oil, taking into account the usual yield factor.[57]
    - Butter: no specific consumption data are available in the EFSA PRIMo for butter. Since butter is a processed product derived from milk, the residue concentrations reported for butter were used to estimate the exposure via milk. For fat soluble substances (characterised by a footnote in the MRL legislation), where the residues are expected to accumulate in butter, the residue concentrations were recalculated to milk assuming a dilution factor.[58] For pesticides that are not fat soluble, the results for butter were directly used to estimate the exposure via milk without any adjustment.
- The unit weight for the individual food products is retrieved from the EFSA PRIMo (EFSA, 2007).
- Processing factors were taken into account for bananas, where such information was available.[59]
- Results that were not compliant with the residue definition were omitted.
- 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.

In Appendix IV, Table B, the residue concentrations used for the short-term exposure assessment (HRMs) are reported.

In order to perform the risk assessment, the exposure estimated for the pesticide/crop combination was compared with the toxicological reference value, usually the ARfD value.

[56] German consumption data: 800 g/day for a child with body weight of 16.15 kg.
[57] For producing 1 kg of olive oil 5 kg of olives are required.
[58] Considering that the fat content of butter is approx. 20 times higher than in raw milk, a factor of 20 was used as correction factor.
[59] The processing factors used were 0.87 for dithiocarbamates and 0.52 for imazalil (BVL, 2002).

The short-term risk assessment was performed with the ADI instead of the ARfD for seven pesticides because these substances 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, chlordane, ethion, heptachlor, hexaconazole, phenthoate and propoxur). The use of the ADI instead of the ARfD is an additional conservative element in the risk assessment. In Appendix IV, Table A the ARfD/ADI values are compiled. It should be mentioned that some of the ARfD values were lowered recently and were not in place in 2012 when the monitoring results were generated (e.g. chlorpyrifos).

Since the residue definition for dimethoate[60] contains compounds with significantly different toxicity, it is not possible to perform an unambiguous risk assessment. Thus, for this compound EFSA calculated two scenarios: the optimistic dimethoate scenario where it is assumed that the determined residues are related only to the less toxic dimethoate, and the pessimistic omethoate scenario, where the total residue concentration reported is assumed to refer to the more toxic omethoate.

Also the residue definitions for esfenvalerate (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 resulted from the use of the authorised substance.

The risk assessment for dithiocarbamates is based on the ARfD established for the pesticide which was leading to the setting of the MRL.[61]

The setting of an ARfD was not necessary for 40 substances included in the EU-coordinated monitoring programme because of the low acute toxicity of the substances. These pesticides are therefore not relevant for acute exposure assessment.

4.1.1. Results of the short-term (acute) risk assessment – individual pesticides

The results of the short-term risk assessment, expressed as a percentage of the toxicological reference values, are presented in Table 4-1. Grey cells represent pesticide/crop combinations for which no results were reported (combinations that were not covered by EUCP, see also Table A, Appendix II). White blank cells in the grid refer to pesticide/crop combinations where the exposure was negligible because none of the samples analysed contained measurable residues. For the pesticide/crop combinations where detectable residues were reported and where an ARfD or ADI was available the calculated exposure, expressed as a percentage of the toxicological reference value is reported. For pesticide/crop combinations where the calculated dietary exposure exceeded the ARfD, the cells are highlighted in orange (exposure between 100 % and 1,000 %: light orange, exposure above 1,000 %: dark orange) whereas the yellow cells represent pesticide/crop combinations where the exposure was below 100 % of the toxicological reference values. The result of the exposure assessment is reported in bold font if the highest residue concentration found for the respective pesticide/crop combination exceeded the MRL.

Overall, for 36 pesticides not a single result above the LOQ was reported in any of the food products tested. Thus, for these pesticides the short-term dietary exposure was considered negligible for all of the food products covered by the EUCP (aldicarb (RD), amitrole, azinphos-ethyl, bromopropylate, chlorfenvinphos, chlorobenzilate, dicrotophos, endrin, fenitrothion, fluquinconazole, formothion, isocarbophos, isofenphos-methyl, isoprocarb, linuron, meptyldinocap (RD), metaflumizone, methoxychlor, metobromuron, nitenpyram, oxadixyl, oxydemeton-methyl (RD), paclobutrazol, parathion-methyl (RD), permethrin, phoxim, prothioconazole (RD), pyrazophos, resmethrin (RD), rotenone, tetramethrin, tolylfluanid (RD), trichlorfon, triflumuron, trifluralin and triticonazole).

[60] Residue definition: Dimethoate (sum of dimethoate and omethoate, expressed as dimethoate).

[61] As the dithiocarbamates MRLs for table grapes, peppers and olives for oil production are linked to the use of propineb, short-term exposure was compared with the ARfD for propineb. The MRLs for bananas, aubergines, broccoli, cauliflower, peas and wheat result from the use of mancozeb or other pesticides belonging to the group of dithiocarbamates with a similar toxicological profile. Thus, the exposure was compared with the ARfD of mancozeb. The MRL legislation does not give an indication from which pesticide use the MRL for oranges was derived. In this case the risk assessment was performed with the reference values set for ziram, the dithiocarbamate with the lowest ARfD.

In addition, for 85 pesticides residues were found in concentrations above the LOQ, but the exposure was below the toxicological reference values (2,4-D, acephate, amitraz (RD), azinphos-methyl, benfuracarb, bifenthrin, biphenyl, bixafen (RD), bromuconazole, buprofezin, captan, carbaryl, carbosulfan, chlordane (RD), chlormequat, chlorothalonil (RD), chlorpropham (RD), chlorpyrifos-methyl, clothianidin, cyfluthrin (RD), cymoxanil, cyromazine, deltamethrin, diazinon, dicloran, dicofol (RD), dieldrin (RD), difenoconazole, dimethoate (RD), dimethomorph, dithianon, dodine, epoxiconazole, esfenvalerate (RD), ethoprophos, etofenprox, famoxadone, fenamiphos (RD), fenarimol, fenazaquin, fenbuconazole, fenbutatin oxide, fenoxycarb, fenpropathrin, fenpropimorph (RD), fenpyroximate, fenthion (RD), fipronil (RD), flutriafol, folpet, fosthiazate, haloxyfop (RD), heptachlor (RD), indoxacarb, lindane, malathion (RD), mepiquat, metalaxyl (RD), metconazole, methidathion, methoxyfenozide, myclobutanil (RD), penconazole, phenthoate, phosalone, phosmet (RD), pirimicarb (RD), pirimiphos-methyl, prochloraz (RD), profenofos, propamocarb (RD), propiconazole, propoxur, pymetrozine, pyrethrins, pyridaben, spiromesifen, spiroxamine (RD), tau-fluvalinate, tefluthrin, terbuthylazine, tetraconazole, thiamethoxam (RD), thiophanate-methyl, triadimenol (RD)). Thus, the presence of these pesticides on food samples analysed in 2012 was not likely to pose a short-term consumer health concern.

In the case of 60 pesticide/food product combinations the dietary exposure calculation identified a potential acute consumer health risk. In total, 280 determinations of the 1.765,663 determinations reported under the EUCP were found to exceed the threshold concentration. The threshold concentration is the residue level that leads to an exposure equivalent to 100 % of the toxicological reference value. The most frequent cases of exceedance of the toxicological threshold were noted for chlorpyrifos (127 determinations)[62], bitertanol (32 determinations) acrinathrin (19 determinations), lambda-cyhalothrin (RD) (12 determinations) and carbendazim (RD) (11 determinations). The ranking is continued (sorted ascending to the frequency of determinations exceeding the ARfD/ADI) with dithiocarbamates (RD), methomyl (RD), imazalil, tebuconazole, carbofuran (RD), ethephon, methamidophos, abamectin (RD), cypermethrin (RD), dimethoate (RD), methiocarb (RD), acetamiprid (RD), procymidone, triazophos, chlorfenapyr, oxamyl, formetanate (RD), hexaconazole, pyraclostrobin, monocrotophos, thiacloprid, parathion, dichlorvos, ethion, flusilazole (RD), imidacloprid, endosulfan (RD), cyproconazole and fluazifop-P-butyl (RD).

The highest results for the exposure calculation, expressed as a percentage of the ARfD, were obtained for pepper samples containing residues of triazophos (approx. 24,500 % of the ARfD, sample originating from India), ethion (approx. 10,700 % of the ADI established for this active substance; sample originating from India), carbofuran (approx. 7,000 % of the ARfD, sample reported under the national control programme, originating from Vietnam) and carbendazim in broccoli (approx. 7,500 % of the ARfD, sample reported under the national control programme, originating from China). Other extreme residue concentrations that were likely to cause consumer health risks (over 1,000 % of the ARfD/ADI) were reported for abamectin and lambda-cyhalothrin in peppers (approx. 6,300 % and 2,400 % of the ARfD, respectively), for chlorpyrifos in table grapes (approx. 1,700 %[63]) and for carbofuran in aubergines (2,100 % of the ARfD). In bananas residues of acrinathrin, chlorpyrifos and bitertanol were found that exceeded significantly the ARfD (acrinathrin: 2,800 % of the ARfD, chlorpyrifos: 1,400 % of the ARfD and bitertanol[64] approx. 1,000 % of the ARfD.) It should be noted that for bananas the calculations are likely to overestimate the real exposure because they are based on the residue concentrations measured in the bananas including the residues in the peel. The residues in the edible part of the crop might have been significantly lower, but lacking data on the ratio of residues in pulp and peel no refined intake calculation could be performed.

[62] It should be highlighted that the risk assessment was performed with the ARfD that was lowered recently. Thus, in 2012 an ARfD of 0.1 mg/kg bw was in place. Using the previous ARfD, no of the ARfD is noted.

[63] It is noted that the ARfD for chlorpyrifos was recently lowered. Although the new ARfD has not yet been adopted in the Standing Committee for Plants, Animal Products, Food and Feed, it is appropriate to base the risk assessment on the toxicological reference value resulting from the most recent evaluation.

[64] Following the lowering of the ARfD for bitertanol, the MRLs were lowered in 2013.

Table 4-1: Results of short-term (acute) dietary risk assessment

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs	Comments
2,4-D (RD)					0.06	0.23				0.14			
2-phenylphenol	*	*	*	*	*					*			*) No acute risk assessment necessary
Abamectin (RD)		10.5		6,298	3.50								
Acephate		0.65		8.82	13.3								
Acetamiprid (RD)	4.16	13.1		101	21.0	193							
Acrinathrin		38.6	2,759	39.7	14.8								
Aldicarb (RD)													Negligible exposure for all products analysed
Amitraz (RD)				11.3									
Amitrole													Negligible exposure for all products analysed
Azinphos-ethyl													Negligible exposure for all products analysed
Azinphos-methyl		46.5											
Azoxystrobin	*	*	*	*	*	*	*	*					*) No acute risk assessment necessary
Benfuracarb				9.13									
Bifenthrin		28.4	17.3	4.41						0.96			
Biphenyl										0.12			Acute RA performed with ADI
Bitertanol			1,003	7.56									
Bixafen (RD)												0.29	
Boscalid (RD)	*	*	*	*	*	*	*	*		*			*) No acute risk assessment necessary
Bromide ion				*						*			*) No acute risk assessment necessary
Bromopropylate													Negligible exposure for all products analysed
Bromuconazole		2.23											
Bupirimate		*		*	*								*) No acute risk assessment necessary
Buprofezin		2.10	15.2	2.39	0.08				0.00				
Captan		14.6		0.69									
Carbaryl				18.9	3.00				0.09				
Carbendazim (RD)	27.2	622		724	13.3	7,571		4.14	0.03	5.78			
Carbofuran (RD)				7,041	2,113								
Carbosulfan					10.00								
Chlorantraniliprole		*		*	*								*) No acute risk assessment necessary
Chlordane (RD)												8.19	Acute RA performed with ADI
Chlorfenapyr		91.7		101		155							
Chlorfenvinphos													Negligible exposure for all products analysed
Chlormequat		76.7			25.0		4.25			20.6			
Chlorobenzilate													Negligible exposure for all products analysed
Chlorothalonil (RD)		13.1	0.96	18.9	6.46	2.14	0.22	0.05					
Chlorpropham (RD)				0.40						0.29			
Chlorpyrifos	49.5	1,702	1,451	806	80.0	291	489	2.46	1.05	24.3			ARfD was recently lowered.
Chlorpyrifos-methyl	1.63	36.7	2.51	7.56		1.57			0.01	39.0			
Clofentezine (RD)			*	*	*								*) No acute risk assessment necessary
Clothianidin		4.19		2.71									
Cyfluthrin (RD)		21.3		6.30		0.29			0.01				
Cymoxanil		4.91											
Cypermethrin (RD)		370	2.84	50.4	2.75	26.8	5.95		0.02	15.2			
Cyproconazole		151		9.76				0.41		0.72			
Cyprodinil (RD)	*	*	*	*	*		*	*					*) No acute risk assessment necessary
Cyromazine					13.4								
DDT (RD)											*	*	*) No acute risk assessment necessary
Deltamethrin		37.3	16.7	69.3		11.6			0.49	92.5			
Diazinon				12.6	1.20								
Dichlofluanid													No results compliant with the legal residue definition
Dichlorvos				126									
Dicloran		4.19			29.0								
Dicofol (RD)				0.79									
Dicrotophos													Negligible exposure for all products analysed
Dieldrin (RD)											12.4	1.24	
Diethofencarb					*								*) No acute risk assessment necessary
Difenoconazole		20.9	0.57	15.0	0.16	4.73	2.89			0.12			
Diflubenzuron (RD)					*					*			*) No acute risk assessment necessary
Dimethoate (RD)													
Dimethoate (RD)- dimethoate scenario		983		34.6	73.9	198	52.9		0.10				RA with less conservative approach.
Dimethoate (RD)-omethoate scenario		4,914		173	370	990	264		0.51				RA with most conservative approach.
Dimethomorph		14.2		2.94		6.79	1.32	0.03					
Diniconazole		**		**									**) Detectable residues but no risk assessment performed (no ADI / ARfD
Diphenylamine		*								*			*) No acute risk assessment necessary
Dithianon		16.4											
Dithiocarbamates (RD)		890	9.67	416	3.86	34.2	49.0	1.07		2.27			
Dodine			1.00	0.13									
Endosulfan (RD)		3.36		118					0.10		0.83	0.08	

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs	Comments
Endrin													Negligible exposure for all products analysed
EPN				**									**) Detectable residues but no risk assessment performed (no ADI / ARfD
Epoxiconazole			5.45		2.28					0.75			
Esfenvalerate (RD)		11.4				3.38							
Ethephon		223		844						5.49			
Ethion		327		10,706									Acute RA performed with ADI
Ethirimol		**		**									**) Detectable residues but no risk assessment performed (no ADI / ARfD
Ethoprophos				8.19									
Etofenprox		1.64		0.47	0.01								
Famoxadone		12.4					0.26		0.00		0.12		
Fenamidone		*											*) No acute risk assessment necessary
Fenamiphos (RD)				52.9									
Fenarimol		28.5											
Fenazaquin		4.58	4.18	27.1	0.50								
Fenbuconazole		0.98											
Fenbutatin oxide		13.1	2.68	1.51	2.43								
Fenhexamid		*	*	*	*		*						*) No acute risk assessment necessary
Fenitrothion													Negligible exposure for all products analysed
Fenoxycarb		0.62		0.20					0.00				
Fenpropathrin		2.18		13.0									
Fenpropimorph (RD)	6.60		44.6							2.94			
Fenpyroximate		65.5		31.5									
Fenthion (RD)									0.08				
Fipronil (RD)				28.0									
Fluazifop-P-butyl						137	93.3	26.5					
Fludioxonil	*	*	*	*	*			*					*) No acute risk assessment necessary
Flufenoxuron		*											*) No acute risk assessment necessary
Fluquinconazole													Negligible exposure for all products analysed
Flusilazole (RD)		35.4		139									
Flutriafol		1.70		50.4									
Folpet		24.9											
Formetanate (RD)		36.6		166	25.6				0.06				
Formothion													Negligible exposure for all products analysed
Fosthiazate			35.1										
Glyphosate							*			*			*) No acute risk assessment necessary

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs	Comments
Haloxyfop (RD)				5.37		0.31							
Heptachlor (RD)											49.7		Acute RA performed with ADI
Hexachlorobenzene											**	**	**) Detectable residues but no risk assessment performed (no ADI / ARfD
Hexachlorocyclohexane (alpha)											**		**) Detectable residues but no risk assessment performed (no ADI / ARfD
Hexachlorocyclohexane (beta)											**		**) Detectable residues but no risk assessment performed (no ADI / ARfD
Hexaconazole		21.0		107									Acute RA performed with ADI
Hexythiazox		*	*	*	*								*) No acute risk assessment necessary
Imazalil	161	3.80	301	3.02	2.45		1.32						
Imidacloprid	1.98	109	8.36	67.2	15.0	12.6	1.76	3.28		1.93			
Indoxacarb		19.9	2.14	5.54	0.32	2.05	0.79				0.30		
Iprodione		*		*	*	*	*	*					*) No acute risk assessment necessary
Iprovalicarb		*											*) No acute risk assessment necessary
Isocarbophos													Negligible exposure for all products analysed
Isofenphos-methyl													Negligible exposure for all products analysed
Isoprocarb													Negligible exposure for all products analysed
Kresoxim-methyl (RD)		*		*	*								*) No acute risk assessment necessary
Lambda-Cyhalothrin (RD)		275	83.6	2,393	26.0	116			0.97				
Lindane												0.21	
Linuron													Negligible exposure for all products analysed
Lufenuron		*		*	*								*) No acute risk assessment necessary
Malathion (RD)		4.61	1.39	0.10						0.21			
Maleic hydrazide (RD)													
Mandipropamid		*		*									*) No acute risk assessment necessary
Mepanipyrim (RD)					*								*) No acute risk assessment necessary
Mepiquat					1.00					1.54			
Meptyldinocap (RD)													Negligible exposure for all products analysed
Metaflumizone													Negligible exposure for all products analysed
Metalaxyl (RD)		5.89		4.03		1.51	0.13						
Metconazole										4.33			
Methamidophos				777	125								
Methidathion				12.6					0.02				
Methiocarb (RD)		161		562									
Methomyl (RD)		786		504	94.0				0.15	11.6			
Methoxychlor													Negligible exposure for all products analysed
Methoxyfenozide		28.2		6.30	0.83								

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs	Comments
Metobromuron													Negligible exposure for all products analysed
Monocrotophos		72.0		441									
Myclobutanil (RD)		8.66	13.2	12.2									
Nitenpyram													Negligible exposure for all products analysed
Oxadixyl													Negligible exposure for all products analysed
Oxamyl				141									
Oxydemeton-methyl (RD)													Negligible exposure for all products analysed
Paclobutrazol													Negligible exposure for all products analysed
Parathion				287									
Parathion-methyl (RD)													Negligible exposure for all products analysed
Penconazole		2.36		0.91									
Pencycuron				*		*							*) No acute risk assessment necessary
Pendimethalin		*		*		*		*	*				*) No acute risk assessment necessary
Permethrin													Negligible exposure for all products analysed
Phenthoate				56.7									Acute RA performed with ADI
Phosalone		1.44	1.84	62.3									
Phosmet (RD)									0.11				
Phoxim													Negligible exposure for all products analysed
Pirimicarb (RD)				3.46	0.65	0.35							
Pirimiphos-methyl				22.7	0.22					41.4			
Prochloraz (RD)	2.77	9.95	3.34	15.1		10.7							
Procymidone		251		78.7	41.7			1.37	0.08				
Profenofos				6.93	0.10								
Propamocarb (RD)		0.11	0.27	11.2	0.37	0.04							
Propargite		**		**	**					**			**) Detectable residues but no risk assessment performed (no ADI / ARfD
Propiconazole		0.44	0.53	6.93		0.91		0.04	0.00				
Propoxur										0.72			Acute RA performed with ADI
Propyzamide (RD)							*		*				*) No acute risk assessment necessary
Prothioconazole (RD)													Negligible exposure for all products analysed
Prothiofos				**									**) Detectable residues but no risk assessment performed (no ADI / ARfD
Pymetrozine				27.1	1.25	4.37							
Pyraclostrobin		138		42.0		11.1			0.01				
Pyrazophos													Negligible exposure for all products analysed
Pyrethrins				12.3						0.36			
Pyridaben		26.2		27.7	1.90	17.5							

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs	Comments
Pyrimethanil	*	*	*	*	*	*	*	*	*	*			*) No acute risk assessment necessary
Pyriproxyfen				0.13	0.02								
Quinoxyfen	*	*	*	*	*			*					*) No acute risk assessment necessary
Resmethrin (RD)													Negligible exposure for all products analysed
Rotenone													Negligible exposure for all products analysed
Spinosad (RD)		*	*	*	*	*				*			*) No acute risk assessment necessary
Spirodiclofen		*											*) No acute risk assessment necessary
Spiromesifen		0.08		0.58	0.06								
Spiroxamine (RD)		32.1	0.92	2.08						0.07			
tau-Fluvalinate								0.16		0.35			
Tebuconazole		284		39.9	7.25	54.4	11.9		0.00	9.15			
Tebufenozide		*		*	*								*) No acute risk assessment necessary
Tebufenpyrad		85.1		58.6									
Teflubenzuron		*		*									*) No acute risk assessment necessary
Tefluthrin				2.52						3.76			
Terbuthylazine									0.61				
Tetraconazole		23.6		12.6									
Tetradifon				*									*) No acute risk assessment necessary
Tetramethrin													Negligible exposure for all products analysed
Thiabendazole (RD)	*	*	*	*	*	*	*		*	*			*) No acute risk assessment necessary
Thiacloprid				231	30.8	12.0	8.81	0.52					
Thiamethoxam (RD)		1.11		1.49	0.69								
Thiophanate-methyl		16.4		22.7	0.54	0.58		0.49					
Tolclofos-methyl				*									*) No acute risk assessment necessary
Tolylfluanid (RD)													Negligible exposure for all products analysed
Triadimenol (RD)		47.1	1.67	25.2	4.20					0.87			
Triazophos				24,562									
Trichlorfon													Negligible exposure for all products analysed
Trifloxystrobin (RD)		*		*	*	*							*) No acute risk assessment necessary
Triflumuron													Negligible exposure for all products analysed
Trifluralin													Negligible exposure for all products analysed
Triticonazole													Negligible exposure for all products analysed
Vinclozolin (RD)		3.60											
Zoxamide	*	*		*									*) No acute risk assessment necessary

The food products that showed the highest frequency of exceedances of the toxicological reference values were bananas (96 determinations), followed by table grapes (87 determinations), peppers (78 determinations) and broccoli (12 determinations). In cauliflower, broccoli and orange juice only few determinations were reported that exceeded the toxicological threshold. As regards peas (with pods), olives, wheat, butter and chicken eggs none of the samples tested contained residues in concentrations that were likely to pose a consumer health risk.

Most of the samples for which an acute risk could not be excluded referred to samples with residues exceeding the EU MRLs (results highlighted in bold in Table 4-1). However, for 10 pesticide/commodity combinations the calculated short-term exposure exceeded the toxicological threshold, even though the reported residue concentration was below the MRL. These pesticide/commodity combinations were: imazalil/orange juice and bananas, imidacloprid/table grapes, pyraclostrobin/table grapes, tebuconazole/table grapes, bitertanol/bananas, chlorpyrifos/bananas, endosulfan (RD)/peppers, lambda-cyhalothrin (RD)/broccoli and dithiocarbamates-propineb/peppers. It should be noted that recently the MRLs for tebuconazole/table grapes, bitertanol/bananas and endosulfan (RD)/peppers have been lowered. For the other cases the MRLs in place for the commodities mentioned should be reviewed in view of a possible short-term consumer health risk, taking into account additional information needed to perform a refined risk assessment, such as peeling factors for bananas.

It should be stressed again that these calculations were performed without taking into account that the residues in the edible part of the crops (e.g. peeled bananas) or after processing (washing, cooking etc.) might be significantly lower. Therefore, the results of the acute risk assessment have to be understood as a conservative screening for potential risks which is likely to overestimate the actual exposure situation that occurred in practice. Regarding the exposure calculations for peppers it was assumed that the reported results refer to sweet peppers. If certain results for peppers referred to chilli peppers, the calculated exposure might be grossly overestimating the real exposure, since the amount of chilli peppers consumed is significantly lower.

For diniconazole, EPN, ethirimol, hexachlorobenzene, hexachlorocyclohexane (alpha and beta), propargite and prothiofos no acute risk assessment could be performed although detectable residues were reported because not appropriate toxicological reference values are available (no ADI or ARfD). Lacking a reliable toxicological assessment for these compounds a possible consumer health risk resulting from the presence of these pesticides in food cannot be ruled out at the moment.

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

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 report on pesticide residues (EFSA, 2013b, 2014a).

The exposure calculations are based on the most commonly consumed food commodities, the food products covered by the three years cycle of the EU-coordinated monitoring programme. For each pesticide/crop combination, the residue concentration used as input value in the chronic exposure estimations was derived according to the following approach:

- For each pesticide/crop combination an overall mean value was calculated, using the actual values measured in the individual samples of surveillance 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.[65]

[65] The approach used to calculate the input values for the exposure assessment (also referred to as upper bound approach) leads to conservative estimates. In order to make more realistic calculations, alternative approaches would be possible (e.g. calculating the mean residue concentration on the basis of results above the limit of detection assuming a zero-residue

- For the unprocessed food products covered by the 2012 EU-coordinated monitoring programme (i.e. aubergines, bananas, broccoli, cauliflower, peas without pods, peppers, table grapes, wheat and eggs), the mean residue concentration was calculated from the results presented in Section 2.3 of this report.[66]

- For the remaining food products considered in the long-term exposure assessment, the residue input figures were derived from the results of the 2012 national programmes (surveillance samples only). This applies to apples, beans with pods, carrots, cucumbers, head cabbage, leek, lettuce, mandarins, pears, peaches, potatoes, rice, spinach, strawberries, oats, rye, liver (see comment below), poultry meat, swine meat.

- 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.

- The following approach was used for processed products covered by the 2012 EU-coordinated monitoring programme:
  - Orange juice: EFSA used the mean residue concentrations calculated from results on orange juice only to estimate the contribution of residues in oranges to the long-term exposure. The results on oranges reported in the framework of the national control programme were not taken into account.
  - Olive oil: as in the EFSA PRIMo the consumption for olives (used for oil consumption, code 402010) is reported on the basis of unprocessed olives, the mean residue concentration calculated for olive oil was recalculated to olives, taking into account the usual yield factor[67], assuming that the residues accumulate in oil by a factor of 5.
  - Butter: no specific consumption data are available in the EFSA PRIMo for butter. Since butter is a processed product derived from milk, the residue concentrations reported for butter were used to estimate the exposure via milk. For fat soluble substances (characterised by a footnote in the MRL legislation), where the residues are expected to accumulate in butter, the residue concentrations were recalculated to milk assuming a dilution factor.[68] For pesticides that are not fat soluble, the results for butter were directly used to estimate the exposure via milk without any adjustment. Results on milk reported within the framework of the national control programme were not included in the data set used to calculate the overall mean residue concentration in milk.

- Results concerning samples analysed with analytical methods for which the LOQ was greater than the corresponding MRL were disregarded.

- Results that were not compliant with the residue definition were omitted.

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concentration for samples with residues below the LOQ (lower bound approach), or taking into account information on the percentage of the crop treated or pesticide approvals granted in the different Member States).

[66] The results reported under the national control programmes for these products have not been considered to derive the input values for long-term exposure assessment because samples taken under the more targeted sampling strategy of the national programmes are expected to bias the long-term exposure.

[67] For producing 1 kg of olive oil 5 kg of olives are required.

[68] Considering that the fat content of butter is approx. 20 times higher than that of raw milk, a factor of 20 was used as correction factor.

- If for a given pesticide/crop combination no positive findings were reported for any of the samples analysed (i.e. all the results were reported below the LOQ), the contribution of these crops to the total dietary intake was not considered, assuming a 'no use/no residue' situation.

- 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 residue levels used as input values for the calculation of the long-term exposure are reported in Appendix IV, Table C. Empty cells in the table concern pesticides/commodity combinations for which none of the samples tested contained quantifiable residues.

The toxicological reference values used for the risk assessment are reported in Appendix IV, Table A.

Since the residue definition for dimethoate contains two compounds with significantly different toxicity (i.e. dimethoate and omethoate), it is not possible to perform an unambiguous risk assessment. Thus, for this compound 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.

Furthermore the residue definitions for esfenvalerate, methomyl and triadimenol contain compounds with different toxicity levels. 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 dithiocarbamates, three scenarios were calculated, assuming that the measured CS_2 concentration refers exclusively to mancozeb, propineb and ziram, respectively.

It is noted that refined, higher tier calculations could be performed by means of probabilistic modelling, using the distributions of the individual food consumptions reported by the respondents of food consumption surveys and the distribution of the measured residue concentrations identified in the monitoring programmes. EFSA developed a methodology for probabilistic calculations (EFSA, 2008, 2009, 2012a, 2013a). However, since details on the practical implementation need to be further discussed, EFSA did not perform higher tier risk assessments in the framework of this report.

4.2.1. Results of the long-term (chronic) risk assessment – individual pesticides

In Table 4-2 the results of the long-term dietary exposure assessments are reported for each pesticide (maximum exposure among the 27 diets included in the PRIMo model). The results are expressed as a percentage of the ADI.

Table 4-2: Results of long-term dietary risk assessment

Pesticide	Long-term exposure (in % of the ADI)	Pesticide	Long-term exposure (in % of the ADI)
2,4-D (RD)	0.33	Amitrole	0.00
2-phenylphenol	0.14	Azinphos-ethyl *)	No detectable residues
Abamectin (RD)	1.41	Azinphos-methyl	5.42
Acephate	0.09	Azoxystrobin	0.22
Acetamiprid (RD)	0.71	Benfuracarb	0.00
Acrinathrin	1.23	Bifenthrin	2.13
Aldicarb (RD)	0.00	Biphenyl	0.07
Amitraz (RD)	0.73	Bitertanol	8.47

Pesticide	Long-term exposure (in % of the ADI)
Bixafen (RD)	0.00
Boscalid (RD)	2.14
Bromide ion	4.42
Bromopropylate	0.11
Bromuconazole	0.16
Bupirimate	0.39
Buprofezin	1.29
Captan	1.06
Carbaryl	2.84
Carbendazim (RD)	1.93
Carbofuran (RD)	13.9
Carbosulfan	0.36
Chlorantraniliprole	0.01
Chlordane (RD)	2.90
Chlorfenapyr	1.63
Chlorfenvinphos	6.57
Chlormequat	2.96
Chlorobenzilate	0.04
Chlorothalonil (RD)	2.00
Chlorpropham (RD)	3.84
Chlorpyrifos	51.4
Chlorpyrifos-methyl	4.36
Clofentezine (RD)	0.92
Clothianidin	0.20
Cyfluthrin (RD)	7.98
Cymoxanil	0.38
Cypermethrin (RD)	1.02
Cyproconazole	0.49
Cyprodinil (RD)	1.49
Cyromazine	0.40
DDT (RD)	1.81
Deltamethrin	4.38
Diazinon	16.0
Dichlofluanid	0.04
Dichlorvos	165
Dicloran	0.62
Dicofol (RD)	3.40
Dicrotophos *)	Detectable residues in one or several commodities.
Dieldrin (RD)	21.3
Diethofencarb	0.01
Difenoconazole	3.70
Diflubenzuron (RD)	0.22
Dimethoate (RD)- dimethoate scenario	18.6
Dimethoate (RD)-omethoate scenario	62.1

Pesticide	Long-term exposure (in % of the ADI)
Dimethomorph	0.32
Diniconazole *)	Detectable residues in one or several commodities.
Diphenylamine	0.92
Dithianon	7.80
Dithiocarbamates (RD) - ziram scenario	93.5
Dithiocarbamates (RD) - propineb scenario	70.1
Dithiocarbamates (RD) - mancozeb scenario	10.01
Dodine	0.45
Endosulfan (RD)	2.57
Endrin	0.00
EPN *)	No detectable residues
Epoxiconazole	1.82
Esfenvalerate (RD)	0.15
Ethephon	2.17
Ethion	0.81
Ethirimol *)	Detectable residues in one or several commodities.
Ethoprophos	0.00
Etofenprox	0.71
Famoxadone	8.54
Fenamidone	0.09
Fenamiphos (RD)	5.07
Fenarimol	0.20
Fenazaquin	3.75
Fenbuconazole	0.26
Fenbutatin oxide	0.68
Fenhexamid	0.23
Fenitrothion	2.26
Fenoxycarb	0.53
Fenpropathrin	0.13
Fenpropimorph (RD)	6.95
Fenpyroximate	1.95
Fenthion (RD)	0.38
Fipronil (RD)	26.3
Fluazifop-P-butyl	1.14
Fludioxonil	0.12
Flufenoxuron	1.87
Fluquinconazole	8.55
Flusilazole (RD)	6.97
Flutriafol	0.73
Folpet	1.06
Formetanate (RD)	1.96
Formothion *)	No detectable residues
Fosthiazate	2.02

Pesticide	Long-term exposure (in % of the ADI)
Glyphosate	0.63
Haloxyfop (RD)	4.14
Heptachlor (RD)	15.6
Hexachlorobenzene *)	Detectable residues in one or several commodities.
Hexachlorocyclohexane (alpha)*)	Detectable residues in one or several commodities.
Hexachlorocyclohexane (beta)*)	Detectable residues in one or several commodities.
Hexaconazole	0.54
Hexythiazox	0.83
Imazalil	5.29
Imidacloprid	0.64
Indoxacarb	3.90
Iprodione	0.98
Iprovalicarb	0.33
Isocarbophos *)	No detectable residues
Isofenphos-methyl *)	No detectable residues
Isoprocarb *)	No detectable residues
Kresoxim-methyl (RD)	0.06
Lambda-Cyhalothrin (RD)	5.85
Lindane	0.29
Linuron	6.46
Lufenuron	1.25
Malathion (RD)	0.51
Maleic hydrazide (RD)	4.42
Mandipropamid	0.03
Mepanipyrim (RD)	0.19
Mepiquat	0.16
Meptyldinocap (RD)	0.10
Metaflumizone	0.47
Metalaxyl (RD)	0.29
Metconazole	0.00
Methamidophos	1.56
Methidathion	14.4
Methiocarb (RD)	0.29
Methomyl (RD)	8.24
Methoxychlor	0.00
Methoxyfenozide	0.21
Metobromuron	0.00
Monocrotophos	5.91
Myclobutanil (RD)	1.03
Nitenpyram *)	No detectable residues
Oxadixyl	0.92
Oxamyl	3.89
Oxydemeton-methyl (RD)	1.84
Paclobutrazol	0.64

Pesticide	Long-term exposure (in % of the ADI)
Parathion	1.23
Parathion-methyl (RD)	1.08
Penconazole	0.67
Pencycuron	0.11
Pendimethalin	0.15
Permethrin	0.77
Phenthoate	0.00
Phosalone	1.99
Phosmet (RD)	1.54
Phoxim	0.00
Pirimicarb (RD)	0.70
Pirimiphos-methyl	17.6
Prochloraz (RD)	2.84
Procymidone	3.28
Profenofos	0.06
Propamocarb (RD)	0.16
Propargite *)	Detectable residues in one or several commodities.
Propiconazole	0.57
Propoxur	0.67
Propyzamide (RD)	0.81
Prothioconazole (RD)	0.00
Prothiofos *)	Detectable residues in one or several commodities.
Pymetrozine	0.16
Pyraclostrobin	0.90
Pyrazophos	0.00
Pyrethrins	0.00
Pyridaben	2.34
Pyrimethanil	0.40
Pyriproxyfen	0.19
Quinoxyfen	0.02
Resmethrin (RD)	0.00
Rotenone *)	Detectable residues in one or several commodities.
Spinosad (RD)	1.06
Spirodiclofen	1.12
Spiromesifen	0.17
Spiroxamine (RD)	0.97
tau-Fluvalinate	3.94
Tebuconazole	1.18
Tebufenozide	0.81
Tebufenpyrad	2.66
Teflubenzuron	2.33
Tefluthrin	2.05
Terbuthylazine	2.90
Tetraconazole	4.84

Pesticide	Long-term exposure (in % of the ADI)
Tetradifon	0.08
Tetramethrin *)	Detectable residues in one or several commodities.
Thiabendazole (RD)	1.09
Thiacloprid	1.89
Thiamethoxam (RD)	0.91
Thiophanate-methyl	0.29
Tolclofos-methyl	0.07
Tolylfluanid (RD)	0.05
Triadimenol (RD)	1.29
Triazophos	1.50
Trichlorfon	9.81
Trifloxystrobin (RD)	0.24
Triflumuron	0.97
Trifluralin	0.26
Triticonazole	0.00
Vinclozolin (RD)	0.16
Zoxamide	0.01

*) No ADI allocated.

Negligible exposure	Exposure ≤ 100 % of ADI
Exposure ≤ 1 % of ADI	Exposure > 100 % of ADI or no exposure calculation due to absence of ADI
Exposure ≤ 10 % of ADI	

No quantifiable residues were reported for 24 pesticides in any of the crops/food products considered in the chronic exposure assessment; these pesticides are aldicarb (RD), amitrole, azinphos-ethyl, benfuracarb, bixafen (RD), endrin, EPN, ethoprophos, formothion, isocarbophos, isofenphos-methyl, isoprocarb, metconazole, methoxychlor, metobromuron, nitenpyram, phenthoate, phoxim, prothioconazole (RD), pyrazophos, pyrethrins, resmethrin (RD), rotenone, and triticonazole. Thus, the long-term exposure is considered negligible for these pesticides.

For another 161 pesticides, the calculated long-term exposure accounted for less than 10 % of the ADI. Based on the current scientific knowledge it is concluded that no long-term risk is expected for these pesticides. For eight pesticides the exposure was above 10 % of the ADI (ranked in ascending order of the exposure these pesticides are carbofuran (RD), methidathion, heptachlor (RD), diazinon, pirimiphos-methyl, dieldrin (RD), fipronil (RD) and chlorpyrifos). Considering the overall conservative approach in the dietary exposure calculations, EFSA concludes that also for these pesticides the dietary exposure was in a range that is not likely to pose a consumer health concern.

In the case of dithiocarbamates and dimethoate, the two pesticides where alternative risk assessment options were calculated, the toxicological reference value was exceeded in none of the scenarios. Even the most conservative scenarios did not raise a consumer health alert (dimethoate – omethoate scenario: 62.1 % of the ADI, dithiocarbamates – ziram scenario: 86.4 % of the ADI).

Dichlorvos was the only pesticide where the calculated long-term dietary exposure exceeded the toxicological threshold; the estimated exposure for German children accounted for 165 % of the ADI. The food product that was the major contributor to the overall long-term exposure with 142.5 % of the ADI was apple with a calculated mean residue concentration of 0.0094 mg/kg[69]. It should be highlighted that the calculations were performed with very conservative assumptions, assuming dichlorvos residues being present on each food produced from apples, pears, strawberries, cucumbers and rice, i.e. the food products where at least one sample contained measurable residues of dichlorvos. Considering that dichlorvos is no longer approved in the EU, the assumptions used for the risk screening are not very realistic, since it would postulate systematically illegal uses of dichlorvos on the five food products mentioned. EFSA calculated an alternative scenario, where the mean residue concentrations were calculated assuming samples as free of residues of dichlorvos where reporting countries did not detect measurable residues above the LOQ (lower-bound approach). Under this assumption, the exposure dropped below 1 % of the ADI. Although the lower-bound exposure

[69] The mean residue concentration was calculated from 2,270 samples with residues below the LOQ and one apple sample containing dichlorvos residues of 0.017 mg/kg.

calculation might underestimate the real exposure, it provides some evidence that the high exposure to this very toxic compound was mainly driven by the conservatism of the exposure calculation.

For nine pesticides (dicrotophos, diniconazole, ethirimol, hexachlorobenzene, hexachlorocyclohexane (alpha), hexachlorocyclo-hexane (beta), propargite, prothiofos and tetramethrin) measurable residues were detected in food but no long-term dietary risk assessment could be performed as no internationally agreed toxicological reference values are available for these compounds. It is noted that none of these pesticides is approved in Europe but residues may be present in food due to the persistence of the pesticides in the environment (e.g. hexachlorobenzene, hexachlorocyclohexane, alpha and beta) or due to their use in third countries (dicrotophos, diniconazole, ethirimol, propargite, prothiofos and tetramethrin). The exposure to these pesticides was calculated to be low (see Table 4-3).

Table 4-3: Results of exposure assessment for active substances without ADI values

Pesticide	Long-term exposure (in mg/kg bw per day)
Dicrotophos	0.00001
Diniconazole	0.000017
Ethirimol	0.00013
Hexachlorobenzene	0.00003
Hexachlorocyclohexane (alpha)	0.00007
Hexachlorocyclohexane (beta)	0.000063
Propargite	0.00033
Prothiofos	0.000025
Tetramethrin	0.000015

Overall, EFSA concludes that based on the results submitted in the framework of the 2012 monitoring programmes, the long-term exposure for the pesticides covered by the EU-coordinated monitoring programme for which toxicological data are available was not likely to pose a consumer health concern. For the nine pesticides without reliable toxicological assessments where detectable residues were reported sporadically, a consumer health concern cannot be fully excluded, but considering the inherent conservatism of the calculation and the low exposure estimates a consumer health risk was not very likely.

4.3. Assessment of short-term exposure to multiple residues

According to the WHO methodology and the risk assessment approach used at EU level in the framework of pesticide authorisations and MRL setting, the dietary exposure to pesticide residues is calculated separately for each individual active substance. However, Regulation (EC) No 396/2005 acknowledges that consumers are exposed to multiple residues present on food eaten with one meal, during one day or over a longer period which may lead to cumulative (additive or synergistic) effects on human health. EFSA has worked on the development of a methodology to assess such effects (EFSA, 2008, 2009, 2012a, 2013a). Currently 11 so-called cumulative assessment groups (CAGs), have been defined which comprise pesticides which have the same toxicological target (EFSA, 2013a). Four of these CAGs are relevant for short-term exposure.[70] The consumption of food products containing more than one pesticide belonging to one of the four acute CAGs, leads to a simultaneous exposure to multiple pesticides within a single meal. Thus, for these cases the approach to assess the individual pesticides separately may not be sufficient to identify potential consumer health risks.

Similar to the previous report, EFSA performed a risk assessment which focused on the short-term (acute) consumer health risk related to the presence of multiple pesticides belonging to one of the cumulative assessment groups that were detected in individual food samples analysed in the framework of the EU-coordinated monitoring programme. The total combined exposure resulting from

[70] CAG on functional effects on motor division, sensory division, and autonomic division and neurochemical endpoints

the individual pesticides was calculated by summing up the exposure calculated for the individual pesticides, expressed as percentage of the adjusted ARfD, respectively. Thus, this methodology is equivalent to the calculation of the hazard index, which is then multiplied by 100. Details on the calculation methodology can be found in the previous report on pesticide residues (EFSA, 2014a). This year, the risk assessment was performed for all food products covered by the EU-coordinated monitoring programme.

It is noted that since not all of the pesticides included in the four CAGs are covered by the 2012 EU-coordinated monitoring programme, the results presented below are indicative.

4.3.1. Results of short-term (acute) risk assessment reflecting multiple residues

In total, 149 samples were identified which contain multiple residues of the pesticides in focus for acute cumulative risk assessment; in Table 4-4 the total number of samples analysed and the number of samples relevant for the individual CAGs because of the presence of multiple residues are tabulated. For this type of analysis it was assumed that the residues reported as dithiocarbamates are related to ziram only. It needs to be stressed that this assumption is a very conservative approach as the other dithiocarbamates were not assigned to any of the CAGs relevant for acute risk. Table grapes, peppers and broccoli were found to be the crops with the highest percentage of multiple residues belonging to CAGs. It is noted that only few samples were identified which contained residues of CAG 4, the group that comprises the pesticides having an effect on the acetylcholine esterase (one sample of peppers and two samples of olive oil). No samples of peas (without pods), orange juice, butter and chicken eggs contained multiple residues belonging to any of the CAGs; for bananas only one sample with multiple residues falling in the scope of the cumulative risk assessment was identified.

Table 4-4: Number of samples with multiple residues of pesticides assigned to one of the cumulative assessment groups

Product	Total number of samples analysed	Number of samples with multiple residues belonging to a cumulative assessment groups	Number of samples with multiple residues per CAG[(a)]			
			CAG 1	CAG 2	CAG 3	CAG 4
Aubergines	944	9 (0.95 %)	7	4	2	0
Bananas	1109	1 (0.09 %)	1	0	0	0
Broccoli	362	8 (2.21 %)	7	5	5	0
Cauliflower	760	12 (1.58 %)	11	11	10	0
Peas (without pods)	763	0 (0 %)	0	0	0	0
Peppers (sweet)	1327	43 (3.24 %)	43	18	8	1
Table grapes	1200	47 (3.92 %)	35	18	18	0
Wheat	862	15 (1.74 %)	15	0	0	0
Olive oil	794	14 (1.75 %)	14	11	5	2
Orange juice	695	0 (0 %)	0	0	0	0
Butter	692	0 (0 %)	0	0	0	0
Chicken eggs	727	0 (0 %)	0	0	0	0

(a): Since the CAGs are overlapping, the number of samples reported for the four CAG is not equal to the overall number of samples with multiple residues reported in the third column of the table.

In Table 4-5 the results of the cumulative exposure calculation for all 149 samples containing more than one pesticide allocated to the four CAGs is illustrated. Overall, the threshold level in one or several CAGs was exceeded for 11 samples; for six samples the exceedance was noted in more than one CAG.

For the samples where an exceedance of the toxicological threshold was identified, the individual residues contributing to the overall short-term exposure were further analysed in Figure 4-1. From this presentation it becomes evident that in the majority of the cases the exceedance of the toxicological threshold results from a single pesticide. In other words, the potential consumer health risk was also noted in the framework of the short-term (acute) risk assessment for the individual pesticides (Section 4.1.1). The presentation also demonstrates that dithiocarbamates were amongst the pesticides contributing predominantly to the exposure, in particular in broccoli and cauliflower. In case the CS_2 residues measured in these samples are related to other dithiocarbamates or to wrong positive results resulting from naturally occurring substances in the plant products (e.g. in brassica vegetables), the number of samples identified in this exercise and the calculated exposure, would be significantly lower. Overall, it is noted that only two samples among all the samples reported in the EU-coordinated monitoring programme contained multiple residues in concentrations that potentially pose a consumer health risk that would not have been identified with the risk assessment performed for single pesticides. These two samples are of pepper samples (pepper sample 23 exceeding the threshold for CAG 1 (functional effects on motor division) and broccoli sample seven exceeding the threshold for CAG 3 (functional effects on sensory division) originating from the Dominican Republic and Portugal, respectively. The pepper sample contained residues of fipronil (0.04 mg/kg), imidacloprid (0.6 mg/kg), lambda-cyhalothrin (0.06 mg/kg), methomyl (0.077 mg/kg) and thiamethoxam (0.067 mg/kg); in addition two pesticides were found which are not belonging to CAG 1 (azoxystrobin, 0.032 mg/kg and fenpyroximate, 1.024 mg/kg). The broccoli sample contained dimethoate (0.34 mg/kg) and dithiocarbamates (0.082 mg/kg). In addition this sample contained fluazifop (0.084 mg/kg), a pesticide that is not assigned to CAG 3 and was therefore not considered in the cumulative exposure assessment.

Table 4-5: Acute cumulative risk assessment (multiple residues of pesticides present in individual samples): cumulative exposure expressed in % of the toxicological threshold

Sample	**Short term exposure in % of toxicological threshold**			
	CAG1	CAG2	CAG3	CAG4
Aubergine s- sample 1	13.5			
Aubergine s- sample 2	14.3		12.9	
Aubergine s- sample 3	0.5			
Aubergine s- sample 4	9.2			
Aubergine s- sample 5	15.5	13.5		
Aubergine s- sample 6		1.7		
Aubergine s- sample 7		0.4		
Aubergine s- sample 8	0.8			
Aubergine s- sample 9	1.7	0.9	5.3	
Bananas - sample 1	72.2			
Broccoli - sample 1	60.1			
Broccoli - sample 2	14.3		11.8	
Broccoli - sample 3	39.8	33.2		
Broccoli - sample 4	192	160	160	
Broccoli - sample 5	203	168	169	
Broccoli - sample 6	13.5		11.1	
Broccoli - sample 7	29.0	25.8	115	
Broccoli - sample 8		37.5		
Cauliflower - sample 1	34.4	28.7	29.0	
Cauliflower - sample 2	81.1	67.7	74.6	
Cauliflower - sample 3	5.2	4.5	11.0	
Cauliflower - sample 4	24.0	20.1	21.5	
Cauliflower - sample 5	75.6	63.4	84.5	
Cauliflower - sample 6	116	96.9		
Cauliflower - sample 7		0.3		
Cauliflower - sample 8	116	93.2	97.9	
Cauliflower - sample 9	95.2	72.0	81.9	
Cauliflower - sample 10	56.9	45.6	48.1	
Cauliflower - sample 11	185	154	155	
Cauliflower - sample 12	95.5		79.5	
Peppers - sample 1	31.7	31.7		
Peppers - sample 2	23.1	13.2	15.3	
Peppers - sample 3	1.2			
Peppers - sample 4	2.0			
Peppers - sample 5	7.9			
Peppers - sample 6	251	74.8	211	
Peppers - sample 7	1.4		0.2	
Peppers - sample 8	19.1	18.7		
Peppers - sample 9	1.1			
Peppers - sample 10	0.5	0.5		
Peppers - sample 11	0.9			
Peppers - sample 12	57.2	16.0	41.1	36.9
Peppers - sample 13	0.8			
Peppers - sample 14	13.1			

Sample	Short term exposure in % of toxicological threshold			
	CAG1	CAG2	CAG3	CAG4
Peppers - sample 15	3.2		9.5	
Peppers - sample 16	17.0	8.1		
Peppers - sample 17	0.4			
Peppers - sample 18	6.2	6.2		
Peppers - sample 19	0.9			
Peppers - sample 20	0.5			
Peppers - sample 21	25.1	16.4	16.0	
Peppers - sample 22	0.4			
Peppers - sample 23	204	69.7	63.0	
Peppers - sample 24	1.7			
Peppers - sample 25	1.3			
Peppers - sample 26	19.4			
Peppers - sample 27	882	883		
Peppers - sample 28	913			
Peppers - sample 29	0.7			
Peppers - sample 30	0.8	0.8		
Peppers - sample 31	13.5			
Peppers - sample 32	90.3	85.2		
Peppers - sample 33	19.9			
Peppers - sample 34	4.7			
Peppers - sample 35	27.4	27.4		
Peppers - sample 36	1.0	1.0		
Peppers - sample 37	0.9			
Peppers - sample 38	7.4			
Peppers - sample 39	25.8	25.8		
Peppers - sample 40	0.4		0.5	
Peppers - sample 41	1.4	1.4		
Peppers - sample 42	25.2			
Peppers - sample 43	20.2	17.2		
Table grapes - sample 1	96.9			
Table grapes - sample 2	22.2			
Table grapes - sample 3	48.2			
Table grapes - sample 4	0.2		0.3	
Table grapes - sample 5	13.7		11.3	
Table grapes - sample 6	0.2		0.1	
Table grapes - sample 7	5.7	4.2	4.6	
Table grapes - sample 8	8.1	6.8		
Table grapes - sample 9		0.4		
Table grapes - sample 10		3.1		
Table grapes - sample 11		8.9		
Table grapes - sample 12		0.4		
Table grapes - sample 13		2.7		
Table grapes - sample 14		8.7		
Table grapes - sample 15		26.7		

Sample	Short term exposure in % of toxicological threshold			
	CAG1	CAG2	CAG3	CAG4
Table grapes - sample 16	16.5	13.9		
Table grapes - sample 17		17.7		
Table grapes - sample 18	1.9			
Table grapes - sample 19	7.9			
Table grapes - sample 20	16.8		6.6	
Table grapes - sample 21	33.6			
Table grapes - sample 22	214		162	
Table grapes - sample 23	18.9		14.4	
Table grapes - sample 24	97.7		81.2	
Table grapes - sample 25	0.4		0.2	
Table grapes - sample 26	19.3			
Table grapes - sample 27		1.5		
Table grapes - sample 28	96.5			
Table grapes - sample 29		1.4		
Table grapes - sample 30	26.5		22.1	
Table grapes - sample 31	13.7		11.2	
Table grapes - sample 32	61.0	23.6	47.3	
Table grapes - sample 33	30.8			
Table grapes - sample 34	0.6		0.7	
Table grapes - sample 35	4.3			
Table grapes - sample 36	8.2		6.8	
Table grapes - sample 37		8.0		
Table grapes - sample 38	10.5			
Table grapes - sample 39	98.4			
Table grapes - sample 40	1.0			
Table grapes - sample 41	0.9			
Table grapes - sample 42	13.8			
Table grapes - sample 43	32.3	21.7	28.8	
Table grapes - sample 44	38.4	10.3	7.3	
Table grapes - sample 45	5.9		3.4	
Table grapes - sample 46		7.3		
Table grapes - sample 47	23.7		19.8	
Wheat - sample 1	0.0			
Wheat - sample 2	7.4			
Wheat - sample 3	0.3			
Wheat - sample 4	0.4			
Wheat - sample 5	1.5			
Wheat - sample 6	0.2			
Wheat - sample 7	26.2			
Wheat - sample 8	2.9			
Wheat - sample 9	0.4			
Wheat - sample 10	92.5			
Wheat - sample 11	15.9			
Wheat - sample 12	3.2			

Sample	Short term exposure in % of toxicological threshold CAG1	CAG2	CAG3	CAG4
Wheat - sample 13	7.0			
Wheat - sample 14	17.4			
Wheat - sample 15	20.3			
Olive oil - sample 1	0.1	0.1		
Olive oil - sample 2	0.0	0.0		
Olive oil - sample 3	0.1	0.0	0.1	
Olive oil - sample 4	0.0	0.0		0.2
Olive oil - sample 5	0.3			
Olive oil - sample 6	0.1	0.0		

Sample	Short term exposure in % of toxicological threshold CAG1	CAG2	CAG3	CAG4
Olive oil - sample 7	0.2	0.2		
Olive oil - sample 8	0.7	0.0	0.1	
Olive oil - sample 9	0.2	0.1	0.1	
Olive oil - sample 10	0.1	0.0	0.1	
Olive oil - sample 11	0.6			
Olive oil - sample 12	0.0	0.0		0.3
Olive oil - sample 13	0.2			
Olive oil - sample 14	0.4	0.3	1.0	

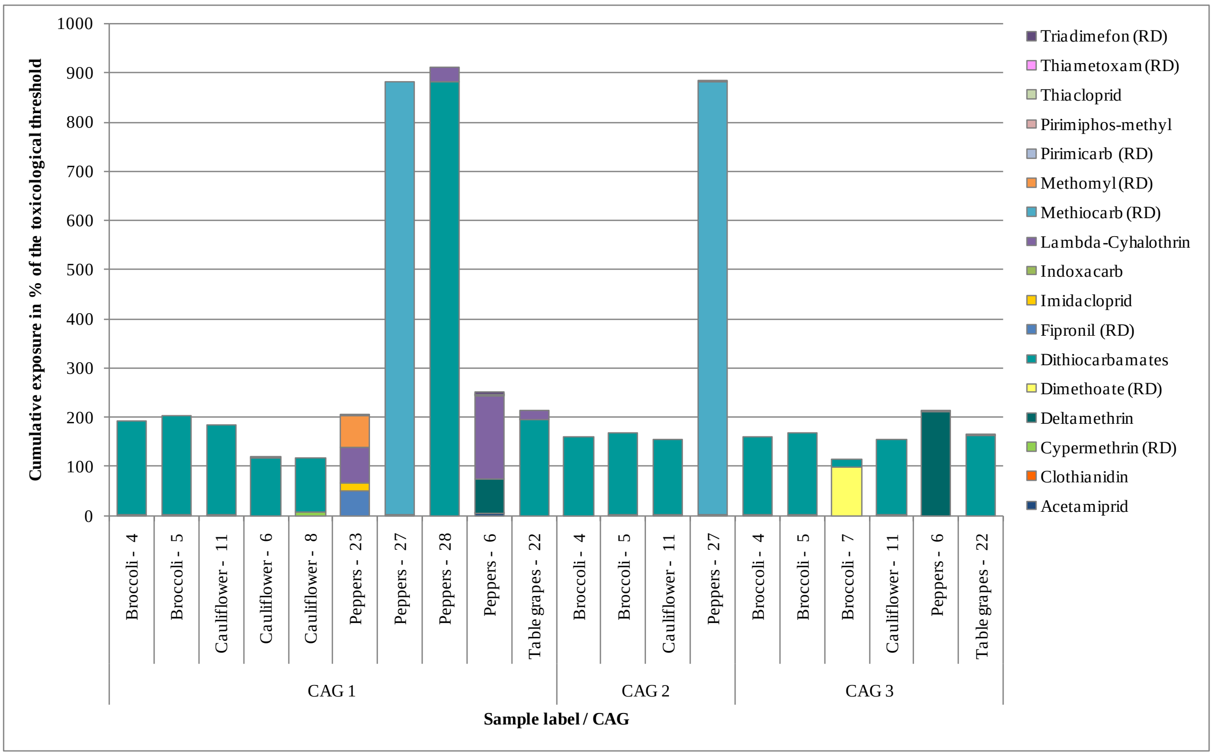

Figure 4-1: Results of the acute risk assessment concerning multiple residues in individual samples

The results of the analysis regarding multiple pesticide residues present on individual samples demonstrate that only a low number of samples was identified as posing a short-term consumer health concern. Thus EFSA is of the opinion that the risk assessment methodology for acute risk assessment which is based on the analysis of individual residues alone is sufficiently conservative. The presence of multiple pesticide residues on individual samples was not found to result in a significant number of additional consumer health concerns which would not be detected with the short-term risk assessment performed for individual pesticides.

EFSA recommends to use the risk assessment methodology described in this Section to get an indication whether the presence of multiple pesticides belonging to one of the cumulative assessment groups is likely to pose a consumer health risk. However, since the work on the definition of cumulative assessment groups is still on going, the results have to be considered as indicative.

SUMMARY CHAPTER 4

EFSA calculated the short-term (acute) exposure for the pesticides covered by the 2012 EUCP. The assessment focussed on the 12 products that were covered by the 2012 Monitoring Regulation; samples taken in the framework of the national and the EUCP were taken into account.

Overall, for 36 pesticides not a single result above the LOQ was reported in any of the food products tested. Thus, the short-term dietary exposure was considered negligible for these pesticides.

In addition, for 85 pesticides residues were found in concentrations above the LOQ, but the exposure was below the toxicological reference values, therefore, the residue concentrations found were not likely to pose a consumer health concern.

For 60 pesticide/food product combinations the dietary exposure calculation identified a potential acute consumer health risk. In total, 280 determinations of the 1,765,663 determinations reported under the EUCP were found to exceed the threshold concentration. The most frequent cases of exceedance of the toxicological threshold were noted for chlorpyrifos, bitertanol, acrinathrin, lambda-cyhalothrin, and carbendazim.

The highest results for the exposure calculation, expressed as a percentage of the ARfD, were obtained for a pepper sample containing residues of triazophos (approx. 24,500 % of the ARfD, sample originating from India), ethion (approx. 10,700 % of the ADI established for this active substance; sample originating from India), carbofuran (RD) (approx. 7,000 % of the ARfD, sample reported under the national control programme, originating from Vietnam) and carbendazim (RD)P in broccoli (approx. 7,500 % of the ARfD, sample reported under the national control programme, originating from China). Other extreme residue concentrations that were likely to cause consumer health risks were reported for abamectin and lambda-cyhalothrin in peppers, for chlorpyrifos in table grapes and for carbofuran in aubergines. Also in bananas residues of acrinathrin, chlorpyrifos and bitertanol were found that significantly exceeded the toxicological thresholds but for bananas the calculations are likely to overestimate the real exposure because they are based on the residue concentrations measured in the bananas including the residues in the peel. The residues in the edible part of the crop might have been significantly lower, but lacking data on the ratio of residues in pulp and peel no refined intake calculation could be performed.

EFSA also calculated the chronic or long-term exposure which estimates the exposure of an individual consumer over a long period, predicting the lifetime exposure. For a total of 24 pesticides the long-term exposure was negligible (no detectable residues in any of the samples analysed); for 161 pesticides the exposure did not exceed 10 % of the toxicologically acceptable dose rate. The exposure was above 10 % but below 100 % of the ADI for eight pesticides. Thus, residues of these 169 pesticides, according to the current scientific knowledge, are not likely to pose a chronic consumer health risk. Also for dimethoate and dithiocarbamates, pesticides with residue definitions which comprise compounds with different toxicological properties, the estimated long-term exposure did not raise consumer concerns, even under the most conservative assumption that the residues were exclusively related to the most toxic compound covered by the residue definitions.

Dichlorvos was the only pesticide where the calculated long-term dietary exposure exceeded the toxicological threshold (165 % of the ADI). Considering that dichlorvos is no longer approved in the EU, the risk assessment approach used for estimating the long-term dietary exposure was found to be overly conservative. In an alternative calculation scenario, using the lower-bound approach, the exposure dropped below 1 % of the ADI. Although the lower-bound exposure calculation might underestimate the real exposure, it provides some evidence that the high estimated exposure for this very toxic compound was mainly driven by the conservatism of the exposure calculation.

Overall, EFSA concluded that based on the results submitted in the framework of the 2012 monitoring programmes, the long-term exposure for the pesticides covered by the EU-coordinated monitoring programme for which toxicological data are available was not likely to pose a consumer health concern. For the nine pesticides without reliable toxicological assessments where detectable residues were reported sporadically, a consumer health concern cannot be fully excluded, but considering the inherent conservatism of the calculation and the low exposure estimates a consumer health risk was not very likely.

As in the previous report, EFSA performed a risk assessment which focused on the short-term (acute) consumer health risk related to the presence of multiple pesticides belonging to one of the cumulative assessment groups that were detected in individual food samples analysed in the framework of the EU-coordinated monitoring programme. This year, the risk assessment was performed for all 12 food products covered by the EU-coordinated monitoring programme.

In total, 149 samples were identified which contain multiple residues of the pesticides in focus for acute cumulative risk assessment. The toxicological threshold level was exceeded for 11 samples. In the majority of the cases the exceedance of the toxicological threshold resulted from a single pesticide. In other words, the potential consumer health risk was also noted in the short-term risk assessment performed for the individual pesticides.

RECOMMENDATIONS

EU-coordinated programme:

During data collection and data analysis of the 2012 monitoring results, EFSA identified several provisions in Regulation (EU) No 1274/2011 that lead to diverging interpretations by Member States. Thus, in future monitoring regulations more guidance should be given on the following issues to ensure a common implementation of the monitoring regulations at national level:

- Analysis of wheat: clarifications were requested by a reporting country concerning which type of wheat samples should be analysed (unprocessed wheat or processed wheat, which type of processed wheat). This question should be addressed when wheat or another cereal will be included in future monitoring regulations.
- No alternative food products should be allowed to be analysed in the framework of the EUCP (e.g. broccoli or cauliflower) under future monitoring regulations as this leads to a reduced number of results for the individual products hampering statistical analysis (see Section 2.3.3).
- In future monitoring regulations, clear guidance should be given about which pesticides must be analysed in which commodities. The presentation of the monitoring programme with many exemptions and explanations in numerous footnotes was not always understood correctly. A more clear presentation of the provisions of the EUCP should be considered. EFSA would also dissuade from the inclusion of pesticides on voluntary basis because the comparability of results is hampered if only few results from a limited number of reporting countries are available for a certain pesticide/commodity combination that was not mandatory. It is noted that in Regulation (EU) No 400/2014[71] defining the EUCP for 2015, 2016 and 2017 this recommendation has been addressed.
- The 2012 monitoring regulation contained several footnotes and remarks regarding residue definitions which were not clear (e.g. footnote (h): '*Substances with difficult residue definition. The official laboratories shall analyse them for the full residue definition in accordance with the capability and capacity and report results as agreed on SSD';* footnote (i): *'Substances with no high level of findings according to the 2009 official control programme. Shall be analysed by those official laboratories which have the method required already validated. For laboratories which have no validated method, it is not obligatory to validate a method in 2012 and 2013')* and which were to a certain extent contradictive or not fully in line with the EU MRL legislation (e.g. '*2,4-D free acid shall be analysed in 2012 on aubergines, cauliflower and table grapes; (...)*' while legislation specified the residue definition as sum of 2,4-D and its esters expressed as 2,4-D). EFSA recommends not encouraging for analysing residues not in line with the residue definition established in Regulation (EC) No 396/2005 or using analytical methods not fully validated as this would compromise the comparability of results. It is noted that in the monitoring regulation defining the EUCP for 2015, 2016 and 2017 this recommendation has been addressed.
- EFSA identified that - as a consequence of the point raised in the previous bullet point – the number of results submitted for a certain pesticide/food product combinations was lower than expected (less than 642 determinations). In particular, for the following pesticides the number of results was significantly below the expectations in all the commodities that had to be analysed on a mandatory basis (less than 50 % of the target number of samples): amitraz (RD), amitrol, isocarbophos, isoprocarb, meptyldinocap (RD), prothioconazole (RD), pyrethrins, rotenone and vinclozolin (RD). In addition, for many other pesticides the target number of determinations was not achieved for individual commodities (most frequently for broccoli). EFSA recommends that Member States which were not able to analyse for the legal residue definition should be provided with further guidance and support by the European

[71] Commission Implementing Regulation (EU) No 400/2014 of 22 April 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 L 119, 23.4.2014, p. 44-56.

Union Reference Laboratories (EURLs) to be able to fulfil their legal obligations. If it is not possible to extend the analytical scope for these pesticides in all official control laboratories in reporting countries, alternative options should be explored (e.g. analysis of samples for these pesticides in specialised laboratories within the reporting country, in other Member States or by EURLs).

- As recommended in previous reports, a modification of the residue definitions for certain pesticides which require the use of single methods and where reporting countries have encountered analytical difficulties should be considered.
- Concerning the analysis of baby food in the framework of the EUCP, clear instructions should be given which pesticides have to be analysed. It is noted that in the monitoring regulation defining the EUCP for 2015, 2016 and 2017 this recommendation has been addressed.
- The number of organic samples requested to be analysed in the framework of the EUCP was very low (one sample per commodity per Member State). This number of samples is not sufficient to perform statistical analysis. EFSA therefore combined the organic samples reported under the national programmes and the EUCP. For future monitoring programmes a decision should be taken on the purpose of the controls in organic samples which usually contain residues with a lower frequency. A statistical approach should be applied to define the number of samples required for the different commodities and the pesticides to be analysed.

Based on the results for the EUCP EFSA derives the following recommendations:

- For designing future control programmes competent authorities in Member States and food business operators should pay specific attention to the origins of the food products and the pesticides found exceeding the legal limits in 2012, in particular for food products originating from countries with previously detected MRL exceedances (see Appendix II, Table B).
- For table grapes and peppers a substantial number of pesticides was found in concentrations exceeding the MRL, in particular insecticides and fungicides (see Section 2.3.6 and 2.3.7). Compared to 2009 the pesticide profile has changed; therefore, pesticides that led to MRL exceedances in the past have been replaced by other pesticides which previously were not detected. Member States should put a specific focus on these two food products which should be analysed with analytical methods which cover a wide range of pesticides, in particular those that were detected and which exceeded the MRLs in 2012 and in previous years, but also other pesticides that might be used on these crops.
- For broccoli and cauliflower a relatively high MRL exceedance rate was identified for dithiocarbamates, measured as CS_2. It is recommended to collect data on the naturally occurring background level of CS_2 and if necessary to amend the legal limits to avoid that residues resulting from approved GAP lead to MRL exceedances.
- For olive oil the results demonstrated that there is a potential for contamination of olives for oil production with herbicides like terbuthylazine or pendimethalin, which are used to facilitate the harvesting of olives (see Section 2.3.9). Before granting authorisations for the use of these herbicides in olive orchards, competent authorities should consider the need to launch a procedure to establish the MRLs at the appropriate level. When performing official controls of the use of plant protection products in the framework of Article 68 of Regulation (EC) No 1107/2009, the potential illegal uses of herbicides in orchards should be considered.
- Further guidance is needed to ensure a consistent approach in all Member States for the enforcement of MRLs for olive oil, in particular on the use of processing factors used to compare the measured residue concentration with the legal limits set for unprocessed olives to olive oil (see Section 2.3.9).
- The MRLs set for dithiocarbamates in broccoli and cauliflower were exceeded in a number of samples. Reporting Member States should further investigate whether these exceedances

result from illegal uses or whether the existing MRL should be amended to reflect the naturally occurring substances that are measured as CS_2.

- In samples of butter and chicken eggs only a limited number of pesticides was detected (see Section 2.3.11 and 2.3.12). In future monitoring programmes the systematic analysis of butter and chicken eggs could be restricted to the pesticides that are likely to be found. Other pesticides with a low probability to be detected should be included in national control programmes with a lower number of sampling frequency.
- For pesticides that were mandatory for plant commodities and where a sufficient number of results provided evidence that the pesticides are not present in the food products analysed, the sampling frequency could be lowered or the pesticide could be removed from the EUCP with random sampling only in the framework of national control programmes (see Section 2.3.).

National monitoring programmes:

Based on the observations of the national control programmes, EFSA derived the following recommendations to be discussed with risk managers:

- Food products with a high prevalence of residues exceeding the legal limit should be included in the national risk based control programmes (see Section 3.2.1). A specific focus should also be on products originating from countries with high frequencies of MRL exceedance (see Section 3.2 and in particular 3.2.3).
- Reporting countries that analyse control samples for a limited number of pesticides only should increase the scope of the analytical methods, considering in particular the pesticides that were frequently leading to MRL exceedances (see Section 3.2.2).
- When preparing the control activities under Article 68 of Regulation (EC) 1107/2009 national competent authorities should pay particular attention to possible misuses of pesticides that were repeatedly found exceeding the existing MRLs like chlorpyrifos, dimethoate, dithiocarbamates, acetamiprid, iprodione, carbendazim, cypermethrin and imidacloprid (more than 20 MRL exceedances) (see Section 3.2.2). One Member State noted that it would be desirable to agree on a more harmonised approach for controls and for reporting of results of control activities performed under Article 68 of Regulation (EC) No 1107/2009.
- In the planning of self-control activities, food business operators should pay particular attention to pesticides found repeatedly in imported products (e.g. methidathion, acetamiprid, dimethoate, carbendazim, chlorpyrifos, triazophos, imidacloprid, endosulfan, profenophos, acephate, methomyl, buprofezin, methamidophos, imazalil, ethion malathion, flubendiamide, formethanate, hexaconazole, monocrotophos, fipronil, myclobutanil, bifenthrin, carbofuran, propargite, diazinon), taking into account the origin of the samples and pesticides found repeatedly in EU products (see also previous bullet point and Section 3.2.2).
- The results on the increased level of import control (see Section 3.2.3) should be discussed by risk managers to decide for which products and countries of origin the increased level of import control should be maintained.
- Food business operators should take all preventive measures to avoid any contamination of raw material used for the production of baby food. In particular, any contamination of cereals with products used for post-harvest treatment needs to be avoided (e.g. pirimiphos-methyl, dichlorvos) (see Section 3.2.4.1).
- For naturally occurring substances like copper, sulphur, CS_2 the default MRL of 0.01 mg/kg for baby food should be reconsidered, taking into account the background concentrations (see Section 3.2.4.1).
- Considering the repeated finding of copper residues exceeding the legal limits for food of animal origin, risk managers should consider the amendment of these MRLs, taking into

account the natural background level, pesticide residues in feed but also other sources of copper like feed additives containing copper (see Section 3.2.4.3).

- Honey: during the authorisation process of plant protection products the risks to bees are carefully assessed. However, also the possible contamination of honey with pesticide residues needs to be considered before granting authorisations for plant protection products that are used on crops that are foraged by bees. If necessary, a procedure to amend the existing MRL for honey has to be launched, supported by studies that demonstrate that these residues are unavoidable and that they do not pose a risk to bees (see Section 3.2.4.3).
- Under Regulation (EC) No 396/2005 and Regulation (EU) No 37/2010[72] MRLs are established for a number of substances that are used both as active substances in plant protection products and in veterinary medicinal products. For some of these so-called dual use substances differences are noted regarding the MRLs (e.g. lambda-cyhalothrin in cattle milk or cypermethrin in milk, muscle or fat, permethrin in bovine fat, phoxim in bovine products). In order to facilitate enforcement of the two legislations on MRLs, the MRLs should be aligned.
- Vine leaves: as in the previous reporting year, a substantial number of MRL exceedances was identified for vine leaves. Last year's recommendation on this product is still valid (see page 71 of EFSA, 2014a).
- Reporting countries should make efforts to report the follow-up actions in case of MRL exceedances (see Section 3.3). A possible amendment of the SSD reporting format should be discussed.
- Analysing the reported results, Member States identified misleading information in the Pesticide EU-MRL database (http://ec.europa.eu/sanco_pesticides/public/?event=homepage) on overlapping residue definitions and contradictious MRLs, in particular for pesticides where the default MRL of 0.01 mg/kg according to Article 18(1)(b) applies (e.g. lambda-cyhalothrin (residue definition for animal commodities: lambda-cyhalothrin, including other mixed isomeric constituents (sum of isomers) and gamma-cyhalothrin or cyhalothrin (default MRLs of 0.01 mg/kg)), demeton/demeton-S, demeton-O, fenoxaprop/fenoxaprop-P, flamprop/flamprop-P). The entries in the MRL database should be revised.

As regards the reporting of results in the SSD format, further harmonisation would be desirable regarding the following issues:

- More guidance is required on the coding of samples to ensure that food products are coded correctly in accordance with the food classification of Regulation (EC) No 396/2005 and the SSD reporting format, in particular for some food products that were analysed in the framework of Regulation (EC) No 699/2009 (import controls) that are not very common in the EU (e.g. Chinese broccoli, yardlong beans, bitter melons, curry leaves, holy basil, coriander leaves) (see Section 3.2.3). Certain food products were reported as 'processed products' which are considered as 'unprocessed' (e.g. dry pulses, dry oil seeds, herbal infusions or tea) (see Section 3.2.1). EFSA should provide clear instructions on the correct coding required to harmonise the reporting among reporting countries in an updated version of the guidance document on the use of the EFSA SSD (EFSA, 2012).
- For food of animal origin such as eggs, milk or milk products and meat and products based on meat/fat, an unambiguous reporting format needs to be agreed and described in the new revision of the guidance document on the use of the EFSA SSD. The guidance regarding reporting the results for olive oil should be also reconsidered, taking into account the experiences of the 2012 reporting.

[72] 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.

Dietary exposure and risk assessment recommendations

Based on the findings of the dietary exposure assessment, EFSA derived the following recommendations:

- For planning future control programmes, Member States and food business operators should pay specific attention to pesticide/product combinations where the acute risk assessment resulted in an exceedance of the ARfD (see Table 4-1).

- When reporting the results of the control activities to EFSA all information relevant for refining the short-term dietary risk assessment should be provided (e.g. processing factors that were used at national level to refine exposure calculations, information whether a lot with residues exceeding the ARfD was seized/recalled from the market, information if a sample was reported under the RASFF, information specifying the food product like chilli peppers).

- For pesticides where the toxicological reference values were recently lowered (e.g. chlorpyrifos), the existing MRLs should be reviewed to ensure that the legal limits are, according to current scientific knowledge, sufficiently protective for the consumers' health.

- In order to reduce the conservatism of the long-term dietary exposure assessment, it would be desirable to report not only information on the limit of quantification, but also on the limit of detection (LOD). For calculating the mean residue concentrations used for estimating the chronic exposure, samples without detectable residues (residues below LOD) could be considered as 'free of residues', thus as real 'zero residue samples'. This information is of particular interest for active substances with very low toxicological reference values (e.g. dichlorvos).

- For dithiocarbamates the exposure calculations were found to be driven by naturally occurring compounds that mimic the presence of dithiocarbamates. To allow more refined intake calculations, further investigations on the naturally occurring background residue levels of CS_2 would be desirable. This information should be taken into account in refined dietary exposure assessments.

- When samples with multiple residues are identified in national monitoring programmes, Member States could use the risk assessment methodology described in Section 4.3 to get an indication whether the presence of multiple pesticides belonging to one of the cumulative assessment groups is likely to pose a consumer health risk. However, since the work on the definition of cumulative assessment groups is still on going, the results have to be considered as indicative.

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ABBREVIATIONS

Country codes

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

Other abbreviations

ADI	Acceptable Daily Intake
ARfD	Acute Reference Dose
BAC	Benzalkonium Chloride
CAG	Cumulative Assessment Group
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
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

APPENDICES

APPENDIX I: AUTHORITIES RESPONSIBLE IN THE REPORTING COUNTRIES FOR PESTICIDE RESIDUE MONITORING

Country	National authority/institution	Web addresses for published national monitoring reports
AT	Austrian Federal Ministry of Health	http://bmg.gv.at/home/Schwerpunkte/VerbraucherInnengesundheit/Lebensmittel/Lebensmittelkontrolle/Monitoringprogramme/Nationales_Rueckstandsmonitoring_Obst_und_Gemuese
	Austrian Agency for Health and Food Safety	http://www.ages.at/risikobewertung/ernaehrungssicherheit/rueckstaende-kontaminanten/pflanzenschutzmittel-rueckstaende-in-lebensmittel/pestizidmonitoring/
BE	Federal Agency for the Safety of the Food Chain (FASFC)	http://www.afsca.be
BG	Bulgarian Food Safety Agency	http://www.babh.government.bg
CY	Pesticides Residues Laboratory of the State General Laboratory of Ministry of Health	www.moh.gov.cy/sgl
CZ	Czech Agriculture and Food Inspection Authority	http://www.szpi.gov.cz/lstDoc.aspx?nid=11386
	State Veterinary Administration	www.svscr.cz
DE	Federal Office of Consumer Protection and Food Safety (BVL)	http://www.bvl.bund.de/berichtpsm
DK	Danish Veterinary and Food Administration	http://www.foedevarestyrelsen.dk/Foedevarer/Kemiske_forureninger/Pesticider/Kontrol_analyser/Sider/Kontrol_analyser.aspx
	National Food Institute, Technical University of Denmark	http://www.food.dtu.dk/Publikationer/F%C3%B8devaresikkerhed/Kemiske_forureninger/Pesticidrester.aspx
EE	Veterinary and Food Board and Agricultural Board	www.vet.agri.ee
ES	Spanish Agency for Consumer Affairs, Food Safety and Nutrition	http://www.aesan.msssi.gob.es/AESAN/web/control_oficial/seccion/planes_nacionales_especificos.shtml
FI	Finnish Food Safety Authority Evira and Finnish Customs	http://www.evira.fi/portal/fi/evira/asiakokonaisuudet/vierasaineet/kasvinsuojeluainejaamat/valvonta/
FR	Ministère de l'Économie, des finances et de l'industrie Direction générale de la concurrence, de la consommation et de la répression des fraudes (DGCCRF)	http://www.economie.gouv.fr/dgccrf/securite/produits-alimentaires
GR	Ministry of Rural Development and Food General Directorate of Plant Produce Directorate of Plant Produce Protection Department of Pesticides	http://www.minagric.gr/index.php/el/for-citizen/food-and-sequre/845-asfaleiatwntrofimvnefsa.html
HU	National Food Chain Safety Office - Directorate of Plant Protection, Soil Conservation and Agri-environment (NFCSO DPPSCA)	http://www.nebih.hu
IE	Department of Agriculture food and the Marine	www.pcs.agriculture.gov.ie
IS	The Food and Veterinary Authority	http://www.mast.is

Country	National authority/institution	Web addresses for published national monitoring reports
IT	Ministero della Salute	http://www.salute.gov.it/portale/temi/p2_6.jsp?lingua=italiano&id=1105&area=fitosanitari&menu=vegetali
LT	National Food and Veterinary Risk Assessment Institute	www.nmvrvi.lt
LU	Food Safety Service	http://www.securite-alimentaire.public.lu/organisme/pcnp/sc/cs9_prod_phyto/index.html?highlight=pesticides
	Administration of Veterinary Service	http://www.securite-alimentaire.public.lu/organisme/pcnp/sc/cs9_prod_phyto/index.html?highlight=pesticides
LV	Ministry of Agriculture Food and Veterinary Service of Latvia	http://www.zm.gov.lv/
MT	Malta Competition and Consumers Affairs Authority	www.mccaa.org.mt
NL	Dutch Food and Consumer product Safety Authority (VWA)	www.vwa.nl
NO	The Norwegian Food Safety Authority	http://www.mattilsynet.no/mat_og_vann/uonskede_stofferimaten/rester_av_plantevernmidler_i_mat/#overvakings_og_kartleggingsprogrammer
PL	The State Sanitary Inspection	http://www.gis.gov.pl
PT	Directorate General of Food and Veterinary (DGAV) Pesticide Residues Laboratory of the National Institute of Agrarian and Veterinary Research (LRP-INIAV) National Reference Laboratory for Fruits, Vegetables and Cereals	http://www.dgav.pt
RO	National Sanitary Veterinary and Food Safety Authority Ministry of Agriculture and Rural Development Ministry of Health	www.madr.ro www.ansvsa.ro
SE	National Food Agency	www.slv.se
SI	Inspectorate of the Republic of Slovenia for Agriculture, Forestry and Food (IRSAFFE) Health Inspectorate of the Republic of Slovenia (HIRS) Veterinary Administration of the Republic of Slovenia (VARS) Phytosanitary Administration of the Republic of Slovenia (PARS)	http://www.uvhvvr.gov.si/si/delovna_podrocja/ostanki_pesticidov/uradni_nadzor/
SK	State Veterinary and Food Administration of the Slovak Republic Public Health Authority of the Slovak Republic	http://www.svssr.sk/
UK	Health and Safety Executive – Chemicals Regulation Directorate	http://www.pesticides.gov.uk/guidance/industries/pesticides/advisory-groups/PRiF/PRiF-archive/2012/2012_programme.htm

APPENDIX II: BACKGROUND INFORMATION ON EU-COORDINATED PROGRAMME

Table A: Description of 2012 EU-coordinated control programme

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
2,4-D (RD)	2,4-D (sum of 2,4-D and its esters expressed as 2,4-D)	P	Ba, Pe, Pp, Wh, Oo, Oj
2-phenylphenol		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Abamectin (RD)	Abamectin (sum of avermectin B1a, avermectinB1b and delta-8,9 isomer of avermectin B1a)	P	
Acephate		P	
Acetamiprid (RD)	Acteamiprid (P) Acetamiprid (sum of acetamiprid and N-desmethyl-acetamiprid (IM-2-1), expressed as acetamiprid) (A)	P	
Acrinathrin		P	
Aldicarb (RD)	Aldicarb (sum of aldicarb, its sulfoxide and its sulfone, expressed as aldicarb)	P	
Amitraz (RD)	Amitraz (amitraz including the metabolites containing the 2,4 -dimethylaniline moiety expressed as amitraz)	P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Amitrole		P	
Azinphos-ethyl		A	
Azinphos-methyl		P	
Azoxystrobin		P	
Benfuracarb		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Bifenthrin		PA	
Biphenyl		P	
Bitertanol		P	
Bixafen (RD)	Bixafen (P) Bixafen (sum of bixafen and desmethyl-bixafen, expressed as bixafen) (A)	A	Bu, Eg
Boscalid (RD)	Boscalid (P) Boscalid (sum of boscalid and M 510F01 including its conjugates) (A)	PA	Bu, Eg
Bromide ion		P	Au, Ba, Br, Ca, Tg, Pe, Wh, Oo, Oj
Bromopropylate		P	
Bromuconazole	Bromuconazole (sum of diasteroisomers)	P	
Bupirimate		P	
Buprofezin		P	
Captan (RD)	Captan and folpet (pome fruit, certain berries, tomatoes, beans with pods), Captan (other P and A)	P	
Carbaryl		P	
Carbendazim (RD)	Carbendazim and benomyl (sum of benomyl and carbendazim expressed as carbendazim) (P) Carbendazim and thiophanate-methyl, expressed as carbendazim (A)	P	
Carbofuran (RD)	Carbofuran (sum of carbofuran and 3-hydroxy-carbofuran expressed as carbofuran)	P	
Carbosulfan		P	

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
Chlorantraniliprole	Chlorantraniliprole (DPX E-2Y45)	P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Chlordane (RD)	Chlordane (sum of cis- and trans-chlordane) (P) Chlordane (sum of cis- and trans-isomers and oxychlordane expressed as chlordane) (A)	A	
Chlorfenapyr		P	
Chlorfenvinphos		P	
Chlormequat		P	Ba, Br, Ca, Pe, Pp, Oo, Oj
Chlorobenzilate		A	Bu, Eg
Chlorothalonil (RD)	Chlorothalonil (P) Chlorothalonil expressed as SDS-3701 (4-hydroxy-2,5,6- trichloroisophthalonitrile) (A)	P	
Chlorpropham (RD)	Chlorpropham (P: potatoes) Chlorpropham and 3-chloroaniline expressed as chlorpropham (P) Chlorpropham and 4′-hydroxychlorpropham-O-sulphonic acid (4-HSA), expressed as chlorpropham (A)	PA	Bu, Eg
Chlorpyrifos		PA	
Chlorpyrifos-methyl		PA	
Clofentezine (RD)	Clofentezine (P, except cereals) Clofentezine (sum of all compounds containing the 2-chlorobenzoyl moiety expressed as clofentezine) (A, cereals)	P	Wh
Clothianidin		P	
Cyfluthrin (RD)	Cyfluthrin (cyfluthrin including other mixtures of constituent isomers (sum of isomers))	PA	
Cymoxanil		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Cypermethrin (RD)	Cypermethrin (cypermethrin including other mixtures of constituent isomers (sum of isomers))	PA	
Cyproconazole		P	
Cyprodinil (RD)	Cyprodinil (P) Cyprodinil (sum cyprodinil and metabolite CGA 304075) (A)	P	
Cyromazine		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
DDT (RD)	DDT (sum of p,p'-DDT, o,p'-DDT, p-p'-DDE and p,p'-TDE (DDD) expressed as DDT)	A	
Deltamethrin	Deltamethrin (cis-deltamethrin)	PA	
Diazinon		PA	
Dichlofluanid		P	
Dichlorvos		P	
Dicloran		P	
Dicofol (RD)	Dicofol (sum of p, p' and o,p' isomers)	P	Wh
Dicrotophos		P	Ba, Tg, Pe, Pp, Wh, Oo, Oj
Dieldrin (RD)	Aldrin and dieldrin (aldrin and dieldrin combined expressed as dieldrin)	A	
Diethofencarb		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
Difenoconazole		P	
Diflubenzuron (RD)	Diflbenzuron (P) Diflubenzuron (sum of Diflubenzuron and 4 – chlorophenylurea expressed as diflubenzuron) (A)	P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Dimethoate (RD)	Dimethoate (sum of dimethoate and omethoate expressed as dimethoate)	P	
Dimethomorph		P	Wh
Diniconazole		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Diphenylamine		P	
Dithianon		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Dithiocarbamates (RD)	Dithiocarbamates expressed as CS_2, including maneb, mancozeb, metiram, propineb, thiram and ziram	P	Oo, Oj
Dodine		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Endosulfan (RD)	Endosulfan (sum of alpha- and beta-isomers and endosulfan-sulphate expresses as endosulfan)	PA	
Endrin		A	
EPN		P	
Epoxiconazole		P	
Esfenvalerate (RD)	Fenvalerate and esfenvalerate (sum of RR and SS isomers) Fenvalerate and esfenvalerate (sum of RS and SR isomers)	PA	
Ethephon		P	Au, Ba, Br, Ca, Pe, Oo,
Ethion		P	
Ethirimol		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Ethoprophos		P	
Etofenprox		PA	Bu, Eg
Famoxadone		PA	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Fenamidone		P	
Fenamiphos (RD)	Fenamiphos (sum of fenamiphos and its sulphoxide and sulphone expressed as fenamiphos)	P	
Fenarimol		P	Wh
Fenazaquin		P	Wh
Fenbuconazole		P	
Fenbutatin oxide		P	Ba, Br, Ca, Pe, Wh, Oo, Oj
Fenhexamid		P	
Fenitrothion		P	
Fenoxycarb		P	
Fenpropathrin		P	
Fenpropimorph (RD)	Fenpropimorph (P) Fenpropimorph carboxylic acid (BF 421-2) expressed as fenpropimorph (A)	P	
Fenpyroximate		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
Fenthion (RD)	Fenthion (fenthion and its oxigen analogue, their sulfoxides and sulfone expressed as parent)	PA	
Fipronil (RD)	Fipronil (sum of fipronil and sulfone metabolite (MB46136) expressed as fipronil)	P	
Fluazifop-P-butyl (RD)	Fluazifop-P-butyl (fluazifop acid (free and conjugate))	P	Au, Ba, Tg, Wh, Oo, Oj
Fludioxonil		P	
Flufenoxuron		P	
Fluquinconazole		PA	Bu, Eg
Flusilazole (RD)	Flusilazole (P) Flusilazole (sum of flusilazole and its metabolite IN-F7321 ([bis-(4-fluorophenyl)methyl]silanol) expressed as flusilazole) (A)	P	
Flutriafol		P	
Folpet	Captan and folpet (pome fruit, certain berries, tomatoes, beans with pods), Folpet (other P and A)	P	
Formetanate (RD)	Formetanate (sum of formetanate and its salts expressed as formetanate(hydrochloride)	P	
Formothion		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Fosthiazate		P	
Glyphosate		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Oo, Oj
Haloxyfop-R (RD)	Haloxyfop including haloxyfop-R (haloxyfop-R methyl ester, haloxyfop-R and conjugates of haloxyfop-R expressed as haloxyfop-R) (P) Haloxyfop including haloxyfop-R (haloxyfop-R and conjugates of haloxyfop-R expressed as haloxyfop-R) (A)	PA	Bu, Eg
Heptachlor (RD)	Heptachlor (sum of heptachlor and heptachlor epoxide expressed as heptachlor)	A	
Hexachlorobenzene		A	
Hexachlorocyclo-hexane (alpha)		A	
Hexachlorocyclo-hexane (beta)		A	
Hexaconazole		P	
Hexythiazox		P	Wh
Imazalil		P	
Imidacloprid		P	
Indoxacarb		PA	Bu, Eg
Iprodione		P	
Iprovalicarb		P	
Isocarbophos		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Isofenphos-methyl		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Isoprocarb		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
Kresoxim-methyl (RD)	Kresoxim-methyl (P) 490M1 expressed as kresoxim-methyl milk products (A: milk), 490M9 expressed as kresoxim-methyl (A: meat)	P	
λ-Cyhalothrin (RD)	λ-cyhalothtrin (P) λ-cyhalothrin, including other mixed isomeric constituents (sum of isomers) (A)	P	
Lindane	Lindane (gamma-isomer of hexachlorocyclohexane (HCH))	A	
Linuron		P	
Lufenuron		P	
Malathion (RD)	Malathion (sum of malathion and malaoxon expressed as malathion)	P	
Maleic hydrazide (RD)	Maleic hydrzide (P, A except milk) Maleic hydrazide and its conjugates expressed as maleic hydrazide (A: milk)	A	Eg
Mandipropamid		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Mepanipyrim (RD)	Mepanipyrim (mepanipyrim and its metabolite (2-anilino-4-(2-hydroxypropyl)-6-methylpyrimidine) expressed as mepanipyrim)	P	
Mepiquat		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Oo, Oj
Meptyldinocap (RD)	Meptyldinocap (sum of 2,4 DNOPC and 2,4 DNOP expressed as meptyldinocap)	P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Metaflumizone	Metaflumizone (sum of E- and Z- isomers)	A	Bu, Eg
Metalaxyl (RD)	Metalaxyl and metalaxyl-M (metalaxyl including other mixtures of constituent isomers including metalaxyl-M (sum of isomers))	P	
Metconazole		P	
Methamidophos		P	
Methidathion		PA	
Methiocarb (RD)	Methiocarb (sum of methiocarb and methiocarb sulfoxide and sulfone, expressed as methiocarb)	P	
Methomyl (RD)	Methomyl and thiodicarb (sum of methomyl and thiodicarb expressed as methomyl)	P	
Methoxychlor		PA	
Methoxyfenozide		P	
Metobromuron		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Monocrotophos		P	
Myclobutanil (RD)	Myclobutanil (P) Myclobutanil (alpha-(3-hydroxybutyl)-alpha-(4-chloro-phenyl)-1H-1,2,4-triazole-1-propanenitrile (RH9090) expressed as myclobutanil) (A)	P	
Nitenpyram		P	Au, Ba, Br, Ca, Tg, Pe,Wh, Oo, Oj
Oxadixyl		P	
Oxamyl		P	
Oxydemeton-methyl (RD)	Oxydemeton-methyl (sum of oxydemeton-methyl and demeton-S-methylsulfone expressed as oxydemeton-methyl)	P	

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
Paclobutrazol		P	
Parathion		PA	
Parathion-methyl (RD)	Parathion-methyl (sum of parathion-methyl and paraoxon-methyl expressed as parathion-methyl)	PA	
Penconazole		P	
Pencycuron		P	
Pendimethalin		P	
Permethrin	Permethrin (sum of isomers)	A	
Phenthoate		P	
Phosalone		P	
Phosmet (RD)	Phosmet (phosmet and phosmet oxon expressed as phosmet) (P) Phosmet (A)	P	
Phoxim		P	
Pirimicarb (RD)	Pirimicarb (sum of pirimicarb and desmethyl pirimicarb expressed as pirimicarb)	P	
Pirimiphos-methyl		PA	
Prochloraz (RD)	Prochloraz (sum of prochloraz and its metabolites containing the 2,4,6-Trichlorophenol moiety expressed as prochloraz)	P	
Procymidone		P	
Profenofos		PA	
Propamocarb (RD)	Propamocarb (sum of propamocarb and its salt expressed as propamocarb)	P	Ba, Tg, Pe, Wh, Oo, Oj
Propargite		P	
Propiconazole		P	
Propoxur		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Propyzamide (RD)	Propyzamide (P) Propyzamide (sum of propyzamide and all metabolites containing the 3,5-dichlorobenzoic acid fraction expressed as propyzamide) (A)	P	
Prothioconazole (RD)	Prothioconazole-desthio (P) Prothioconazole (sum of prothioconazole-desthio and its glucuronide conjugate, expressed as prothioconazoledesthio) (A)	P	
Prothiofos		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Pymetrozine		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Pyraclostrobin		P	
Pyrazophos		A	
Pyrethrins		P	
Pyridaben		P	
Pyrimethanil		P	
Pyriproxyfen		P	
Quinoxyfen		P	
Resmethrin (RD)	Resmethrin (resmethrin including other mixtures of constituent isomers (sum of isomers))	A	

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
Rotenone		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Spinosad (RD)	Spinosad (sum of spinosyn A and spinosyn D, expressed as spinosad)	P	
Spirodiclofen		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Spiromesifen		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Spiroxamine (RD)	Spiroxamine (P) Spiroxamine carboxylic acid expressed as spiroxamine (A)	P	
tau-Fluvalinate		PA	Bu
Tebuconazole		P	
Tebufenozide		P	
Tebufenpyrad		P	Wh
Teflubenzuron		P	
Tefluthrin		P	
Terbuthylazine		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Tetraconazole		PA	Bu
Tetradifon		P	Wh
Tetramethrin		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Thiabendazole (RD)	Thiabendazole (P) Thiabendazole (sum of thiabendazole and 5-hydroxythiabendazole) (A)	P	
Thiacloprid		P	
Thiametoxam (RD)	Thiametoxam (sum of thiametoxam and clothianidin expressed as thiametoxam)	P	
Thiophanate-methyl		P	
Tolclofos-methyl		P	
Tolylfluanid (RD)	Tolylfluanid (Sum of tolylfluanid and dimethylaminosulfotoluidide expressed as tolylfluanid) (P) Tolylfluanid analysed as dimethylaminosulfotoluidide and expressed as tolylfluanid (A)	P	Wh
Triadimenol (RD)	Triadimefon and triadimenol (sum of triadimefon and triadimenol)	P	
Triazophos		PA	
Trichlorfon		P	Au, Ba, Br, Ca, Tg, Pe, Pp, Wh, Oo, Oj
Trifloxystrobin (RD)	Trifloxystrobin (P) Trifloxystrobin (sum of trifloxystrobin and its metabolite (E, E)-methoxyimino- {2-[1-(3-trifluoromethyl-phenyl)-ethylideneamino-oxymethyl]-phenyl}-acetic acid (CGA 321113)) (A)	P	
Triflumuron		P	
Trifluralin		P	
Triticonazole		P	

Pesticide	Residue definition according to Regulation (EC) No 396/2005 on EU MRLs [(a)]	Type of food to be analysed [(b)]	Analysis not mandatory for the following food products [(c)]
Vinclozolin (RD)	Vinclozolin (sum of vinclozolin and all metabolites containing the 3,5-dichloraniline moiety, expressed as vinclozolin) (P) Vinclozolin, iprodione, procymidone, sum of compounds and all metabolites containing the 3,5-dichloroaniline moiety expressed as 3,5 dichloroaniline (A)	P	Wh
Zoxamide		P	

(a): If not specifically mentioned, the residue definition comprises the parent compound only.

(b): Pesticide to be analysed on plant products (P) and/or animal products (A) according to Regulation (EU) No 1274/2011

(c): Au: aubergines; Ba: bananas; Br: broccoli; Ca: cauliflower; Pe: peas (without pods); Pp: peppers; Tg: table grapes; Wh: wheat; Oo: olive oil; Oj: orange juice; Bu: butter; Eg: chicken eggs.

Table B: Detailed information on products exceeding the MRL (EUCP)

Part A: Samples that were reported by reporting countries as exceeding the MRLs

Food item	Pesticide	Country of origin[(a)]	Reported Concentration (mg/kg)	Non-compliant[(b)]	MRL
Aubergines	Acephate	Bangladesh	0.29	Y	0.02*
Aubergines	Acephate	Kenya	0.050	Y	0.02*
Aubergines	Carbofuran (RD)	Cyprus	0.13	Y	0.02*
Aubergines	Chlormequat	Spain	0.10	N	0.05*
Aubergines	Chlormequat	Spain	0.20	Y	0.05*
Aubergines	Chlormequat	Spain	0.70	Y	0.05*
Aubergines	Diazinon	Bangladesh	0.012	N	0.01*
Aubergines	Dimethoate (RD)	Bangladesh	0.032	N	0.02*
Aubergines	Dimethoate (RD)	Cambodia	0.047	Y	0.02*
Aubergines	Mepiquat	Netherlands	0.092	N	0.05*
Aubergines	Methamidophos	Bangladesh	0.066	Y	0.01*
Aubergines	Procymidone	Poland	0.20	Y	0.02*
Bananas	Acrinathrin	Portugal	0.75	N	0.5
Bananas	Acrinathrin	Portugal	1.70	Y	0.5
Bananas	Acrinathrin	Portugal	3.30	Y	0.5
Bananas	Buprofezin	Spain	0.91	N	0.5
Bananas	Cypermethrin (RD)	Non domestic, import	0.068	N	0.05*
Bananas	Imidacloprid	Spain	0.060	N	0.05*
Bananas	Spinosad (RD)	Portugal	0.028	N	0.02*
Bananas	Spinosad (RD)	Unknown	0.033	N	0.02*
Broccoli	Chlorpyrifos	Poland	0.15	Y	0.05*
Broccoli	Chlorpyrifos	Poland	0.25	Y	0.05*
Broccoli	Dimethoate (RD)	Portugal	0.34	N	0.02*
Broccoli	Dithiocarbamates (RD)	Italy	1.3	N	1
Broccoli	Dithiocarbamates (RD)	Netherlands	2.0	N	1
Broccoli	Dithiocarbamates (RD)	Spain	1.1	N	1
Broccoli	Dithiocarbamates (RD)	Spain	1.4	N	1
Broccoli	Esfenvalerate (RD)	Poland	0.029	N	0.02*
Broccoli	Fluazifop-P-butyl (RD)	Luxembourg	0.23	N	0.2
Broccoli	Fluazifop-P-butyl (RD)	Spain	0.40	N	0.2
Cauliflower	Chlorpyrifos	Italy	0.06	N	0.05*
Cauliflower	Chlorpyrifos	Poland	0.06	N	0.05*
Cauliflower	Chlorpyrifos	Poland	0.18	Y	0.05*
Cauliflower	Chlorpyrifos	Poland	0.19	Y	0.05*
Cauliflower	Chlorpyrifos	Spain	0.37	Y	0.05*
Cauliflower	Dimethoate (RD)	Germany	0.022	N	0.02*
Cauliflower	Dimethoate (RD)	Germany	0.023	N	0.02*

Food item	Pesticide	Country of origin[(a)]	Reported Concentration (mg/kg)	Non-compliant[(b)]	MRL
Cauliflower	Dimethoate (RD)	Germany	0.071	Y	0.02*
Cauliflower	Dimethoate (RD)	Poland	0.049	Y	0.02*
Cauliflower	Dimethoate (RD)	Poland	0.080	Y	0.02*
Cauliflower	Dimethomorph	Croatia	0.12	Y	0.05*
Cauliflower	Dithiocarbamates (RD)	France	1.0	N	1
Cauliflower	Dithiocarbamates (RD)	Netherlands	1.1	N	1
Cauliflower	Dithiocarbamates (RD)	Poland	1.1	N	1
Cauliflower	Dithiocarbamates (RD)	Poland	1.9	N	1
Cauliflower	Dithiocarbamates (RD)	Poland	2.5	Y	1
Cauliflower	Fluazifop-P-butyl (RD)	Luxembourg	0.24	N	0.2
Peas (without pods)	Dithiocarbamates (RD)	Spain	0.44	N	0.2
Peppers (sweet)	Acephate	India	0.061	Y	0.02*
Peppers (sweet)	Carbendazim (RD)	Dominican Republic	1.3	Y	0.1*
Peppers (sweet)	Chlorfenapyr	India	0.24	Y	0.05*
Peppers (sweet)	Cypermethrin (RD)	Cyprus	1.4	Y	0.5
Peppers (sweet)	Endosulfan (RD)	Dominican Republic	0.087	N	0.05*
Peppers (sweet)	Ethephon	Hungary	0.16	Y	0.05*
Peppers (sweet)	Ethephon	Poland	0.12	Y	0.05*
Peppers (sweet)	Ethephon	Poland	2.5	Y	0.05*
Peppers (sweet)	Ethephon	Poland	6.7	Y	0.05*
Peppers (sweet)	Ethion	India	3.4	Y	0.01*
Peppers (sweet)	Fipronil (RD)	Dominican Republic	0.040	Y	0.005*
Peppers (sweet)	Formetanate (RD)	Turkey	0.13	Y	0.05*
Peppers (sweet)	Haloxyfop-R (RD)	Netherlands	0.064	N	0.05
Peppers (sweet)	λ-Cyhalothrin (RD)	Turkey	0.14	N	0.1
Peppers (sweet)	Methamidophos	India	0.37	Y	0.01*
Peppers (sweet)	Methiocarb (RD)	Greece	1.2	Y	0.2
Peppers (sweet)	Methomyl (RD)	Dominican Republic	0.077	Y	0.02*
Peppers (sweet)	Methomyl (RD)	Hungary	0.20	Y	0.02*
Peppers (sweet)	Methomyl (RD)	Unknown	0.060	Y	0.02*
Peppers (sweet)	Phosalone	India	0.99	Y	0.05*
Peppers (sweet)	Procymidone	Cyprus	0.15	Y	0.02*
Peppers (sweet)	Profenofos	India	0.075	N	0.05*
Peppers (sweet)	Quinoxyfen	Spain	0.080	Y	0.02*
Peppers (sweet)	Tetradifon	Turkey	0.013	N	0.01*
Peppers (sweet)	Thiophanate-methyl	Poland	0.63	Y	0.1*
Peppers (sweet)	Thiophanate-methyl	Poland	0.72	Y	0.1*
Peppers (sweet)	Triazophos	India	3.9	Y	0.01*

Food item	Pesticide	Country of origin[(a)]	Reported Concentration (mg/kg)	Non-compliant[(b)]	MRL
Table grapes	Acrinathrin	Spain	0.059	Y	0.05*
Table grapes	Azinphos-methyl	Chile	0.052	N	0.05*
Table grapes	Carbendazim (RD)	Italy	0.43	N	0.3
Table grapes	Chlorfenapyr	India	0.14	Y	0.05*
Table grapes	Chlormequat	India	0.40	Y	0.05*
Table grapes	Chlormequat	India	0.82	Y	0.05*
Table grapes	Chlormequat	South Africa	0.053	N	0.05*
Table grapes	Chlorpyrifos	Italy	0.71	N	0.5
Table grapes	Cypermethrin (RD)	Cyprus	0.51	Y	0.5
Table grapes	Diphenylamine	Italy	0.064	N	0.05*
Table grapes	Dithiocarbamates (RD)	Spain	7.2	N	5
Table grapes	Ethephon	South Africa	0.8	N	0.7
Table grapes	Ethephon	Unknown	0.71	N	0.7
Table grapes	Ethion	Iran	0.10	Y	0.01*
Table grapes	Folpet	Hungary	0.021	N	0.02*
Table grapes	Folpet	Hungary	0.023	N	0.02*
Table grapes	Folpet	Hungary	0.027	N	0.02*
Table grapes	Folpet	Hungary	0.035	N	0.02*
Table grapes	Folpet	Italy	0.70	Y	0.02*
Table grapes	Folpet	South Africa	0.76	Y	0.02*
Table grapes	Malathion (RD)	South Africa	0.030	N	0.02*
Table grapes	Monocrotophos	Spain	0.022	Y	0.01*
Table grapes	Procymidone	France	0.37	Y	0.02*
Table grapes	Procymidone	Italy	0.46	Y	0.02*
Table grapes	Procymidone	South Africa	0.088	Y	0.02*
Table grapes	Thiophanate-methyl	Italy	0.20	N	0.1*
Wheat	2,4-D (RD)	Netherlands	0.074	N	0.05*
Wheat	Chlorpropham (RD)	Netherlands	0.066	N	0.02*
Wheat	Chlorpropham (RD)	United Kingdom	0.10	Y	0.02*
Wheat	Chlorpyrifos	Hungary	0.063	N	0.05*
Wheat	Chlorpyrifos	Hungary	0.084	N	0.05*
Wheat	Diflubenzuron (RD)	Greece	0.17	N	0.1
Olive oil	Pendimethalin	Spain	0.07	Y	0.05*

(a): Country of origin as informed by the reporting country
(b): Non-compliant sample as considered by the reporting country
(*): MRL set at the LOQ.

Part B: Samples not reported by reporting countries as exceeding the MRLs, but which should be reconsidered as possibly exceeding the legal limit, considering the most appropriate processing factor.

Food item	Pesticide	Country of origin[a]	Reported concentration (mg/kg)	Processing factor[b]	MRL
Olive oil	Endosulfan (sum)	Spain	0.06	1	0.05*
Olive oil	Famoxadone	Spain	0.036	1	0.02*
Olive oil	Fenthion (sum)	Greece	0.029	1	0.01*
Olive oil	Fenthion (sum)	Greece	0.025	1	0.01*
Olive oil	Fenthion (sum)	Germany	0.017	1	0.01*
Olive oil	Terbuthylazine	Italy	0.191	1	0.05*
Olive oil	Terbuthylazine	Spain	0.09	1	0.05*
Olive oil	Terbuthylazine	Italy	0.062	1	0.05*
Olive oil	Terbuthylazine	Spain	0.053	1	0.05*

(a): Country of origin as reported by the reporting country.

(b): For non-fat soluble pesticides and for pesticides with MRLs set at the LOQ and for which there is no evidence that a GAP is approved, EFSA proposed to use a processing factor of 1.

(*): MRL set at the LOQ.

APPENDIX III: BACKGROUND INFORMATION ON NATIONAL CONTROL PROGRAMMES

Table A: Import control programme for 2012

Country of origin	Food and feed	Examples of pesticides to be checked	Frequency of checks
China	*Brassica oleracea* (other edible Brassica, 'Chinese broccoli') [(a)]	Chlorfenapyr, fipronil, carbendazim, acetamiprid, dimethomorph, propiconazole	10 %
	Pomelos [(b)]	Triazofos, triadimefon and triadimenol, parathion-methyl, phenthoate, methidathion	20 %
	Tea leaves (black and green)	Buprofezin; imidacloprid; fenvalerate and esfenvalerate; profenofos; trifluralin; triazophos; triadimefon and triadimenol, cypermethrin	10 %
Dominican Republic	Yardlong beans (*Vigna unguiculata spp. sesquipedalis*) [(c)] Bitter melon (*Momordica charantia*) [(d)] Peppers (sweet and other than sweet) (*Capsicum spp.*) Aubergines	Amitraz, acephate, aldicarb, benomyl, carbendazim, chlorfenapyr, chlorpyrifos, CS_2 (dithiocarbamates), diafenthiuron, diazinon, dichlorvos, dicofol, dimethoate, endosulfan, fenamidone, imidacloprid, malathion, methamidophos, methiocarb, methomyl, monocrotophos, omethoate, oxamyl, profenofos, propiconazole, thiabendazol, thiacloprid	50/20 %[(h)]
Egypt	Oranges (fresh or dried) Peaches (excluding nectarines) Pomegranates Strawberries	Carbendazim, cyfluthrin, cyprodinil, diazinon, dimethoate, ethion, fenitrothion, fenpropathrin, fludioxonil, hexaflumuron, lambda-cyhalothrin, methiocarb, methomyl, omethoate, oxamyl, phenthoate, thiophanate-methyl	10 %
	Peppers (sweet and other than sweet) (*Capsicum spp.*)	Carbofuran, chlorpyrifos, cypermethrin, cyproconazole, dicofol, difenoconazole, dinotefuran, ethion, flusilazole, folpet, prochloraz, profenofos, propiconazole, thiophanate-methyl and triforine	
India	Curry leaves (*Bergera/Murraya koenigii*) [(e)]	triazophos, oxydemeton-methyl, chlorpyriphos, acetamiprid, thiamethoxam, clothianidin, methamidophos, acephate, propargite, monocrotophos	10/50 %[(h)]
	Okra	Acephate, methamidophos, triazophos, endosulfan, monocrotophos	10/50 %[(h)]
Thailand	Peppers (other than sweet) (*Capsicum spp.*)	Carbofuran, methomyl, omethoate, dimethoate, triazophos, malathion, profenofos, prothiofos, ethion, carbendazim, triforine, procymidone, formetanate	10 %
	Coriander leaves [(f)]	Acephate, carbaryl, carbendazim,	20 %

Country of origin	Food and feed	Examples of pesticides to be checked	Frequency of checks
	Basil (holy, sweet) (e)	carbofuran, chlorpyriphos, chlorpyriphos-methyl, dimethoate, ethion, malathion, metalaxyl, methamidophos, methomyl, monocrotophos, omethoate, prophenophos, prothiophos, quinalphos, triadimefon, triazophos, dicrotophos, EPN, triforine	
	Yardlong beans (*Vigna unguiculata spp. sesquipedalis*) (c)		50 %
	Aubergines		
	Brassica vegetables (g)		
Turkey	Sweet Peppers (*Capsicum annuum*)	Methomyl, oxamyl, carbendazim, clofentezine, diafenthiuron, dimethoate, formetanate, malathion, procymidone, tetradifon, thiophanate-methyl	10 %
	Tomatoes		

(a): Classified in Regulation (EU) No 600/2010[73] under broccoli (Code 0241010).
(b): Classified in Regulation (EU) No 600/2010 under grapefruit (Code 0110010).
(c): Classified in Regulation (EU) No 600/2010 under beans with pods (Code 0260010).
(d): Not explicitly mentioned in Regulation (EU) No 600/2010; in 2013 bitter melons were classified under courgettes (Code 0232030).
(e): Not explicitly mentioned in Regulation (EU) No 600/2010; in 2013 curry leaves and holy basil were classified under basil (Code 0256080).
(f): Classified in Regulation (EU) No 600/2010 under celery leaves (Code 0256030).
(g): All crops classified in Regulation (EU) No 600/2010 under Code 0240000.
(h): For some products the sampling frequency was increased during 2012.

[73] Commission Regulation (EU) No 600/2010 of 8 July 2010 amending Annex I to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards additions and modification of the examples of related varieties or other products to which the same MRL applies (Text with EEA relevance). OJ L 174, 9.7.2010, p. 18–39.

Table B: Detailed analysis of possible reasons for MRL exceedances

Details on most frequently detected MRL exceedances on products originating from EU/EFTA and from third countries[74]

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
Products originating from EU and EFTA countries						
Bovine liver / Copper	20	DE	40 – 454	30	The copper residues might result from feed additives. The MRL for copper in animal commodities should be reviewed, taking into account this copper source.	The existing MRL probably does not take into account other sources than pesticides leading to increased copper residues in food of animal origin.
Turnips / Chlorpyrifos	12	8 FR, 3 PT, 1 BE	0.052 – 0.15	0.05*	Chlorpyrifos is approved in the EU. The use on turnips is not authorised.	Use of an approved pesticide on a crop for which the use was not permitted.
Table grapes / Folpet	10	5 DE, 4 HU, 1 IT	0.021 – 0.698	0.02*	The MRL for wine grapes was set at a level of 5 mg/kg, which was raised in 2013 to 10 mg/kg. However, for table grapes the MRL is set at the LOQ because the use is not authorised.	Use of an approved pesticide on a crop for which the use was not permitted.
Cherries / Dimethoate (RD)	9	3 FR, 2 GR, 2 IT, 2 DE	0.2 – 0.7	0.2	In 2009 the maximum residue level has been established temporarily at a level of 0.2 mg/kg pending the finalisation of the review under article 12(2). Before, the MRL was set at a level of 1 mg/kg.	Use of an approved pesticide on a crop for which the use was no longer permitted.
Cumin seed / Propiconazole	9	UK	0.4 – 1.0	0.1*	A number of pesticides were found exceeding the MRLs set in cumin seeds. Among them pesticides not approved in the EU (profenofos, tricyclazole, triazophos). The origin of the samples was reported as UK, but probably this is the country of packaging and not the country where the product was grown.	Use of pesticides on a crop where no specific MRLs (MRL above the LOQ) were established.
Cumin seed / Profenofos	9	UK	0.5 – 1.0	0.05*		
Cumin seed / Tricyclazole	9	UK	1.0 – 2.6	0.05*		
Cumin seed / Acetamiprid (RD)	9	UK	0.5 – 0.6	0.1*		
Cumin seed / Imidacloprid	9	UK	0.2 – 0.3	0.05*		
Cumin seed / Carbendazim (RD)	9	UK	0.7 – 2.0	0.1*		
Cumin seed / Iprodione	9	UK	0.2 – 0.4	0.1*		
Celery / Iprodione	8	4 FR, 2 BE, 1 DE, 1 CY	0.031 – 1.4	0.02*	Iprodione is authorised for a number of crops, but not for celery.	Use of an approved pesticide on a crop for which the use was not permitted.
Rocket, Rucola / Bromide ion	8	7 IT, 1 NL	52.4 – 214	50	Bromide ion is naturally occurring in plants. Since 2009, methyl bromide is no	The existing MRL might not be sufficient to cover the naturally

[74] The MRL exceedances detected on products subject to increased import controls in the framework or Regulation (EC) No 669/2005 are not included in this table. More details on these products can be found in section 3.2.3.

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
					longer approved in the EU. The existing MRL should reflect the background level.	occurring background concentrations for bromide ion occurring in certain crops like rucola.
Yams / Chlordecone	8	8 FR	0.026 – 0.28	0.02	Chlordecone is banned in the EU. It is classified as a persistent organic pollutant. Residues can be taken up by plants grown in contaminated soil.	Residue of persistent pesticides due to uptake via contaminated soil.
Parsley / Chlorpyrifos	7	2 FR, 2 IT,1 PT, 1 CY, 1 BE, 1 IE	0.06 – 0.5	0.05*	Chlorpyrifos is an approved active substance (insecticide).	Use of an approved pesticide on a crop for which the use was not permitted.
Celery / Fludioxonil	7	5 BE, 2 FR	0.06 – 0.26	0.05*	Fludioxonil is an approved active substance. In 2013 the MRL was raised to 1.5 mg/kg.	Use of an approved pesticide on a crop for which the use has not yet been authorised in 2012.
Carrots / Chlorpyrifos	7	2 IT, 2 ES, 2 GR, 1 FR	0.11 – 0.61	0.1	The use of chlorpyrifos in carrots is authorised in the EU.	Use of an approved pesticide on a crop for which the use was authorised, but probably not respecting the Good Agricultural Practice (e.g. dose rate, waiting period).
Tomatoes / Naphthoxyacetic acid, 2-	7	7 IT	0.011 – 0.022	0.01*	Default MRL of 0.01 mg/kg is applicable. 2-naphthoxyacetic acid is a non-approved plant growth regulator preventing fruit from falling prematurely.	Use of a non- approved pesticide.
Leafy vegetables, fresh herbs, not specified / Dimethoate (RD)	7	5 DE, 2 GR	0.035 – 1.15	0.02*	Dimethoate is approved in the EU. For lettuce a MRL above the LOQ was in place before 2009 (0.2 mg/kg).	Use of an approved pesticide on a crop for which the use was not permitted.
Table grapes / Cypermethrin (RD)	7	6 CY, 1 GR	0.51 – 11.3	0.5	The use of cypermethrin in table grapes is authorised in the EU.	Use of an approved pesticide on a crop for which the use was authorised, but probably not respecting the Good Agricultural Practice (e.g. dose rate, waiting period).
Honey / Acetamiprid (RD)	7	5 ES, 1 CZ, 1 DE	0.01 – 0.097	0.05*	Acetamiprid is an approved pesticide used on a wide range of crops.	The residues in honey are result from bees foraging in crops treated with acetamiprid.
Leafy vegetables, fresh herbs, not specified / DDAC	6	6 DE	0.023 – 0.92	0.01*	DDAC was previously used as pesticide. Currently it is widely used as a biocide for disinfection of machineries, surfaces	Residue resulting from the use of DDAC in biocidal products. Food business operators were probably not

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
					etc. which may get in contact with food during processing or packaging. The default MRL of 0.01 mg/kg is applicable. In 2012 a guideline level for enforcement of 0.5 mg/kg was proposed. In 2014, an amendment of the legal limit was agreed at EU level, to allow marketing of food that contained residues of these biocidal products (Regulation (EU) No 1119/2014[75]).	aware that the use of disinfectants will lead to residues which are in conflict with the pesticide residue legislation.
Turnips / Dithiocarbamates (RD)	6	6 PT	0.083 – 0.95	0.05*	Dithiocarbamates are often analysed with a method measuring CS_2. Since this method is not very specific, there might be false positive results for products which contain a high level of sulphur compounds.	The existing ML for dithiocarbamates should be reviewed and if necessary, the MRL for dithiocarbamates has to be adjusted to reflect the background concentration of CS_2 resulting from natural compounds.
Lemons / Imazalil	6	4 ES, 2 IT	5.18 – 7.12	5	The use of imazalil on lemons is authorised in the EU.	Use of an approved pesticide on a crop for which the use was authorised, but probably not respecting the Good Agricultural Practice (e.g. dose rate).
Apples / Dimethoate (RD)	6	2 DE, 2 FR, 1 HU, 1 HR	0.034 – 0.11	0.02*		Use of an approved pesticide on a crop for which the use was not permitted.
Cumin seed / Linuron	6	4 FR, 2 UK	0.3 – 0.7	0.1*	See cumin comments above	See comments above on cumin seeds
Vine leaves / Myclobutanil	6	5 GR, 1 DE	0.03 – 1.2	0.02*	Myclobutanil is approved in the EU; uses are registered for table and wine grapes.	For most of the pesticides authorised for the use in table and wine grapes the legal limits in vine leaves are set at the limit of quantification. Thus, label restrictions on the plant protection products need to make clear that vine leaves treated according to the authorised good agricultural practices defined for table and wine grapes cannot be used for food purposes.

[75] Commission Regulation (EU) No 1119/2014 of 16 October 2014 amending Annex III to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for benzalkonium chloride and didecyldimethylammonium chloride in or on certain products. OJ L 304, 23.10.2014, p. 43–74.

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
Cauliflower / Chlorpyrifos	5	3 PL, 1 ES, 1 IT	0.06 – 0.37	0.05*	Chlorpyrifos is approved in the EU.	Use of an approved pesticide on a crop for which the use is not permitted.
Pears / Chlormequat	5	2 NL, 1 BE, 1 ES, 1 PL	0.12 – 4.2	0.1	The use of chlormequat in pears has been withdrawn in 2000. Due to its persistence in pear trees residues are still found in pears resulting from the use of chlormequat before 2000. The MRLs were successively lowered; in 2009 the MRL was lowered from 0.2 mg/kg to 0.1 mg/kg.	Residue resulting from use of the pesticide in pears before 2000.
Cauliflower / Dimethoate (RD)	5	3 DE, 2 PL	0.022 – 0.08	0.02*	The MRL was lowered in 2009 from 0.2 mg/kg to the LOQ of 0.02 mg/kg.	Use of an approved pesticide on a crop for which the use was no longer permitted in 2012.
Cucumbers / Heptachlor (RD)	5	5 DE	0.012 – 0.017	0.01*	In the EU heptachlor has been banned in 1979. The substance is classified as persistent organic pollutant. Residues can be taken up by plants grown in contaminated soil. In particular, in cucurbits an accumulation of this type of residue is observed.	Residue of persistent pesticides due to uptake via contaminated soil.
Celery / Chlorpyrifos	5	5 FR	0.053 – 0.3	0.05*	Chlorpyrifos is an approved active substance (insecticide). Residues in celery: Use of a plant protection product on a crop for which the use is not authorised.	Use of an approved pesticide on a crop for which the use was not permitted.
Cumin seed / Triazophos	5	5 UK	0.1	0.02*	See cumin comments above	See comments above
Cauliflower / Dithiocarbamates (RD)	5	3 PL, 1 FR, 1 NL	1.02 – 2.5	1	Dithiocarbamates are often analysed with a method measuring CS_2. Since this method is not very specific, there might be false positive results for products which contain a high level of sulphur compounds.	The existing ML for dithiocarbamates should be reviewed and if needed the MRL for dithiocarbamates need to be adjusted to reflect the background concentration of CS_2 resulting from natural compounds.

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
Products originating from third countries (excluding results for food products/countries covered by import control, see Sections 3.2.3)						
Basil / Flubendiamide	33	Morocco (33)	0.015 – 3.66	0.01*	Flubendiamide is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Basil / Chlorpyrifos	29	Morocco (26), Vietnam (2), Cambodia (1)	0.064 – 3.05	0.05*	Chlorpyrifos is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Peas (with pods) / Dimethoate (RD)	27	Kenya (25), Guatemala (2)	0.022 – 0.33	0.02*	Dimethoate is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Tea leaves / Imidacloprid	21	Taiwan (7), Vietnam (5), others (9)	0.053 – 2.7	0.05*	Imidacloprid is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Triazophos	21	India (20), Israel (1)	0.055 – 15.4	0.01*	Triazophos is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Profenofos	20	India (20)	0.23 – 36.7	0.05*	Profenofos is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Tea leaves / Acetamiprid (RD)	19	Hong Kong (4), Taiwan (4), others (11)	0.11 – 0.87	0.1*	Acetamiprid is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Ethion	19	India (19)	0.014 – 11	0.01*	Ethion is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Grapefruit / Imazalil	18	Turkey (18)	6.9 – 21.2	5	Imazalil is an fungicide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Beans (with pods) / Dimethoate (RD)	17	Kenya (7), others (10)	0.03 – 0.97	0.02*	Dimethoate is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Basil / Myclobutanil	17	Morocco (17)	0.026 – 0.78	0.02	Myclobutanil is an fungicide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Chlorpyrifos	17	India (7), others (10)	0.06 – 1.1	0.05*	Chlorpyrifos is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Bifenthrin	17	India (16), Israel (1)	0.059 – 5.2	(b)	Bifenthrin is an insecticide/acaricide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
Peppers / Profenofos	15	India (4), Vietnam (4), others (7)	0.06 – 1.1	0.05	Profenofos is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Carbendazim (RD)	14	India (7), others (10)	0.11 – 16.0	0.1*	Carbendazim is a fungicide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Basil / Endosulfan (RD)	12	Morocco (12)	0.1 – 2.38	0.05	Endosulfan is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Acephate	12	India (12)	0.048 – 9.8	0.02*	Acephate is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Peppers / Carbendazim (RD)	12	Malaysia (7), others (5)	0.136 – 2.3	0.1*	Carbendazim is a fungicide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Endosulfan (RD)	12	India (11), Malaysia (1)	0.1 - 2.8	0.05*	Endosulfan is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Propargite	12	India (8), others (4)	0.047 – 1.1	0.01*	Propargite is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Celery leaves / Chlorpyrifos	10	Malaysia (4), others (6)	0.051 – 2.3	0.05*	Chlorpyrifos is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Basil / Dimethoate (RD)	10	Morocco (10)	0.034 – 19.0	0.02*	Dimethoate is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Okra / Acetamiprid (RD)	10	Jordan (4), others (6)	0.011 – 0.9	0.01*	Acetamiprid is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Bananas / DDAC	9	Ecuador (4), Dominican Republic (4), other (1)	0.011 – 0.292	0.01*	DDAC is a dual use substance, used as biocide (disinfectant) and as pesticide[75]. The pesticide use is no longer authorised in the EU.	Food business operators were probably not aware that the use of disinfectants will lead to residues which are in conflict with the pesticide residue legislation.
Oranges / Carbaryl	9	Dominican Republic	0.055 – 0.71	0.05*	Carbaryl is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Lentils, dry / Glyphosate	9	Canada (7), others (2)	0.84 – 10.5	0.1*[(c)]	Glyphosate is a widely used herbicide. In lentils it is used as a desiccant. In 2012 an application for setting import tolerances in lentils was assessed by	Use of a pesticide on a crop for which the import tolerance was not yet established in 2012.

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
					EFSA. The MRL has been raised in 2012.	
Basil / Hexaconazole	8	Morocco (8)	0.049 – 0.6	0.02*	Hexaconazole is a fungicide which is no longer approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Methamidophos	8	India (8)	0.019 – 0.26	0.01*	Methamidophos is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Pineapples / Ethephon	7	Cameroon (3), others (4)	2.037 – 13.5	2	Ethephon is a plant growth regulator approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Hexaconazole	7	India (5), others (2)	0.042 – 0.43	0.02*	Hexaconazole is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Rice / Isoprothiolane	7	India (5), others (2)	0.01 – 0.16	0.01*/5[(d)]	Isoprothiolane is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Acetamiprid (RD)	7	India (6), other (1)	3.8 – 10.0	0.01*- 5[(b)]	Acetamiprid is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Tea leaves / Buprofezin	7	Taiwan (3), others (4)	0.064 – 0.21	0.05*	Buprofezin is an insecticide approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Beans (with pods) / Acephate	6	Kenya (6)	0.022 – 0.12	0.02*	Acephate is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Cress / 4-CPA	6	Peru (5), other (1)	0.048 – 0.225	0.01*	4-CPA is a plant growth regulator not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Basil / Carbendazim (RD)	6	Morocco (3), others (3)	0.13 – 1.8	0.1*	Carbendazim is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Vine leaves / Myclobutanil	6	Turkey (4), other (2)	0.04 – 0.78	0.02*	Myclobutanil is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Peppers / Hexaconazole	6	Cambodia (2), others (4)	0.021 – 0.085	0.02*	Hexaconazole is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Beans (with pods) / Dicofol (RD)	6	Morocco (5), other (1)	0.03 – 3.8	0.02*	Dicofol is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Mangoes / Tebuconazole	6	Brazil (5), other	0.21 – 1.5	0.1	Tebuconazole is approved in the EU.	Use of a pesticide on a crop for which

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
		(1)				no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Diazinon	5	Israel (2), others (3)	0.04 – 3.3	0.01*	Diazinon is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Rice / Carbendazim (RD)	5	India (4), others (1)	0.011 – 0.035	0.01*	Carbendazim is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Peppers / Propiconazole	5	Vietnam (2), others (3)	0.055 – 0.33	0.05*	Propiconazole is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Vine leaves / Boscalid	5	Turkey (5)	0.22 – 6.1	0.05*	Boscalid is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Table grapes / Chlorfenapyr	5	India (5)	0.088 – 0.21	0.05*	Chlorfenapyr is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Vine leaves / Methoxyfenozide	5	Turkey (5)	0.04 – 2.0	0.02*	Methoxyfenozide is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Basil / Bifenthrin	5	Morocco (4), other (1)	0.063 – 1.39	0.05*	Bifenthrin is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Aubergines / Acephate	5	Malaysia (2), others (3)	0.046 – 0.53	0.02*	Acephate is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Courgettes / 4-CPA	5	Turkey (5)	0.015 – 0.046	0.01*	4-CPA is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Peas (with pods) / Acetamiprid (RD)	5	Thailand (3), others (2)	0.015 – 0.12	0.01*	Acetamiprid is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Celery leaves / Malathion (RD)	5	Morocco (3), others (2)	0.025 – 0.87	0.02*	Malathion is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Aubergines / Dimethoate (RD)	5	Malaysia (2), others (3)	0.032 – 0.30	0.02*	Dimethoate is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Phosalone	5	India (5)	0.1 – 5.1	0.05*	Phosalone is not approved in the EU.	Use of a pesticide which is not approved in the EU on a crop for which no import tolerance is set.
Beans (with pods) / Oxamyl	5	Morocco (5)	0.028 – 0.7	0.01*	Oxamyl is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Vine leaves / Azoxystrobin	5	Turkey (5)	0.052 – 8.7	0.05*	Azoxystrobin is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Peppers / Carbofuran (RD)	5	Malaysia (3),	0.027 – 0.168	0.02*	Carbofuran is not approved in the EU.	Use of a pesticide which is not

Product/pesticide[(a)]	Number of detections exceeding the MRL	Origin of the products	Range of measured residue levels (mg/kg)	MRL (mg/kg)	Comment	Possible reason for MRL exceedance
		others (2)				approved in the EU on a crop for which no import tolerance is set.
Leafy vegetables, fresh herbs, not specified / Fipronil (RD)	5	Vietnam (3), others (2)	0.062 – 0.19	0.005*	Fipronil is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.
Beans (with pods) / Methomyl (RD)	5	Kenya (4), India (1)	0.026 – 0.2	0.02*	Methomyl is approved in the EU.	Use of a pesticide on a crop for which no import tolerance is set.

(a): Product/pesticide combinations with at least 5 cases of MRL exceedances
(b): The MRLs for the different crops classified in the group of leafy vegetables and fresh herbs range from 0.01 mg/kg to 5 mg/kg.
(c): MRL in place on 01/01/2012. The MRL changed during the year.
(d): In 2012 the MRL was changed from the default MRL of 0.01 * mg/kg to 5 mg/kg.

APPENDIX IV: BACKGROUND INFORMATION ON DIETARY RISK ASSESSMENT

Table A: Toxicological reference values used in the dietary risk assessments

Pesticide	ARfD (mg/kg bw)	Year	Source	ADI (mg/kg bw per d)	Year	Source
2,4-D (RD)	0.75	2014	EFSA	0.05	2014	EFSA
2-phenylphenol	ARfD not necessary	2008	EFSA	0.4	2008	EFSA
Abamectin (RD)	0.005	2008	COM	0.0025	2008	EFSA
Acephate	0.1	2005	JMPR	0.03	2005	JMPR
Acetamiprid (RD)	0.025	2013	EFSA	0.025	2013	EFSA
Acrinathrin	0.01	2013	EFSA	0.01	2013	EFSA
Aldicarb (RD)	0.003	2001	JMPR	0.003	2001	JMPR
Amitraz (RD)	0.01	2003	COM	0.003	2003	COM
Amitrole	0.015	2014	EFSA	0.001	2014	EFSA
Azinphos-ethyl	No ARfD allocated			No ADI allocated		
Azinphos-methyl	0.01	2006	COM	0.005	2006	COM
Azoxystrobin	ARfD not necessary	2011	COM	0.2	2011	COM
Benfuracarb	0.02	2009	EFSA	0.01	2009	EFSA
Bifenthrin	0.03	2011	EFSA	0.015	2011	EFSA
Biphenyl	No ARfD allocated			0.125	1967	JMPR
Bitertanol	0.01	2011	COM	0.003	2011	COM
Bixafen (RD)	0.2	2012	EFSA	0.02	2012	EFSA
Boscalid (RD)	ARfD not necessary	2008	COM	0.04	2008	COM
Bromide ion[(a)]	No ARfD allocated			1	1988	JMPR
Bromopropylate	No ARfD allocated			0.03	1993	JMPR
Bromuconazole	0.1	2010	COM	0.01	2010	COM
Bupirimate	ARfD not necessary	2011	COM	0.05	2011	COM
Buprofezin	0.5	2010	COM	0.01	2010	COM
Captan	0.3	2008	COM	0.1	2007	COM
Carbaryl	0.01	2006	EFSA	0.0075	2006	EFSA
Carbendazim (RD)	0.02	2010	COM	0.02	2010	COM
Carbofuran (RD)	0.00015	2009	EFSA	0.00015	2009	EFSA
Carbosulfan	0.005	2009	EFSA	0.005	2009	EFSA
Chlorantraniliprole	ARfD not necessary	2013	EFSA	1.56	2013	EFSA
Chlordane (RD)	No ARfD allocated			0.0005	1994	JMPR
Chlorfenapyr	0.015	2006	EFSA	0.015	1999	ECCO
Chlorfenvinphos	No ARfD allocated			0.0005	1994	JMPR
Chlormequat[(b)]	0.07	2009	COM	0.031	2009	COM
Chlorobenzilate	No ARfD allocated			0.02	1980	JMPR
Chlorothalonil (RD)	0.6	2006	COM	0.015	2006	COM
Chlorpropham (RD)	0.5	2004	COM	0.05	2004	COM
Chlorpyrifos	0.005	2014	EFSA	0.001	2014	EFSA
Chlorpyrifos-methyl	0.1	2005	COM	0.01	2005	COM
Clofentezine (RD)	ARfD not necessary	2010	COM	0.02	2010	COM
Clothianidin	0.1	2006	COM	0.097	2006	COM
Cyfluthrin (RD) [(c)]	0.02	2003	COM	0.003	2003	COM
Cymoxanil	0.08	2008	EFSA	0.013	2008	EFSA
Cypermethrin (RD) [(d)]	0.2	2005	COM	0.05	2005	COM
Cyproconazole	0.02	2011	COM	0.02	2011	COM
Cyprodinil (RD)	ARfD not necessary	2006	COM	0.03	2006	COM
Cyromazine	0.1	2009	COM	0.06	2009	COM
DDT (RD)	ARfD not necessary	2000	JMPR	0.01	2000	JMPR
Deltamethrin	0.01	2003	COM	0.01	2003	COM
Diazinon	0.025	2006	EFSA	0.0002	2006	EFSA
Dichlofluanid	No ARfD allocated			0.3	1983	JMPR
Dichlorvos	0.002	2006	EFSA	0.00008	2006	EFSA

Pesticide	ARfD (mg/kg bw)	Year	Source	ADI (mg/kg bw per d)	Year	Source
Dicloran	0.025	2010	EFSA	0.005	2010	EFSA
Dicofol (RD)	0.2	2011	JMPR	0.002	1992	JMPR
Dicrotophos	No ARfD allocated			No ADI allocated		
Dieldrin (RD)	0.003	2007	EFSA	0.0001	1994	JMPR
Diethofencarb	ARfD not necessary	2010	EFSA	0.43	2010	EFSA
Difenoconazole	0.16	2008	COM	0.01	2008	COM
Diflubenzuron (RD)	ARfD not necessary	2009	EFSA	0.1	2009	EFSA
Dimethoate (RD)-dimethoate scenario[(e)]	0.01	2013	EFSA	0.001	2013	EFSA
Dimethoate (RD)-omethoate scenario[(e)]	0.002	2013	EFSA	0.0003	2013	EFSA
Dimethomorph	0.6	2007	COM	0.05	2007	COM
Diniconazole	No ARfD allocated			No ADI allocated		
Diphenylamine	ARfD not necessary	2008	EFSA	0.075	2008	EFSA
Dithianon	0.12	2011	COM	0.01	2011	COM
Dithiocarbamates (RD) - ziram scenario[(f)]	0.04	2004	COM	0.003	2004	COM
Dithiocarbamates (RD) - propineb scenario[(f)]	0.053	2003	COM	0.004	2003	COM
Dithiocarbamates (RD) - mancozeb scenario[(f)]	0.337	2005	COM	0.028	2005	COM
Dodine	0.1	2010	EFSA	0.1	2010	EFSA
Endosulfan (RD)	0.015	2001	ECCO	0.006	2006	JMPR
Endrin	No ARfD allocated			0.0002	1994	JMPR
EPN	No ARfD allocated			No ADI allocated		
Epoxiconazole	0.023	2008	COM	0.008	2008	COM
Esfenvalerate (RD) [(g)]	0.05	2000	COM	0.02	2000	COM
Ethephon	0.05	2008	COM	0.03	2006	COM
Ethion	No ARfD allocated			0.002	1990	JMPR
Ethirimol	No ARfD allocated			No ADI allocated		
Ethoprophos	0.01	2006	EFSA	0.0004	2006	EFSA
Etofenprox	1	2009	COM	0.03	2009	COM
Famoxadone	0.2	2002	COM	0.012	2002	COM
Fenamidone	ARfD not necessary	2003	COM	0.03	2003	COM
Fenamiphos (RD)	0.0025	2006	COM	0.0008	2006	COM
Fenarimol	0.02	2006	COM	0.01	2006	COM
Fenazaquin	0.1	2013	EFSA	0.005	2013	EFSA
Fenbuconazole	0.3	2010	COM	0.006	2010	COM
Fenbutatin oxide	0.1	2011	COM	0.05	2011	COM
Fenhexamid	ARfD not necessary	2014	EFSA	0.2	2014	EFSA
Fenitrothion	0.013	2006	EFSA	0.005	2006	EFSA
Fenoxycarb	2	2011	COM	0.053	2011	COM
Fenpropathrin	0.03	2012	JMPR	0.03	1993	JMPR
Fenpropimorph (RD)	0.03	2008	COM	0.003	2008	COM
Fenpyroximate	0.02	2013	EFSA	0.01	2013	EFSA
Fenthion (RD)	0.01	2000	JMPR	0.007	2000	JMPR
Fipronil (RD)	0.009	2007	COM	0.0002	2007	COM
Fluazifop-P-butyl (RD)[(h)]	0.017	2012	EFSA	0.01	2012	EFSA
Fludioxonil	ARfD not necessary	2007	COM	0.37	2007	COM
Flufenoxuron	ARfD not necessary	2011	EFSA	0.01	2011	EFSA
Fluquinconazole	0.02	2011	COM	0.002	2011	COM
Flusilazole (RD)	0.005	2007	COM	0.002	2007	COM
Flutriafol	0.05	2011	COM	0.01	2011	COM
Folpet	0.2	2013	EFSA	0.1	2013	EFSA
Formetanate (RD)	0.005	2007	COM	0.004	2007	COM

Pesticide	ARfD (mg/kg bw)	Year	Source	ADI (mg/kg bw per d)	Year	Source
Formothion	No ARfD allocated	1996	JMPR	No ADI allocated	1996	JMPR
Fosthiazate	0.005	2003	COM	0.004	2003	COM
Glyphosate	ARfD not necessary	2001	COM	0.3	2001	COM
Haloxyfop-R (RD)	0.075	2006	EFSA	0.00065	2006	EFSA
Heptachlor (RD)	No ARfD allocated			0.0001	1994	JMPR
Hexachlorobenzene	No ARfD allocated			No ADI allocated		
Hexachlorocyclohexane (α)	No ARfD allocated			No ADI allocated		
Hexachlorocyclohexane (β)	No ARfD allocated			No ADI allocated		
Hexaconazole	No ARfD allocated			0.005	1990	JMPR
Hexythiazox	ARfD not necessary	2011	COM	0.03	2011	COM
Imazalil	0.05	2011	COM	0.025	2011	COM
Imidacloprid	0.06	2013	EFSA	0.06	2013	EFSA
Indoxacarb	0.125	2005	COM	0.006	2005	COM
Iprodione	ARfD not necessary	2002	COM	0.06	2002	COM
Iprovalicarb	ARfD not necessary	2002	COM	0.015	2002	COM
Isocarbophos	No ARfD allocated			No ADI allocated		
Isofenphos-methyl	No ARfD allocated			No ADI allocated		
Isoprocarb	No ARfD allocated			No ADI allocated		
Kresoxim-methyl (RD)	ARfD not necessary	2011	COM	0.4	2011	COM
Lambda-cyhalothrin (RD)	0.005	2014	EFSA	0.005	2014	EFSA
Lindane	0.06	2000	COM	0.005	2000	COM
Linuron	0.03	2002	COM	0.003	2002	COM
Lufenuron	ARfD not necessary	2009	COM	0.015	2009	COM
Malathion (RD)	0.3	2010	COM	0.03	2010	COM
Maleic hydrazide (RD)	ARfD not necessary	2003	COM	0.25	2003	COM
Mandipropamid	ARfD not necessary	2012	EFSA	0.15	2012	EFSA
Mepanipyrim (RD)	ARfD not necessary	2004	COM	0.02	2004	COM
Mepiquat[(i)]	0.23	2008	COM	0.154	2008	COM
Meptyldinocap (RD)	0.12	2013	EFSA	0.016	2013	EFSA
Metaflumizone	0.13	2013	EFSA	0.01	2013	EFSA
Metalaxyl (RD)	0.5	2002	COM	0.08	2002	COM
Metconazole	0.01	2006	COM	0.01	2006	COM
Methamidophos	0.003	2007	COM	0.001	2007	COM
Methidathion	0.01	1997	JMPR	0.001	1997	JMPR
Methiocarb (RD)	0.013	2007	COM	0.013	2007	COM
Methomyl (RD) [(j)]	0.0025	2009	COM	0.0025	2009	COM
Methoxychlor	No ARfD allocated			0.1	1977	JMPR
Methoxyfenozide	0.2	2005	COM	0.1	2005	COM
Metobromuron	0.3	2014	EFSA	0.008	2014	EFSA
Monocrotophos	0.002	1995	JMPR	0.0006	1995	JMPR
Myclobutanil (RD)	0.31	2010	COM	0.025	2010	COM
Nitenpyram	No ARfD allocated			No ADI allocated		
Oxadixyl	No ARfD allocated			0.01	1984	FR
Oxamyl	0.001	2006	COM	0.001	2006	COM
Oxydemeton-methyl (RD)	0.0015	2006	COM	0.0003	2006	COM
Paclobutrazol	0.1	2011	COM	0.022	2011	COM
Parathion	0.005	2001	ECCO 100	0.0006	2001	ECCO 100
Parathion-methyl (RD)	0.03	2001	COM	0.003	2002	COM
Penconazole	0.5	2009	COM	0.03	2009	COM
Pencycuron	ARfD not necessary	2011	COM	0.2	2011	COM
Pendimethalin	ARfD not necessary	2003	COM	0.125	2003	COM

Pesticide	ARfD (mg/kg bw)	Year	Source	ADI (mg/kg bw per d)	Year	Source
Permethrin	1.5	2000	COM	0.05	2000	COM
Phenthoate	No ARfD allocated			0.003	1984	JMPR
Phosalone	0.1	2006	EFSA	0.01	2006	EFSA
Phosmet (RD)	0.045	2007	COM	0.01	2007	COM
Phoxim	No ARfD allocated			0.00375	2000	EMEA
Pirimicarb (RD)	0.1	2006	COM	0.035	2006	COM
Pirimiphos-methyl	0.15	2007	COM	0.004	2007	COM
Prochloraz (RD)	0.025	2011	COM	0.01	2011	COM
Procymidone	0.012	2007	DAR FR	0.0028	2007	DAR FR
Profenofos	1	2007	JMPR	0.03	2007	JMPR
Propamocarb (RD) [k]	0.84	2007	COM	0.244	2007	COM
Propargite	No ARfD allocated			No ADI allocated	2011	EFSA
Propiconazole	0.3	2003	COM	0.04	2003	COM
Propoxur	No ARfD allocated			0.02	1989	JMPR
Propyzamide (RD)	ARfD not necessary	2003	COM	0.02	2003	COM
Prothioconazole (RD)	0.01	2008	COM	0.01	2008	COM
Prothiofos	No ARfD allocated			No ADI allocated		
Pymetrozine	0.1	2001	COM	0.03	2001	COM
Pyraclostrobin	0.03	2004	COM	0.03	2004	COM
Pyrazophos	No ARfD allocated			0.004	1992	JMPR
Pyrethrins[l]	0.2	2013	EFSA	0.04	2013	EFSA
Pyridaben	0.05	2010	COM	0.01	2010	COM
Pyrimethanil	ARfD not necessary	2006	EFSA	0.17	2006	COM
Pyriproxyfen	10	2008	COM	0.1	2008	COM
Quinoxyfen	ARfD not necessary	2003	COM	0.2	2004	COM
Resmethrin (RD)	No ARfD allocated			0.03	1991	JMPR
Rotenone	No ARfD allocated			No ADI allocated		
Spinosad (RD)	ARfD not necessary	2006	COM	0.024	2007	COM
Spirodiclofen	ARfD not necessary	2009	EFSA	0.015	2009	EFSA
Spiromesifen	2	2007	EFSA	0.03	2007	EFSA
Spiroxamine (RD)	0.1	2011	COM	0.025	1999	COM
tau-Fluvalinate	0.05	2010	COM	0.005	2010	COM
Tebuconazole	0.03	2013	EFSA	0.03	2013	EFSA
Tebufenozide	ARfD not necessary	2011	COM	0.02	2011	COM
Tebufenpyrad	0.02	2009	COM	0.01	2009	COM
Teflubenzuron	ARfD not necessary	2008	COM	0.01	2008	COM
Tefluthrin	0.005	2010	COM	0.005	2010	COM
Terbuthylazine	0.008	2011	EFSA	0.004	2011	EFSA
Tetraconazole	0.05	2008	COM	0.004	2008	COM
Tetradifon	ARfD not necessary	2002	DE	0.015	2001	DE
Tetramethrin	No ARfD allocated			No ADI allocated		
Thiabendazole (RD)	ARfD not necessary	2001	COM	0.1	2001	COM
Thiacloprid	0.03	2004	COM	0.01	2004	COM
Thiamethoxam (RD)	0.5	2007	COM	0.026	2007	COM
Thiophanate-methyl	0.2	2005	COM	0.08	2005	COM
Tolclofos-methyl	ARfD not necessary	2006	COM	0.064	2006	COM
Tolylfluanid (RD)	0.25	2006	COM	0.1	2006	COM
Triadimenol (RD) [m]	0.05	2008	COM	0.05	2008	COM
Triazophos	0.001	2002	JMPR	0.001	2002	JMPR
Trichlorfon	0.1	2006	EFSA	0.002	2003	JMPR
Trifloxystrobin (RD)	ARfD not necessary	2003	COM	0.1	2003	COM
Triflumuron	ARfD not necessary	2011	COM	0.014	2011	COM
Trifluralin	ARfD not necessary	2005	EFSA	0.015	2005	EFSA

Pesticide	ARfD (mg/kg bw)	Year	Source	ADI (mg/kg bw per d)	Year	Source
Triticonazole	0.05	2006	COM	0.025	2006	COM
Vinclozolin (RD)	0.06	2006	COM	0.005	2006	COM
Zoxamide	ARfD not necessary	2003	COM	0.5	2003	COM

(a): Bromide ion: The toxicological reference values for methyl bromide are not suitable as the residues are expressed as inorganic bromide ion. The ADI derived by JMPR was used for the long-term risk assessment. No ARfD has been established by JMPR at the time when methyl bromide was assessed.

(b): Chlormequat: the toxicological values for chlormequat chloride (ADI: 0.04 mg/kg bw/d and ARfD: 0.09 mg/kg bw) were recalculated to chlormequat ion to match the residue definition by applying a molecular weight conversion factor calculated as: (ADI or ARfD)*(122.6/158.1).

(c): Cyfluthrin: the risk assessment was performed with the toxicological reference values for cyfluthrin which are the same for beta-cyfluthrin isomer.

(d): Cypermethrin: the risk assessment was performed with the toxicological reference values for cypermethrin (mixture of isomers). Other toxicological reference values for cypermethrin isomers are: alpha-cypermethrin (ADI: 0.015 mg/kg bw/d; ARfD: 0.04 mg/kg bw), beta-cypermethrin (ADI: 0.0016 mg/kg bw/d; ARfD 0.0016 mg/kg bw) and zeta-cypermethrin (ADI: 0.04 mg/kg bw/d; ARfD: 0.125 mg/kg bw).

(e): Dimethoate (RD): the risk assessment was calculated for two scenarios.
Dimethoate scenario, based on the toxicological reference values derived for dimethoate.
Omethoate scenario, based on the toxicological reference values derived for omethoate

(f): Dithiocarbamates (RD): the risk assessment was calculated based on the results reported as CS_2. For the long-term risk assessment, EFSA calculated three scenarios (mancozeb, propineb and ziram scenario). For the acute risk assessment, it was assumed that the residues measured as CS_2 were resulting from the pesticide that was the basis for setting the MRL (see footnote in MRL legislation). The ADI and ARfD values derived for these three active substances were recalculated to CS_2, taking into account the respective molecular weights. (Ziram: the toxicological reference values for ziram (ADI: 0.006 mg/kg bw/d and ARfD: 0.08 mg/kg bw) were recalculated to CS_2 to match the residue definition by applying a conversion factor calculated as: (ADI or ARfD)*2*mol. weight CS_2/ mol. weight ziram (306). Propineb: the toxicological reference values for propineb (ADI: 0.007 mg/kg bw/d and ARfD: 0.1 mg/kg bw) were recalculated to CS_2 to match the residue definition by applying a conversion factor calculated as: (ADI or ARfD)*2* mol. weight CS_2/ mol. weight propineb (289.9). Mancozeb: the toxicological reference values for mancozeb (ADI: 0.05 mg/kg bw/d and ARfD: 0.6 mg/kg bw) were recalculated to CS_2 to match the residue definition by applying a conversion factor calculated as: (ADI or ARfD)*2* mol. weight CS_2/mol. weight mancozeb (271.3). (Molecular weight for CS_2 = 76))

(g): Esfenvalerate (RD): the risk assessment was performed with the toxicological values for esfenvalerate.

(h): Fluazifop-P-butyl (RD): the toxicological values are expressed as fluazifop acid to match with the residue definition.

(i): Mepiquat: the toxicological values for mepiquat chloride (ADI: 0.2 mg/kg bw/d and ARfD: 0.3 mg/kg bw) were recalculated to mepiquat to match the residue definition by applying a molecular weight conversion factor calculated as: (ADI or ARfD)*(114.2/149.9).

(j): Methomyl (RD): the risk assessment was performed with the toxicological reference values of methomyl and not with the lower values derived for thiodicarb (ADI: 0.01 mg/kg bw/d and ARfD: 0.01 mg/kg bw) since it is more likely that the residues are resulting from the use of the approved substance methomyl.

k): Propamocarb (RD): the toxicological values for propamocarb hydrochloride (ADI: 0.29 mg/kg bw/d and ARfD: 1 mg/kg bw) were recalculated to probamocarb to match the residue definition by applying a molecular weight conversion factor calculated as: (ADI or ARfD)*(189/224.5).

(l): Pyrethrins: the toxicological values referred to the mixture of the six pyrethrins.

(m): Triadimenol (RD): the risk assessment was performed with the toxicological reference values of triadimenol and not the values derived for triadimefon since it is more likely that the residues are resulting from the use of the approved substance triadimenol.

Table B: Input values for short-term dietary exposure calculation

Highest residues measured (HRM) (in mg/kg) used as input values for the short-term dietary exposure assessment (Section 4.1)

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs
2,4-D (RD)					0.02	0.03				0.07		
2-phenylphenol	0.07	0.02	0.01	0.04	0.01					0.01		
Abamectin (RD)		0.01		5.00	0.01							
Acephate		0.01		0.14	0.53							
Acetamiprid (RD)	0.02	0.05		0.40	0.21	0.83						
Acrinathrin		0.06	3.30	0.06	0.06							
Aldicarb (RD)												
Amitraz (RD)				0.02								
Amitrole												
Azinphos-ethyl												
Azinphos-methyl		0.07										
Azoxystrobin	0.04	0.78	1.90	2.70	0.07	0.03	0.01	0.12				
Benfuracarb				0.03								
Bifenthrin		0.13	0.06	0.02						0.02		
Biphenyl										0.01		
Bitertanol			1.20	0.01								
Bixafen (RD)												
Boscalid (RD)	0.02	2.60	0.01	1.32	0.06	0.28	0.07	0.42		0.05		
Bromide ion				18.0						15.3		
Bromopropylate												
Bromuconazole		0.03										
Bupirimate		0.29		0.36	0.03							
Buprofezin		0.16	0.91	0.19	0.02				0.04			
Captan		0.67		0.03								
Carbaryl				0.03	0.01				0.04			
Carbendazim (RD)	0.11	1.90		2.30	0.11	26.0		0.10	0.03	0.08		
Carbofuran (RD)				0.17	0.13							
Carbosulfan					0.02							
Chlorantraniliprole		0.13		0.08	0.03							
Chlordane (RD)												0.00
Chlorfenapyr		0.21		0.24		0.40						
Chlorfenvinphos												
Chlormequat		0.82			0.70		0.05			1.00		
Chlorobenzilate												
Chlorothalonil (RD)		1.20	0.07	1.80	1.55	0.22	0.02	0.03				
Chlorpropham (RD)				0.03						0.10		
Chlorpyrifos	0.05	1.30	0.87	0.64	0.16	0.25	0.37	0.02	0.21	0.08		
Chlorpyrifos-methyl	0.03	0.56	0.03	0.12		0.03			0.04	2.70		
Clofentezine (RD)			0.03	0.04	0.00							
Clothianidin		0.06		0.04								
Cyfluthrin (RD)		0.07		0.02		0.00			0.00			
Cymoxanil		0.06										
Cypermethrin (RD)		11.3	0.07	1.60	0.22	0.92	0.18		0.15	2.10		
Cyproconazole		0.46		0.03				0.01		0.01		
Cyprodinil (RD)	0.03	1.22	0.02	0.15	0.28		0.01	0.05				
Cyromazine					0.53							
DDT (RD)											0.04	0.82
Deltamethrin		0.06	0.02	0.11		0.02			0.19	0.64		
Diazinon				0.05	0.01							
Dichlofluanid												
Dichlorvos				0.04								
Dicloran		0.02			0.29							
Dicofol (RD)				0.03								
Dicrotophos												
Dieldrin (RD)											0.00	0.00
Diethofencarb					0.04							
Difenoconazole		0.51	0.01	0.38	0.01	0.13	0.07			0.01		
Diflubenzuron (RD)					0.02					0.17		
Dimethoate (RD)		1.50		0.06	0.30	0.34	0.08		0.04			
Dimethomorph		1.30		0.28		0.70	0.12	0.02				
Diniconazole		0.03		0.01								
Diphenylamine		0.06								0.01		
Dithianon		0.30										
Dithiocarbamates (RD)		7.20	0.39	3.50	0.52	1.98	2.50	0.44		0.53		
Dodine			0.01	0.00								
Endosulfan (RD)		0.01		0.28					0.06		0.00	0.00

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs
Endrin												
EPN				0.04								
Epoxiconazole			0.02		0.02					0.01		
Esfenvalerate (RD)		0.09				0.03						
Ethephon		1.70		6.70						0.19		
Ethion		0.10		3.40								
Ethirimol		0.07		0.01								
Ethoprophos				0.01								
Etofenprox		0.25		0.07	0.01							
Famoxadone		0.38					0.01		0.04		0.00	
Fenamidone		0.11										
Fenamiphos (RD)				0.02								
Fenarimol		0.09										
Fenazaquin		0.07	0.05	0.43	0.02							
Fenbuconazole		0.05										
Fenbutatin oxide		0.20	0.03	0.02	0.10							
Fenhexamid		4.60	0.05	1.03	0.82		0.02					
Fenitrothion												
Fenoxycarb		0.19		0.06					0.01			
Fenpropathrin		0.01		0.06								
Fenpropimorph (RD)	0.04		0.16							0.06		
Fenpyroximate		0.20		0.10								
Fenthion (RD)									0.03			
Fipronil (RD)				0.04								
Fluazifop-P-butyl						0.40	0.24	0.55				
Fludioxonil	0.11	2.20	0.01	0.41	0.10			0.05				
Flufenoxuron		0.27										
Fluquinconazole												
Flusilazole (RD)		0.03		0.11								
Flutriafol		0.01		0.40								
Folpet		0.76										
Formetanate (RD)		0.03		0.13	0.05				0.01			
Formothion												
Fosthiazate			0.02									
Glyphosate							0.09			3.20		
Haloxyfop (RD)				0.06		0.00						
Heptachlor (RD)											0.00	
HCB											0.01	0.44

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs
HCH (alpha)											0.00	
HCH (beta)											0.02	
Hexaconazole		0.02		0.09								
Hexythiazox		0.04	0.13	0.08	0.01							
Imazalil	1.63	0.03	1.80	0.02	0.05		0.01					
Imidacloprid	0.02	1.00	0.06	0.64	0.36	0.13	0.02	0.24		0.08		
Indoxacarb		0.38	0.03	0.11	0.02	0.04	0.02				0.00	
Iprodione		3.00		0.46	0.10	0.34	0.05	0.14				
Iprovalicarb		0.30										
Isocarbophos												
Isofenphos-methyl												
Isoprocarb												
Kresoxim-methyl (RD)		0.54		0.20	0.04							
λ-Cyhalothrin (RD)		0.21	0.05	1.90	0.05	0.10			0.19			
Lindane												0.01
Linuron												
Lufenuron		0.01		0.06	0.01							
Malathion (RD)		0.21	0.05	0.01						0.04		
Maleic hydrazide (RD)												
Mandipropamid		0.58		0.03								
Mepanipyrim (RD)					0.03							
Mepiquat					0.09					0.25		
Meptyldinocap (RD)												
Metaflumizone												
Metalaxyl (RD)		0.45		0.32		0.13	0.01					
Metconazole										0.03		
Methamidophos				0.37	0.15							
Methidathion				0.02					0.01			
Methiocarb (RD)		0.32		1.16								
Methomyl (RD)		0.30		0.20	0.09				0.02	0.02		
Methoxychlor												
Methoxyfenozide		0.86		0.20	0.07							
Metobromuron												
Monocrotophos		0.02		0.14								
Myclobutanil (RD)		0.41	0.49	0.60								
Nitenpyram												
Oxadixyl												

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs
Oxamyl				0.02								
Oxydemeton-methyl (RD)												
Paclobutrazol												
Parathion				0.23								
Parathion-methyl (RD)												
Penconazole		0.18		0.07								
Pencycuron				0.04		0.02						
Pendimethalin		0.02		0.01		0.03		0.01	0.07			
Permethrin												
Phenthoate				0.03								
Phosalone		0.02	0.02	0.99								
Phosmet (RD)									0.20			
Phoxim												
Pirimicarb (RD)				0.06	0.03	0.01						
Pirimiphos-methyl				0.54	0.01					4.30		
Prochloraz (RD)	0.01	0.04	0.01	0.06		0.05						
Procymidone		0.46		0.15	0.20			0.02	0.04			
Profenofos				1.10	0.04							
Propamocarb (RD)		0.01	0.03	1.50	0.13	0.01						
Propargite		0.80		1.20	0.18					0.04		
Propiconazole		0.02	0.02	0.33		0.05		0.01	0.02			
Propoxur										0.01		
Propyzamide (RD)							0.01		0.00			
Prothioconazole (RD)												
Prothiofos				0.02								
Pymetrozine				0.43	0.05	0.08						
Pyraclostrobin		0.63		0.20		0.06			0.01			
Pyrazophos												
Pyrethrins				0.39						0.05		
Pyridaben		0.20		0.22	0.04	0.15						
Pyrimethanil	0.18	2.40	0.02	0.86	0.16			0.09				
Pyriproxyfen				0.20	0.07							
Quinoxyfen		0.17		0.08				0.02				

Pesticide	Oranges (juice)	Table grapes	Bananas	Peppers	Aubergines	Broccoli	Cauliflower	Peas (w/o pods)	Olives (oil)	Wheat	Milk (butter)	Eggs
Resmethrin (RD)												
Rotenone												
Spinosad (RD)		0.14	0.03	0.43	0.07	0.01				0.23		
Spirodiclofen		0.17										
Spiromesifen		0.03		0.18	0.05							
Spiroxamine (RD)		0.49	0.01	0.03						0.01		
tau-Fluvalinate								0.01		0.01		
Tebuconazole		1.30		0.19	0.09	0.28	0.05		0.01	0.19		
Tebufenozide		0.12		0.13	0.09							
Tebufenpyrad		0.26		0.19								
Teflubenzuron		0.01		0.04								
Tefluthrin				0.00						0.01		
Terbuthylazine									0.19			
Tetraconazole		0.18		0.10								
Tetradifon				0.01								
Tetramethrin												
Thiabendazole (RD)	0.45	0.02	3.50	0.01	0.01	0.02	0.01		0.01			
Thiacloprid				1.10	0.37	0.06	0.04	0.02				
Thiamethoxam (RD)		0.09		0.12	0.14							
Thiophanate-methyl		0.50		0.72	0.04	0.02		0.12				
Tolclofos-methyl				0.00								
Tolylfluanid (RD)												
Triadimenol (RD)		0.36	0.01	0.20	0.08					0.03		
Triazophos				3.90								
Trichlorfon												
Trifloxystrobin (RD)		0.87		0.32	0.08	0.09						
Triflumuron												
Trifluralin												
Triticonazole												
Vinclozolin (RD)		0.03										
Zoxamide	0.01	0.13		0.02								

Table C: Input values for long-term dietary exposure calculations

Mean residue concentrations (in mg/kg) used for long-term dietary exposure calculations (Section 4.2)

Pesticide	Oranges (juice)	Mandarins	Apples	Pears	Peaches	Table grapes	Strawberries	Bananas	Potatoes	Carrots	Tomatoes	Peppers	Aubergines	Cucumbers	Broccoli	Cauliflower	Head cabbage	Lettuce	Spinach	Beans (with pods)	Peas (without pods)	Leek	Olives (oil production)	Oats	Rice	Rye	Wheat	Swine meat	Liver	Poultry meat	Milk (butter)	Chicken eggs
2,4-D (RD)		0.0472											0.0150												0.0097		0.0164					
2-phenylphenol	0.0195	0.1234	0.0171	0.0188	0.0199	0.0189	0.0177	0.0191	0.0209			0.0144	0.0147														0.0206					
Abamectin (RD)							0.0145				0.0099		0.0100																0.0061			
Acephate						0.0111						0.0115	0.0113	0.0112						0.0112					0.0095							
Acetamiprid (RD)		0.0094	0.0101	0.0103	0.0096	0.0094	0.0092				0.0102	0.0105	0.0102	0.0098			0.0094	0.0161	0.0112	0.0097					0.0087							
Acrinathrin					0.0185	0.0180	0.0168	0.0320			0.0189	0.0214	0.0156	0.0178				0.0173		0.0194												
Aldicarb (RD)																																
Amitraz (RD)				0.0193																0.0155												
Amitrole																																
Azinphos-ethyl																																
Azinphos-methyl			0.0195	0.0161	0.0146	0.0168																										
Azoxystrobin	0.0128	0.0137	0.0131	0.0128	0.0146	0.0175	0.0332	0.0460	0.0140	0.0137	0.0159	0.0142	0.0137	0.0163	0.0121	0.0106	0.0164	0.0220	0.0208	0.0159	0.0126	0.0190			0.0200							
Benfuracarb																																
Bifenthrin			0.0132	0.0119	0.0119	0.0126	0.0107	0.0134		0.0110	0.0124	0.0114		0.0104				0.0117		0.0139							0.0180					
Biphenyl																											0.0097					
Bitertanol			0.0148	0.0146	0.0107			0.0275			0.0138	0.0111								0.0199					0.0131							
Bixafen (RD)																																
Boscalid (RD)	0.0108	0.0136	0.0326	0.0463	0.0218	0.0769	0.0617	0.0113	0.0204	0.0186	0.0255	0.0172	0.0110	0.0137	0.0111	0.0110	0.0493	0.1049	0.0957	0.0297	0.0151	0.0688		0.0115		0.0150	0.0169					
Bromide ion											2.8490	3.0903						6.5408	5.5484					2.1424	5.5572	3.9093	3.2616					
Bromopropylate											0.0094							0.0090														
Bromuconazole						0.0128																										
Bupirimate			0.0129		0.0137		0.0173				0.0135	0.0129	0.0122	0.0137						0.0134												
Buprofezin		0.0124		0.0131	0.0144	0.0146		0.0135		0.0144	0.0163	0.0154	0.0142										0.0149		0.0208							
Captan (RD)			0.0785	0.0795	0.0190		0.0267			0.0182	0.0224									0.0269												
Carbaryl		0.0118	0.0150	0.0120			0.0109			0.0126													0.0154									
Carbendazim (RD)	0.0120	0.0127	0.0143	0.0121	0.0166	0.0107	0.0113		0.0113		0.0134	0.0113	0.0099	0.0133			0.0168	0.0119	0.0140	0.0171	0.0099		0.0144		0.0081		0.0166					
Carbofuran (RD)		0.0116					0.0093						0.0103							0.0109												
Carbosulfan													0.0168							0.0162												

Pesticide	Oranges (juice)	Mandarins	Apples	Pears	Peaches	Table grapes	Strawberries	Bananas	Potatoes	Carrots	Tomatoes	Peppers	Aubergines	Cucumbers	Broccoli	Cauliflower	Head cabbage	Lettuce	Spinach	Beans (with pods)	Peas (without pods)	Leek	Olives (oil production)	Oats	Rice	Rye	Wheat	Swine meat	Liver	Poultry meat	Milk (butter)	Chicken eggs
Chlorantraniliprole			0.0109	0.0127	0.0102	0.0094				0.0093	0.0096	0.0093	0.0095	0.0088				0.0103		0.0092												
Chlordane (RD)						0.0098																							0.0008			0.0019
Chlorfenapyr			0.0165	0.0147		0.0142					0.0152	0.0133																				
Chlorfenvinphos										0.0109																						0.0062
Chlormequat				0.0292		0.0178			0.0101				0.0162			0.0089								0.2583		0.0942	0.0640					
Chlorobenzilate		0.0095																0.0094														
Chlorothalonil (RD)			0.0159	0.0161	0.0157	0.0178	0.0179			0.0162	0.0197	0.0175	0.0204	0.0222	0.0206	0.0151		0.0096		0.0180	0.0147	0.0174										
Chlorpropham (RD)			0.0144	0.0160	0.0122		0.0113		0.2950	0.0149	0.0142						0.0177										0.0116					
Chlorpyrifos	0.0111	0.0545	0.0179	0.0190	0.0157	0.0167	0.0129	0.0202	0.0124	0.0130	0.0128	0.0129	0.0120	0.0128	0.0126	0.0119	0.0145	0.0114	0.0233	0.0129	0.0111	0.0163	0.0176		0.0203		0.0171					
Chlorpyrifos-methyl	0.0111	0.0165	0.0122	0.0110	0.0129	0.0124	0.0115	0.0118	0.0118	0.0100	0.0119	0.0112		0.0115	0.0114		0.0146						0.0160	0.0146	0.0173	0.0183	0.0249					
Clofentezine (RD)		0.0111	0.0103	0.0106	0.0103		0.0142	0.0110			0.0111	0.0097	0.0094	0.0096					0.0110													
Clothianidin			0.0101	0.0099	0.0094	0.0094			0.0100		0.0100	0.0093		0.0092			0.0111	0.0103	0.0109	0.0104					0.0084							
Cyfluthrin (RD)			0.0154	0.0165	0.0162	0.0168					0.0150							0.0167		0.0196			0.0114									
Cymoxanil						0.0095					0.0127			0.0124				0.0112														
Cypermethrin (RD)		0.0159	0.0204	0.0235	0.0266	0.0288	0.0164	0.0193			0.0232	0.0248	0.0304	0.0161	0.0276	0.0212	0.0219	0.0217	0.0298	0.0351		0.0309	0.0224		0.0198	0.0204	0.0194					
Cyproconazole					0.0113	0.0123	0.0119				0.0126	0.0118		0.0107				0.0112		0.0130					0.0178	0.0142						
Cyprodinil (RD)	0.0109		0.0164	0.0217	0.0177	0.0430	0.0659		0.0160	0.0120	0.0168	0.0109	0.0125	0.0142		0.0103		0.0390		0.0180	0.0100					0.0182						
Cyromazine									0.0318		0.0334		0.0241	0.0360				0.0407		0.0370												
DDT (RD)									0.0106	0.0115				0.0142					0.0109							0.0098	0.0111	0.0157	0.0018	0.0056	0.0006	0.0048
Deltamethrin		0.0160	0.0167	0.0176	0.0183	0.0189	0.0165	0.0186			0.0169	0.0154		0.0157	0.0152		0.0181	0.0199	0.0241	0.0166			0.0174		0.0268	0.0187	0.0217					
Diazinon		0.0096		0.0097						0.0095		0.0109	0.0096					0.0096							0.0102							
Dichlofluanid			0.0095																													
Dichlorvos			0.0094	0.0096			0.0091							0.0093											0.0088							
Dichlorvos - lower bound approach			0.0000	0.0000			0.0000							0.0001											0.0000							
Dicloran										0.0116			0.0124					0.0106														
Dicofol (RD)		0.0212					0.0110				0.0161			0.0164						0.0212												
Dicrotophos																				0.0091												
Dieldrin (RD)														0.0091															0.0010		0.0002	0.0048
Diethofencarb							0.0114				0.0103			0.0099																		
Difenoconazole		0.0124	0.0128	0.0132	0.0149	0.0142	0.0134	0.0124	0.0138	0.0161	0.0153	0.0141	0.0127	0.0147		0.0134	0.0193	0.0137	0.0164	0.0133		0.0185			0.0157		0.0148					
Diflubenzuron (RD)			0.0116	0.0168	0.0127																						0.0154					

Pesticide	Oranges (juice)	Mandarins	Apples	Pears	Peaches	Table grapes	Strawberries	Bananas	Potatoes	Carrots	Tomatoes	Peppers	Aubergines	Cucumbers	Broccoli	Cauliflower	Head cabbage	Lettuce	Spinach	Beans (with pods)	Peas (without pods)	Leek	Olives (oil production)	Oats	Rice	Rye	Wheat	Swine meat	Liver	Poultry meat	Milk (butter)	Chicken eggs
Dimethoate (RD)		0.0098	0.0100	0.0102	0.0104	0.0100	0.0095			0.0099	0.0110		0.0099	0.0109	0.0112	0.0098	0.0110	0.0102	0.0121	0.0134			0.0147									
Dimethomorph		0.0124		0.0125	0.0133	0.0199	0.0126		0.0144		0.0152	0.0122		0.0133		0.0109		0.0317	0.0162	0.0129	0.0103											
Diniconazole						0.0109						0.0112																				
Diphenylamine		0.0133	0.0411	0.0466	0.0138	0.0172			0.0180	0.0155	0.0143							0.0170							0.0137		0.0127					
Dithianon			0.0598	0.0566	0.0895																											
Dithiocarbamates (RD)	0.0552	0.0683	0.1074	0.1941	0.0854	0.0806	0.0728	0.0458	0.0879	0.0431	0.0883	0.0542	0.0460	0.0907	0.2060	0.1460	0.2489	0.1916	0.0344	0.0810	0.0433	0.1713				0.0890	0.0774					
Dodine		0.0217	0.0288	0.0252	0.0243			0.0345			0.0187																					
Endosulfan (RD)				0.0119		0.0141	0.0113		0.0125	0.0119	0.0132	0.0129		0.0127						0.0135			0.0140		0.0102				0.0013		0.0005	
Endrin																																
EPN																																
Epoxiconazole							0.0103	0.0103					0.0123											0.0104			0.0162					
Esfenvalerate (RD)		0.0119			0.0132	0.0148									0.0119		0.0142															
Ethephon			0.0266	0.0477		0.0661					0.0324	0.0512															0.0418					
Ethion						0.0094						0.0123								0.0093												
Ethirimol			0.0088		0.0089	0.0091	0.0092				0.0087			0.0085																		
Etofenprox		0.0124	0.0107	0.0113	0.0183	0.0113			0.0107		0.0102	0.0117		0.0101				0.0097	0.0195	0.0100					0.0100							
Ethoprophos																																
Famoxadone		0.0105	0.0106			0.0169					0.0133			0.0134		0.0133				0.0105		0.0278	0.0114								0.0238	
Fenamidone						0.0110	0.0104							0.0103				0.0127														
Fenamiphos (RD)		0.0098									0.0100	0.0093		0.0093																		
Fenarimol						0.0118	0.0109																									
Fenazaquin		0.0103	0.0102	0.0099	0.0105	0.0101	0.0108	0.0099			0.0099	0.0096	0.0097	0.0095																		
Fenbuconazole					0.0135															0.0137												
Fenbutatin oxide		0.0170	0.0231		0.0155	0.0200					0.0128		0.0134	0.0123				0.0188	0.0101	0.0104												
Fenhexamid		0.0117	0.0167	0.0154	0.0163	0.1150	0.0882			0.0134	0.0190	0.0169	0.0159	0.0161				0.0326	0.0190			0.0185										
Fenitrothion			0.0094																													
Fenoxycarb			0.0165	0.0167	0.0182	0.0196			0.0160														0.0165									
Fenpropathrin		0.0126				0.0095	0.0123				0.0095																					
Fenpropimorph (RD)	0.0103	0.0098					0.0101	0.0105	0.0134									0.0113		0.0128		0.0170					0.0124					
Fenpyroximate		0.0115	0.0117	0.0122	0.0122	0.0128	0.0108				0.0131	0.0097								0.0114												
Fenthion (RD)		0.0097			0.0115																		0.0096									

Pesticide	Oranges (juice)	Mandarins	Apples	Pears	Peaches	Table grapes	Strawberries	Bananas	Potatoes	Carrots	Tomatoes	Peppers	Aubergines	Cucumbers	Broccoli	Cauliflower	Head cabbage	Lettuce	Spinach	Beans (with pods)	Peas (without pods)	Leek	Olives (oil production)	Oats	Rice	Rye	Wheat	Swine meat	Liver	Poultry meat	Milk (butter)	Chicken eggs
Fipronil (RD)									0.0086											0.0042												
Fluazifop-P-butyl (RD)							0.0101		0.0136						0.0162	0.0127	0.0220	0.0134	0.0217		0.0136											
Fludioxonil	0.0115	0.0137	0.0171	0.0210	0.0234	0.0374	0.0475		0.0145	0.0132	0.0145	0.0134	0.0118	0.0120				0.0322	0.0168	0.0150	0.0113				0.0146							
Flufenoxuron			0.0131	0.0131	0.0125	0.0137																										
Fluquinconazole			0.0137				0.0114																						0.0064			
Flusilazole (RD)			0.0104			0.0106																										
Flutriafol		0.0124				0.0122	0.0132				0.0139	0.0188		0.0134				0.0121		0.0135												
Folpet (RD)			0.0785	0.0795	0.0123	0.0137	0.0267				0.0224							0.0365	0.0286	0.0269												
Formetanate (RD)											0.0115	0.0103	0.0105	0.0109									0.0169									
Formothion																																
Fosthiazate								0.0114	0.0104																							
Glyphosate																0.0537				0.0129				0.1445		0.1117	0.2191					
Haloxyfop-R (RD)												0.0122			0.0111		0.0127			0.0141		0.0081										
Heptachlor (RD)														0.0087															0.0010		0.0001	
Hexachlorobenzene														0.0081								0.0065						0.0065	0.0017	0.0038	0.0004	0.0042
HCH(alpha)																															0.0020	
HCH (beta)																													0.0012		0.0016	
Hexaconazole		0.0104		0.0113										0.0104						0.0106					0.0117							
Hexythiazox		0.0116	0.0137	0.0123	0.0117	0.0137	0.0118	0.0118			0.0145	0.0151	0.0131	0.0145																		
Imazalil	0.0239	1.0447	0.0149	0.0424	0.0117	0.0129	0.0108	0.1351	0.0147	0.0117	0.0135	0.0119	0.0121	0.0122		0.0119	0.0157	0.0129														
Imidacloprid	0.0108	0.0123	0.0116	0.0131	0.0116	0.0220	0.0105	0.0115	0.0114	0.0103	0.0126	0.0114	0.0133	0.0108	0.0118	0.0099	0.0114	0.0186	0.0122	0.0131	0.0106				0.0152	0.0118	0.0130					
Indoxacarb			0.0116	0.0113	0.0117	0.0125		0.0112			0.0119	0.0121	0.0107	0.0117	0.0107	0.0106	0.0141	0.0132	0.0171	0.0115											0.0014	
Iprodione		0.0154	0.0318	0.0304	0.0764	0.0468	0.0266			0.0219	0.0229	0.0178	0.0159	0.0248		0.0138	0.0297	0.1512	0.0152	0.0238	0.0148				0.0146							
Iprovalicarb						0.0107					0.0147																					
Isocarbophos																																
Isofenphos-methyl																																
Isoprocarb																																
Kresoxim-methyl (RD)		0.0134	0.0140	0.0129		0.0162	0.0152				0.0148	0.0144	0.0124									0.0176										
λ-cyhalothrin (RD)		0.0114	0.0134	0.0123	0.0125	0.0137	0.0111	0.0126	0.0118	0.0101	0.0127	0.0123	0.0126	0.0111	0.0131		0.0176	0.0165	0.0188	0.0141			0.0161									
Lindane																												0.0081				0.0034
Linuron		0.0122	0.0136							0.0185								0.0132	0.0172			0.0131										

Pesticide	Oranges (juice)	Mandarins	Apples	Pears	Peaches	Table grapes	Strawberries	Bananas	Potatoes	Carrots	Tomatoes	Peppers	Aubergines	Cucumbers	Broccoli	Cauliflower	Head cabbage	Lettuce	Spinach	Beans (with pods)	Peas (without pods)	Leek	Olives (oil production)	Oats	Rice	Rye	Wheat	Swine meat	Liver	Poultry meat	Milk (butter)	Chicken eggs
Lufenuron		0.0112	0.0122	0.0123			0.0134				0.0114	0.0096		0.0103				0.0119		0.0106												
Malathion (RD)		0.0103				0.0102																			0.0117	0.0130	0.0164					
Maleic hydrazide (RD)									1.8732																							
Mandipropamid						0.0093					0.0089	0.0087						0.0329	0.0088													
Mepanipyrim (RD)							0.0160				0.0110		0.0102																			
Mepiquat													0.0122											0.0197		0.0287	0.0210					
Meptyldinocap (RD)							0.0269																									
Metaflumizone											0.0117	0.0113						0.0155														
Metalaxyl (RD)		0.0101	0.0110			0.0124	0.0105		0.0122	0.0125	0.0122	0.0112		0.0121	0.0097	0.0119	0.0161	0.0127	0.0139	0.0126					0.0139							
Metconazole																																
Methamidophos												0.0101	0.0098							0.0096					0.0086							
Methidathion		0.0109	0.0112									0.0118											0.0125									
Methiocarb (RD)				0.0104		0.0113	0.0100					0.0116		0.0110				0.0139				0.0178										
Methomyl (RD)			0.0107			0.0103	0.0094					0.0110		0.0121						0.0126			0.0132				0.0115					
Methoxychlor																																
Methoxyfenozide			0.0133	0.0126	0.0109	0.0151					0.0126	0.0134	0.0113							0.0125												
Metobromuron																																
Monocrotophos						0.0092					0.0095									0.0094												
Myclobutanil (RD)		0.0125	0.0124	0.0126	0.0118	0.0172	0.0160	0.0155		0.0130	0.0123	0.0130		0.0122						0.0128												
Nitenpyram																																
Oxadixyl									0.0145									0.0129		0.0099												
Oxamyl							0.0094				0.0094			0.0096				0.0092		0.0110												
Oxydemeton-methyl (RD)							0.0089																									
Paclobutrazol			0.0110	0.0101															0.0115													
Parathion							0.0118																									
Parathion-methyl (RD)										0.0122																						
Penconazole			0.0127		0.0117	0.0134	0.0132				0.0124	0.0105		0.0115				0.0112														
Pencycuron			0.0129						0.0138	0.0113					0.0097			0.0115	0.0134							0.0108						
Pendimethalin		0.0111	0.0109		0.0118	0.0121	0.0107			0.0123	0.0116				0.0109			0.0107	0.0113		0.0114	0.0102	0.0143									
Permethrin			0.0183						0.0175			0.0181	0.0152	0.0208		0.0153				0.0174							0.0240					
Phenthoate																																

Pesticide	Oranges (juice)	Mandarins	Apples	Pears	Peaches	Table grapes	Strawberries	Bananas	Potatoes	Carrots	Tomatoes	Peppers	Aubergines	Cucumbers	Broccoli	Cauliflower	Head cabbage	Lettuce	Spinach	Beans (with pods)	Peas (without pods)	Leek	Olives (oil production)	Oats	Rice	Rye	Wheat	Swine meat	Liver	Poultry meat	Milk (butter)	Chicken eggs
Phosalone			0.0139		0.0124		0.0110	0.0124				0.0136																				
Phosmet (RD)		0.0126	0.0114	0.0109	0.0108																		0.0163									
Phoxim																																
Pirimicarb (RD)		0.0111	0.0157	0.0111	0.0107		0.0115			0.0108	0.0125	0.0099	0.0100	0.0103				0.0142	0.0180	0.0131												
Pirimiphos-methyl							0.0111				0.0132	0.0124												0.0725	0.0214	0.0873	0.0506					
Prochloraz (RD)	0.0113	0.0340	0.0136	0.0121		0.0116	0.0103	0.0135			0.0148							0.0128														
Procymidone					0.0110	0.0122	0.0105			0.0110	0.0115	0.0114	0.0112	0.0120				0.0107		0.0207	0.0117		0.0111									
Profenofos		0.0113										0.0115													0.0178							
Propamocarb (RD)						0.0129	0.0117	0.0107	0.0132	0.0154	0.0220	0.0141	0.0134	0.0637			0.0181	0.2006	0.3063	0.0139		0.0177										
Propargite		0.0133	0.0192	0.0131	0.0184	0.0150				0.0095	0.0143	0.0163	0.0136							0.0115							0.0092					
Propiconazole			0.0129	0.0116	0.0123	0.0124	0.0114	0.0119		0.0124		0.0120								0.0129	0.0120		0.0155		0.0163							
Propoxur																											0.0157					
Propyzamide (RD)			0.0113	0.0107			0.0109							0.0109		0.0104	0.0139	0.0122	0.0125				0.0119									
Prothioconazole (RD)																																
Prothiofos										0.0094																						
Pymetrozine							0.0099				0.0100	0.0108	0.0093	0.0114				0.0110	0.0206													
Pyraclostrobin		0.0094	0.0137	0.0154	0.0103	0.0147	0.0179		0.0096	0.0093	0.0099	0.0101		0.0091			0.0095	0.0199	0.0134			0.0115	0.0109	0.0110								
Pyrazophos																																
Pyrethrins																																
Pyridaben		0.0114	0.0144		0.0112	0.0138	0.0108				0.0144	0.0150	0.0134	0.0125					0.0163	0.0140												
Pyrimethanil	0.0110	0.1261	0.0312	0.0543	0.0139	0.0423	0.0211	0.0175	0.0166	0.0130	0.0157	0.0124	0.0120	0.0132				0.0165		0.0159	0.0119	0.0168										
Pyriproxyfen		0.0141	0.0131	0.0114	0.0117						0.0145	0.0115	0.0109																			
Quinoxyfen					0.0108	0.0143	0.0112					0.0110									0.0103											
Resmethrin (RD)																																
Rotenone																																
Spinosad (RD)			0.0105	0.0106	0.0128	0.0120	0.0135	0.0099			0.0107	0.0108	0.0104	0.0107				0.0191	0.0255	0.0110		0.0104					0.0129					
Spirodiclofen		0.0103	0.0112	0.0107	0.0112	0.0112	0.0108																									
Spiromesifen							0.0100				0.0117	0.0101	0.0101	0.0101						0.0099												
Spiroxamine (RD)			0.0118		0.0113	0.0139		0.0114				0.0097							0.0139								0.0140					
tau-Fluvalinate			0.0111	0.0107			0.0102							0.0111				0.0105		0.0109							0.0107					
Tebuconazole		0.0119	0.0142	0.0139	0.0232	0.0197	0.0113			0.0127	0.0153	0.0131	0.0128	0.0130	0.0129	0.0123	0.0174	0.0125		0.0147		0.0225	0.0154	0.0129	0.0193		0.0190					

Pesticide	Oranges (juice)	Mandarins	Apples	Pears	Peaches	Table grapes	Strawberries	Bananas	Potatoes	Carrots	Tomatoes	Peppers	Aubergines	Cucumbers	Broccoli	Cauliflower	Head cabbage	Lettuce	Spinach	Beans (with pods)	Peas (without pods)	Leek	Olives (oil production)	Oats	Rice	Rye	Wheat	Swine meat	Liver	Poultry meat	Milk (butter)	Chicken eggs
Tebufenozide			0.0112	0.0107		0.0101						0.0097	0.0097												0.0130							
Tebufenpyrad		0.0135	0.0155	0.0131	0.0151	0.0146	0.0127				0.0167	0.0156		0.0173						0.0158					0.0161							
Teflubenzuron			0.0160	0.0166							0.0183			0.0187																		
Tefluthrin				0.0097						0.0098								0.0095	0.0099								0.0108					
Terbuthylazine		0.0120					0.0117		0.0161					0.0118				0.0146	0.0141				0.0148									
Tetraconazole			0.0115	0.0116	0.0123	0.0124	0.0112				0.0120	0.0126		0.0120				0.0108														
Tetradifon		0.0092										0.0092								0.0088												
Tetramethrin		0.0082			0.0087									0.0086																		
Thiabendazole (RD)	0.0143	0.3023	0.0485	0.0320	0.0143	0.0152	0.0120	0.1246	0.0175	0.0121	0.0137	0.0124	0.0123		0.0111	0.0118			0.0145				0.0138									
Thiacloprid			0.0116	0.0140	0.0111		0.0146				0.0111	0.0105	0.0106	0.0116	0.0102	0.0097	0.0127	0.0112	0.0114	0.0107	0.0095	0.0116										
Thiamethoxam (RD)			0.0117	0.0116	0.0121	0.0114	0.0110		0.0124		0.0129	0.0105	0.0107	0.0128			0.0121	0.0156	0.0123	0.0124					0.0139							
Thiophanate-methyl			0.0139	0.0119	0.0147	0.0105	0.0100				0.0144	0.0117	0.0103	0.0110	0.0131		0.0176	0.0123	0.0159	0.0157	0.0113	0.0168										
Tolclofos-methyl										0.0113	0.0125							0.0137														
Tolylfluanid (RD)										0.0144	0.0155																					
Triadimenol (RD)			0.0168	0.0139	0.0169	0.0159	0.0168	0.0118		0.0145	0.0176	0.0169	0.0150	0.0184				0.0161		0.0167							0.0181					
Triazophos												0.0129								0.0097					0.0101							
Trichlorfon			0.0158				0.0117																									
Trifloxystrobin (RD)		0.0102	0.0133	0.0121	0.0110	0.0202	0.0143			0.0109	0.0111	0.0113	0.0109	0.0108	0.0098		0.0134	0.0109		0.0115		0.0132										
Triflumuron			0.0107	0.0113																												
Trifluralin							0.0121			0.0126								0.0137														
Triticonazole																																
Vinclozolin (RD)							0.0127																									