Review of the existing maximum residue levels for copper compounds according to Article 12 of Regulation (EC) No 396/2005

European Food Safety Authority (EFSA)

Abstract

According to Article 12 of Regulation (EC) No 396/2005, EFSA has reviewed the maximum residue levels (MRLs) currently established at European level for the pesticide active substance copper compounds. To assess the occurrence of copper compounds residues in plants, processed commodities, rotational crops and livestock, EFSA considered the conclusions derived in the framework of Directive 91/414/EEC and under Regulation (EC) No 1107/2009 as well as the European authorisations reported by Member States (including the supporting residues data). Considering the fact that copper is an element also naturally present in the environment, any data regarding the inherent content of copper in plant and livestock were also considered. Based on the assessment of the available data, MRL proposals were derived and a consumer risk assessment was carried out. Some information required by the regulatory framework was missing and a possible chronic risk to consumers was identified. Hence, the consumer risk assessment is considered indicative only and some MRL proposals derived by EFSA still require further consideration by risk managers. Measures for reduction of the consumer exposure may also be considered.

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Keywords: copper compounds, MRL review, Regulation (EC) No 396/2005, consumer risk assessment, inorganic pesticide, fungicide, bactericide

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Copper compounds was included in Annex I to Directive 91/414/EEC on 23 April 2009 by Commission Directive 2009/37/EC, and has been deemed to be approved under Regulation (EC) No 1107/2009, in accordance with Commission Implementing Regulation (EU) No 540/2011, as amended by Commission Implementing Regulations (EU) No 541/2011, 2015/232 and 2018/84. As the active substance was approved after the entry into force of Regulation (EC) No 396/2005 on 2 September 2008, the European Food Safety Authority (EFSA) is required to provide a reasoned opinion on the review of the existing maximum residue levels (MRLs) for that active substance in compliance with Article 12(1) of the aforementioned regulation. To collect the relevant pesticide residues data, EFSA asked France, as the designated rapporteur Member State (RMS), to complete the Pesticide Residues Overview File (PROFile) and to prepare a supporting evaluation report. The PROFile and evaluation report provided by the RMS were made available to the Member States. A request for additional information was addressed to the Member States in the framework of a completeness check period, which was initiated by EFSA on 20 June 2016 and finalised on 12 September 2016. After having considered all the information provided, EFSA prepared a completeness check report which was made available to Member States on 7 December 2016.

Based on the conclusions derived by EFSA in the framework of Directive 91/414/EEC and the additional information provided by the RMS and Member States, EFSA prepared in November 2017 a draft reasoned opinion, which was circulated to Member States for consultation via a written procedure. Comments received by 10 January were considered during the finalisation of this reasoned opinion. The following conclusions are derived.

Copper is a monoatomic element and therefore inherently stable. As no metabolites are expected, the nature of residues in primary crops, rotational crops and processed commodities as well as the storage stability are considered addressed and specific studies are not required. The relevant residue for monitoring and risk assessment was defined as total copper, including copper residues arising from all forms of copper. Analytical methods for enforcement of mineral copper independently from its chemical form are available for high water and high acid content commodities. However, these are still missing for commodities with high oil content, dry commodities as well as for any other complex matrices (hops, herbal infusions, etc.).

Due to the endogenous occurrence of copper in soil and plant commodities, MRLs were derived for all plant commodities included in the Annex I to Regulation (EC) No 396/2005. For those commodities for which Good Agricultural Practices (GAPs) are authorised MRL and risk assessment values were derived in accordance with the standard procedure. However, for certain commodities, the derived MRL was found to be lower than the background levels expected in the commodity itself. For these commodities and for the commodities where trials were not sufficient to derive MRLs, tentative MRLs were then derived on the basis of the monitoring data and/or background levels. For these commodities for which no GAPs are authorised, EFSA derived MRLs proposals and risk assessment values on the basis of background levels in order to allow risk managers to consider the fact that inherent copper levels may occur independently from the pesticide authorisations of the molecule. For that purpose, EFSA used the results of a comprehensive survey performed by the RMS. It was noted that these MRLs would also cover the possible residue uptakes that may occur in succeeding crops.

Copper compounds are used on many crops that might be fed to livestock and may also be present in feed commodities for which no GAPs are authorised. Thus, the calculated dietary burdens highly exceed the trigger value for all groups of livestock. For the same reason as reported for the nature of residues in plant commodities, the residue definition for livestock commodities can be defined as total copper for both enforcement and risk assessment without requiring further studies. This residue definition includes copper residues arising from all forms of copper. An analytical method for enforcement in livestock commodities is available but its performance characteristic should still be demonstrated.

Copper is an essential micronutrient for animals and can also be used as a feed additive. For that purpose, maximum contents of copper in feedstuffs are currently in place in the framework of the feed legislation. Since these levels are legal values which are not supposed to be exceeded, MRL and risk assessment values were derived assuming that the current maximum contents of copper in feedstuffs are respected. As this would imply that livestock exposure to copper residues has remained constant over the last years, the monitoring data as well as the survey on background levels were considered as reliable sources to estimate MRL and risk assessment values in commodities of animal origin. When
possible, MRLs were derived from monitoring data unless the background levels reported by the RMS indicated higher residues. In this latter case, MRLs were then derived from the background levels. For those commodities where no monitoring data were available, MRLs were directly derived from the background levels.

Chronic exposure calculations were performed using revision 2 of the EFSA Pesticide Residues Intake Model (PRIMo) and were compared with the acceptable daily intake (ADI) for copper previously derived by EFSA (2008) and confirmed in the EFSA renewal (2018a) under Regulation (EC) No 1107/2009. Acute exposure calculations were not carried out because an acute reference dose (ARfD) was not deemed necessary for this active substance. A first calculation was performed considering the MRLs derived for all commodities of plant and animal origin, including the crops for which pesticide uses are authorised as well as all other crops where a significant background concentration of copper is expected. It is noted that this calculation would then cover residues arising from the authorised GAPs as well as from any other sources of residues, including among others residues from rotational crops. The highest chronic exposure was calculated for WHO Cluster diet B, for which a chronic intake concern was identified as the highest chronic exposure represented 109% of the ADI. It is noted that for all other diets, the chronic exposures were below the ADI, ranging from 14% to 86% of the ADI.

The major contributors to the calculated exposure were identified and different options for risk mitigations measures to reduce the chronic exposure were assessed by EFSA. It was shown that lettuces (8.2% ADI), tomatoes (5.1% ADI), wine grapes (3% ADI) and potatoes (3.6% ADI) were the main commodities for which efficient risk mitigations measures could be possible. For potatoes, a fall-back GAP was identified and a lower MRL could be proposed. For lettuce, tomatoes and wine grapes, however, no fall-back GAPs were identified. Chronic exposures were recalculated in accordance with a second scenario where risk mitigation would be taken on the above mentioned crops. In this calculation, the highest chronic exposure declined to 93.4% of the ADI for WHO Cluster diet B. It is highlighted that this scenario is not necessarily the only alternative to reduce the chronic exposure to copper and other minor contributors were also identified. Finally, it was noted that for the most important contributors (wheat, maize, sunflower seed, soya bean and bovine liver), risk mitigation measures were very limited because MRL and risk assessment values derived for these commodities are not necessarily associated to an agricultural practice in particular. Consequently, lowering the MRL to limit of quantification (LOQ) for these commodities may not be applicable in practice.

In addition to food of plant and animal origin, an estimation of the consumer exposure that would results from copper present in drinking water was also provided. The exposures calculated with the occurrence data in tap water (reported by the RMS) and the WHO default consumption values for water indicate that copper intake through drinking water range between 0.62% and 15.1% of the ADI when considering median/average concentrations. Reference was also made to a previous assessment of EFSA where the average copper intake associated to water and water-based beverages was equivalent to 0.2–4.6% of the ADI. However, the above figures do not consider the possible higher chronic exposures which may be due to local high concentration of copper in tap water.
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Background

Regulation (EC) No 396/20051 (hereinafter referred to as 'the Regulation') establishes the rules governing the setting and the review of pesticide maximum residue levels (MRLs) at European level. Article 12(1) of that Regulation stipulates that the European Food Safety Authority (EFSA) shall provide, within 12 months from the date of the inclusion or non-inclusion of an active substance in Annex I to Directive 91/414/EEC2 a reasoned opinion on the review of the existing MRLs for that active substance. As copper compounds was included in Annex I to Council Directive 91/414/EEC on 23 April 2009 by means of Commission Directive 2009/37/EC,3 and has been deemed to be approved under Regulation (EC) No 1107/20094, in accordance with Commission Implementing Regulation (EU) No 540/20115, as amended by Commission Implementing Regulation (EU) No 541/20116, EFSA initiated the review of all MRLs for that active substance.

According to the legal provisions, EFSA shall base its reasoned opinion in particular on the relevant assessment report prepared under Directive 91/414/EEC. It should be noted, however, that, in the framework of Directive 91/414/EEC, only a few representative uses are evaluated, whereas MRLs set out in Regulation (EC) No 396/2005 should accommodate all uses authorised within the European Union (EU), and uses authorised in third countries that have a significant impact on international trade. The information included in the assessment report prepared under Directive 91/414/EEC is therefore insufficient for the assessment of all existing MRLs for a given active substance.

To gain an overview of the pesticide residues data that have been considered for the setting of the existing MRLs, EFSA developed the Pesticide Residues Overview File (PROFile). The PROFile is an inventory of all pesticide residues data relevant to the risk assessment and MRL setting for a given active substance. This includes data on:

- the nature and magnitude of residues in primary crops;
- the nature and magnitude of residues in processed commodities;
- the nature and magnitude of residues in rotational crops;
- the nature and magnitude of residues in livestock commodities;
- the analytical methods for enforcement of the proposed MRLs.

France, the designated rapporteur Member State (RMS) in the framework of Directive 91/414/EEC, was asked to complete the PROFile for copper compounds and to prepare a supporting evaluation report. The PROFile and the supporting evaluation report were submitted to EFSA on 2 October 2014 and updated by the RMS in 2016 (France, 2016). These documents were then made available to the Member States. A request for additional information was addressed to the Member States in the framework of a completeness check period which was initiated by EFSA on 20 June 2016 and finalised on 12 September 2016. Additional evaluation reports were submitted by Austria, Belgium, the Czech Republic, Germany, Spain, Greece, Hungary, Italy and Portugal (Austria, 2016; Belgium, 2016; Germany, 2016, 2017; Greece, 2016; Hungary, 2016; Portugal, 2016; Spain, 2016; Czech Republic, 2017; Italy, 2017) and, after having considered all the information provided by RMS and Member States, EFSA prepared a completeness check report which was made available to all Member States on 7 December 2016. Further clarifications were sought from Member States via a written procedure in December 2016-January 2017.

Based on the conclusions derived by EFSA in the framework of Directive 91/414/EEC and the additional information provided by the Member States, EFSA prepared in November 2017 a draft reasoned opinion, which was submitted to Member States for commenting via a written procedure. All

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1 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 70, 16.3.2005, p. 1–16.
2 Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market. OJ L 230, 19.8.1991, p. 1–32. Repealed by Regulation (EC) No 1107/2009.
3 Commission Directive 2009/37/EC of 23 April 2009 amending Council Directive 91/414/EEC to include chlorimequat, copper compounds, propaquizafop, quizafoiop-P, tebufluzuron and zeta-cypermethrin as active substances. OJ L 104, 24.4.2009, p. 23–32.
4 Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. OJ L 309, 24.11.2009, p. 1–50.
5 Commission Implementing Regulation (EU) No 540/2011 of 25 May 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances. OJ L 153, 11.6.2011, p. 187–188.
6 Commission Implementing Regulation (EU) No 541/2011 of 1 June 2011 amending Implementing Regulation (EU) No 540/2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances. OJ L 153, 11.6.2011, p. 1–186.
comments received by 10 January 2018 were considered by EFSA during the finalisation of the reasoned opinion.

In addition, during the finalisation of the assessment, additional clarifications were requested to RMS and Germany on these studies as key elements to assess the most critical Good Agricultural Practices (cGAP) on potatoes. Therefore, further amendments have become necessary at the final stage. More specifically, the evaluation of the MRL derived on potatoes from the northern European Union (NEU) GAP and trials are update following consideration of the raw studies made available to EFSA in February 2018.

The evaluation report submitted by the France (2016) and the evaluation reports submitted by Member States Austria, Belgium, the Czech Republic, Germany, Spain, Greece, Hungary, Italy and Portugal (Austria, 2016; Belgium, 2016; Germany, 2016, 2017; Greece, 2016; Hungary, 2016; Portugal, 2016; Spain, 2016; Czech Republic, 2017; Italy, 2017) are considered as supporting documents to this reasoned opinion and, thus, are made publicly available.

In addition, key supporting documents to this reasoned opinion are the completeness check report (EFSA, 2017) and the Member States consultation report (EFSA, 2018b). These reports are developed to address all issues raised in the course of the review, from the initial completeness check to the reasoned opinion. Also, the chronic exposure calculations for all crops reported in the framework of this review performed using the EFSA Pesticide Residues Intake Model (PRIMo) (excel file) and the PROFile are key supporting documents and made publicly available as background documents to this reasoned opinion. Furthermore, a screenshot of the Report sheet of the PRIMo (EU1 and EU2) is presented in Appendix C.

Considering the importance of the completeness check and consultation report, all documents are considered as background documents to this reasoned opinion and, thus, are made publicly available.

Terms of Reference

According to Article 12 of Regulation (EC) No 396/2005, EFSA shall provide a reasoned opinion on:

- the inclusion of the active substance in Annex IV to the Regulation, when appropriate;
- the necessity of setting new MRLs for the active substance or deleting/modifying existing MRLs set out in Annex II or III of the Regulation;
- the inclusion of the recommended MRLs in Annex II or III to the Regulation;
- the setting of specific processing factor (PFs) as referred to in Article 20(2) of the Regulation.

The active substance and its use pattern

There is no ISO common name for copper (I), copper (II) variants (not an ISO common name) (IUPAC).

Copper compounds belong to the group of inorganic compounds which are used as a fungicide and bactericide. Copper compounds is taken up from the soil by plant roots and translocated to other parts of the plant mainly via the sap. In the plant, copper plays an important role in respiration and photosynthesis. It is a component of several enzyme systems involved in carbohydrate, nitrogen and cell metabolism. However, when used as a fungicide/bactericide copper is applied as a contact protective foliar spray to the crops leaves. Once absorbed, copper is thought to disrupt the enzyme systems of the pathogenic organisms. Copper is not converted to a metabolite or degradation product in order to exert its intended effect.

Copper compounds was evaluated in the framework of Directive 91/414/EEC with France designated as RMS. The representative uses supported for the peer review process were spraying applications for tomatoes and grapes. Following the first peer review (EFSA, 2008), a decision on inclusion of the active substance in Annex I to Directive 91/414/EEC was published by means of Commission Directive 2009/37/EC, which entered into force on 1 December 2009, and has been deemed to be approved under Regulation (EC) No 1107/2009, in accordance with Commission Implementing Regulation (EU) No 540/2011, as amended by Commission Implementing Regulations (EU) No 541/2011. After Annex I inclusion, confirmatory data were submitted to the European commission by France and peer reviewed by EFSA (2013). Following consideration of these additional data, a revised final review report was published by the European commission (2015). The conditions of the approval were further amended by Commission Implementing Regulation (EU) 2015/2327 and Commission Implementing Regulation (EU) 2015/232 of 13 February 2015 amending and correcting Implementing Regulation (EU) No 540/2011 as regards the conditions of approval of the active substance copper compounds. OJ L 39, 14.2.2015, p. 7–10.
Commission Implementing Regulation (EU) 2018/848. This approval is restricted to uses as bactericide and fungicide only.

EFSA carried out the peer review of the pesticide risk assessment for its renewal (EFSA, 2018a), under Commission Implementing Regulation (EU) No 844/20129, in the framework of the Commission Regulation (EC) No 686/2012, with France designated as RMS and Germany as co-RMS. EFSA peer-review conclusions (EFSA, 2018a), supersedes the previous EFSA assessment (EFSA, 2008) and confirmatory data for environmental fate and behaviour and ecotoxicology data (EFSA, 2013). The representative uses supported for the peer review renewal process were as a fungicide/bactericide on field applications on grapes and field and greenhouse applications on tomatoes and cucurbits.

The EU MRLs for copper compounds are established in Annexes IIIA of Regulation (EC) No 396/2005 and Codex maximum residue limits (CXLs) for copper compounds are not available. An overview of the MRL changes that occurred since the entry into force of the Regulation mentioned above is provided in Table 1.

### Table 1: Overview of the MRL changes since the entry into force of Regulation (EC) No 396/2005

| Procedure | Legal implementation | Remarks |
|-----------|----------------------|---------|
| Art. 10 (EFSA, 2014) | Not yet implemented | Reasoned opinion on setting of an MRL for copper compounds in wild game. As MRL of 4 mg/kg (instead of 0.01* mg/kg) was proposed based on monitoring data obtained on wild game. |

MRL: maximum residue level.

*: Indicates that the MRL is set at the limit of quantification.

For the purpose of this MRL review, the critical uses of copper compounds currently authorised within the EU have been collected by the RMS and reported in the PROFile. The additional GAPs reported by Member States during the completeness check were also considered. The details of the authorised GAP(s) for active substance are given in Appendix A. The RMS did not report any use authorised in third countries that might have a significant impact on international trade.

**Assessment**

EFSA has based its assessment on the PROFile submitted by the RMS, the evaluation report accompanying the PROFile (France, 2016), the assessment report and its addenda prepared under the first peer-review and under Regulation (EC) No 1107/2009 (France, 2007, 2012, 2013) the EFSA conclusion on the peer review of the pesticide risk assessment of the active substance copper compounds in the context of the renewal procedure under Commission Regulation (EC) No 686/20129 (EFSA, 2018a). Several previous EFSA’s opinions on copper compounds were also considered for this assessment, including one reasoned opinion on MRLs (EFSA, 2014), the opinion of the NDA panel on the Dietary Reference Values for copper (EFSA NDA Panel, 2015) and the opinions of the FEEDAP panel on the revision of the currently authorised maximum copper content in complete feed (EFSA FEEDAP Panel, 2012, 2016). Furthermore, the evaluation reports submitted during the completeness check (Austria, 2016; Belgium, 2016; Czech Republic, 2017; Germany, 2016, 2017; Spain, 2016; Greece, 2016; Hungary, 2016; Italy, 2017; Portugal, 2016) were also taken on board. The assessment is performed in accordance with the legal provisions of the uniform principles for evaluation and authorisation of plant protection products as set out in Commission Regulation (EU) No 546/201110 and the currently applicable guidance documents relevant for the consumer risk assessment of pesticide residues (European Commission, 1997a–g, 2000, 2010a,b, 2017; OECD, 2011, 2013).

More detailed information on the available data and on the conclusions derived by EFSA can be retrieved from the list of end points reported in Appendix B.

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8 Commission Implementing Regulation (EU) 2018/84 of 19 January 2018 amending Implementing Regulation (EU) No 540/2011 as regards the extension of the approval periods of the active substances chlorpyrifos, chlorpyrifos-methyl, clothianidin, copper compounds, dimoxystrobin, mancozeb, mecoprop-p, metiram, oxamyl, petothamin, propiconazole, propinieb, propyzamide, pyraclostrobin and zoxamide OJ L 16, 20.1.2018, p. 8-10.
9 Commission Implementing Regulation (EU) No 844/2012 of 18 September 2012 setting out the provisions necessary for the implementation of the renewal procedure for active substances, as provided for in Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market. OJ L 252, 19.9.2012, p. 26-32.
10 Commission Regulation (EU) No 546/2011 of 10 June 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards uniform principles for evaluation and authorisation of plant protection products. OJ L 155, 11.06.2011, p. 127-175.
1. Residues in plants

1.1. Nature of residues and methods of analysis in plants

1.1.1. Nature of residues in primary crops

Specific studies evaluating metabolism and distribution of residue in plants following the use of copper as a plant protection product are not available. However, the public scientific literature reported in the framework of the first peer review provided enough information on the uptake, translocation and effects of copper in plants (EFSA, 2008, 2018a).

In plants, copper is absorbed from soil through the roots. From the roots, copper is transported in the sap to the rest of the plant. Upon foliar application, transportation and distribution of copper in plants are limited. Copper is a monoatomic element and therefore inherently stable. It does not degrade and no metabolites are expected.

1.1.2. Nature of residues in rotational crops

Copper is extremely stable in soil and since no degradation is expected in soil, no DT$_{50}$/DT$_{90}$ were derived during the peer review (EFSA, 2008, 2018a). However, for the same reason as mentioned in Section 1.1.1, specific studies to evaluate the nature of residues in succeeding crops are not necessary.

As copper is absorbed from soil and can be transported to the rest of the plant, residue uptake in succeeding crops is a relevant issue in the framework of this MRL review. This point is discussed under Section 1.2.2.1.

1.1.3. Nature of residues in processed commodities

No studies investigating the effects of industrial processing or household preparation on the nature of residues are available. However, such studies are not necessary as copper is known to be inherently stable (see also Section 1.1.1) and therefore is not expected to be degraded into any other material.

1.1.4. Methods of analysis in plants

Analytical methods for enforcement of copper residues in plant matrices were provided and evaluated in the framework of the initial peer review (EFSA, 2008). The available methods for the determination of copper residues in plants involve atomic absorption spectrometry (AAS) and were validated in commodities with high water content (limit of quantification (LOQ) of 2 mg/kg) and high acid content (LOQ of 5 mg/kg). It is noted that in the framework of the assessment for Annex I Renewal of copper compounds, similar methods were reassessed and there are indications that lower LOQ could be achieved in these crops (EFSA, 2018a).

As the method is considered to be highly specific, no confirmatory method is required. No independent laboratory validation (ILV) is available but this is not deemed necessary since AAS are recognised as standard methods of analysis for inorganic elements.

As the reported analytical methods include a mineralisation of the samples (by acid digestion), it is expected that all forms of copper present in the plant are converted to Cu$^{2+}$. Therefore, total copper content can measured regardless from its chemical form.

No analytical methods are available for commodities with high oil content and dry commodities as well as for any other complex matrices (hops, herbal infusions, etc.). Since MRLs are derived on commodities belonging to these categories, additional analytical methods for enforcement in these matrices should be required.

1.1.5. Stability of residues in plants

There are no standard studies investigating the storage stability of copper residues in plant matrices. However, as copper is a monoatomic element and inherently stable it is not expected to undergo degradation during storage. Therefore, residues of copper are expected to be stable in all residue trials samples.

1.1.6. Proposed residue definitions

Based on the information reported above, the meeting of experts concluded that the relevant residue for monitoring and risk assessment should be defined as total copper (EFSA, 2008, 2018a). This definition is expected to include copper residues arising from all forms of copper as they would be...
converted to Cu^{2+} during the analytical phase (see also Section 1.1.4). This conclusion is still valid in the framework on of this review.

1.2. Magnitude of residues in plants

1.2.1. Magnitude of residues in primary crops

To assess the magnitude of copper compounds residues resulting from the reported GAPs, EFSA considered all residue trials reported by the RMS in its evaluation report (France, 2016), including residue trials evaluated in the framework of the peer reviews (France, 2007, 2017) and additional data submitted during the completeness check (Germany, 2016; Spain, 2016). Considering that copper residues are stable in all plant matrices (see also Section 1.1.5), decline of residues during storage of the trial samples is not expected.

The number of residue trials and extrapolations were evaluated in accordance with the European guidelines on comparability, extrapolation, group tolerances and data requirements for setting MRLs (European Commission, 2016).

Residue trials are not available or not sufficient to support the authorisations on figs, passion fruits, mangoes, cherimoyas, beans (without pods), lentils (fresh), asparagus, cardoons, beans (dry), lentils (dry), sunflower seeds, rapeseeds, soya beans and sugar beets (roots and tops). Therefore, MRL or risk assessment values in line with the cGAPs could not be derived for these crops and the following data gaps were identified:

- Figs: four trials compliant with the southern outdoor GAP are required.
- Passion fruits: four trials compliant with the southern outdoor GAP are required.
- Mangoes: four trials compliant with the southern outdoor GAP are required.
- Cherimoyas: four trials compliant with the southern outdoor GAP are required.
- Head cabbages: only two trials performed on savoy cabbage are available to support the northern outdoor GAP (Germany, 2016). Germany also proposed to use two additional trials performed on Brussels sprouts to derive a tentative MRL. It is acknowledged that residues observed in these commodities are below the LOQ of the trials (i.e. < 5 mg/kg). However, trials on Brussels sprouts are not appropriate to support a GAP on head cabbage and that the LOQ for enforcement is 2 mg/kg for this crop. Furthermore, based on the cGAP reported for head cabbage (four applications at 0.5 kg a.s./ha; preharvest interval (PHI) 7 days), there is no apparent reason to expect a no residue situation in this crop. Therefore, eight residue trials performed on head cabbage and compliant with the northern outdoor GAP are required.
- Beans (without pods): eight trials compliant with the southern outdoor GAP are required.
- Lentils (fresh): four trials compliant with the southern outdoor GAP are required.
- Cardoons: four trials compliant with the southern outdoor GAP are required.
- Beans (dry) and lentils (dry): eight trials on dry beans (or dry peas) compliant with the southern outdoor GAP on these crops are required.
- Sunflower seeds: eight trials compliant with the southern outdoor GAP are required.
- Rapeseeds: eight trials compliant with the southern outdoor GAP are required.
- Soya beans: eight trials compliant with the southern outdoor GAP are required.
- Sugar beets (roots and tops): six trials compliant with the northern outdoor GAP and six trials compliant with the southern outdoor GAP are required.
- Turnips (tops): MRL and risk assessment values could not be derived for this feed item. However, as MRL for feed item are not yet a requirement since residues in this commodity are not expected to have an impact on the MRL derived in livestock commodities (see also Section 2.3), this only considered as a minor deficiency. Thus, four trials compliant with the northern outdoor GAP and four trials compliant with the southern outdoor GAP are desirable.

For other crops, the number of GAP-compliant residue trials reported is not compliant with the data requirements. Therefore, only tentative MRL and risk assessment values could be derived by EFSA and the following data gaps were identified:

- Citrus fruits: two additional trials on oranges and two additional trials on mandarins compliant with the southern outdoor GAP on citrus fruits are required.
- Plums: eight trials compliant with the northern outdoor GAP and four additional trials compliant with the southern outdoor GAP are required.
• Kiwi fruits: four additional trials compliant with the southern outdoor GAP are required.
• Carrots, beetroots, celeriacs, horseradishes, Jerusalem artichokes, parsnips, parsley roots, radishes, salsifies, swedes and turnips: four additional trials on carrots compliant with the northern outdoor GAP and seven additional trials compliant with the southern outdoor GAP are required.
• Cucurbits with inedible peel: tentative MRL and risk assessment values can be derived from the southern data which are all below LOQ (France, 2016). However, the LOQs of these trials (5–10 mg/kg) are much higher than the LOQ for enforcement for high water content commodities (2 mg/kg). Therefore, the proposed MRL and risk assessment values may probably be overestimated. Consequently, eight trials on melons compliant with the southern outdoor GAP and performed with a lower LOQ are required. Furthermore, four trials on melons compliant with the northern outdoor GAP and two trials on melons compliant with the indoor GAP are also required.
• Watercress: a tentative MRL can be derived from seven southern trials performed on lettuce, out of which only four were performed on open leaf varieties. Therefore, five additional trials performed on open leaf varieties of lettuce (or on watercress) compliant with the southern outdoor GAP are still required.
• Beans (with pods) and peas (with pods): two additional trials compliant with the northern outdoor GAP and two additional trials compliant with the southern outdoor GAP are required.
• Peas (without pods): two additional trials compliant with the northern outdoor GAP and five additional trials compliant with the southern outdoor GAP are required.
• Hops: tentative MRL and risk assessment values can be derived based on seven overdosed northern trials available for this crop. However, four trials compliant with the northern outdoor GAP are still required.

For all other crops, available residue trials are sufficient to derive MRL and risk assessment values, taking note of the following considerations:

• Almonds, chestnuts, hazelnuts and walnuts: although appropriate MRL and risk assessment values can be derived from the southern data, six trials in total on two representatives of the group of tree nuts (except coconuts) compliant with the northern outdoor GAP are still required.
• Apples, pears and quinces: although appropriate MRL and risk assessment values can be derived from the southern data, eight trials on apples/pears (with a minimum of four trials on apples) compliant with the northern outdoor GAP are still required.
• Apricots: although appropriate MRL and risk assessment values can be derived from the northern data, eight trials compliant with the southern outdoor GAP are still required.
• Cherries and jambuls/jambolans: although appropriate MRL and risk assessment values can be derived from the southern data, five additional trials on cherries compliant with the northern outdoor GAP are still required.
• Peaches: although appropriate MRL and risk assessment values can be derived from the southern data, five trials compliant with the northern outdoor GAP are still required.
• Tables and wine grapes: although appropriate MRL and risk assessment values can be derived from the northern data, five additional trials compliant with the southern outdoor GAP are still required.
• Strawberries: it is noted that seven residue trials instead of eight are available to support the southern outdoor GAP. However, this is deemed acceptable in this case because a full data set compliant with the indoor GAP indicates that the indoor GAP is probably more critical than the outdoor GAPs. Further residue trials are therefore not required and MRL and risk assessment values can be derived from the indoor GAP.
• Blueberries: although appropriate MRL and risk assessment values can be derived from the northern data, four trials compliant with the southern outdoor GAP are still required.
• Cane fruits and other small fruits and berries (except dewberries): it is noted that no trials are available to support the indoor GAP. However, based on the northern outdoor trials, it is expected that treatment before flowering or after commercial harvest will not result in residues above the enforcement LOQ for these crops (i.e. 5* mg/kg). Further residue trials are therefore not required and MRL can be proposed at the LOQ.
• Potatoes: it is noted that the validity of the residue trials supporting the northern GAP on potatoes was discussed during the Member State (MS) consultation (EFSA, 2018b). Based on the additional information provided by Germany, these trials were considered valid and thus, appropriate MRL and risk assessment values can be derived from the northern GAP. As only
seven trials are available, one additional trial compliant with the northern GAP is still desirable to complete the data set; this is deemed as a minor deficiency.

- Onions, garlic and shallots: although appropriate MRL and risk assessment values can be derived from the northern data, four additional trials on onions compliant with the southern outdoor GAP are still required.
- Tomatoes and aubergines: although appropriate MRL and risk assessment values can be derived from the northern data, three additional trials on tomatoes compliant with the southern outdoor GAP and four trials compliant with the indoor GAP are still required.
- Peppers: although appropriate MRL and risk assessment values can be derived from the southern data, four additional trials compliant with the northern outdoor GAP are still required.
- Cucurbits with edible peel: although appropriate MRL and risk assessment values can be derived from the indoor data, eight trials on cucumbers and/or courgettes compliant with the northern outdoor GAP are still required.
- Lettuce and other leafy crops: although appropriate MRL and risk assessment values can be derived from the indoor data, eight trials on lettuce (open leaf varieties) compliant with the northern outdoor GAP and five additional trials on lettuce (open leaf varieties) compliant with the southern outdoor GAP are still required. It is also noted that one additional trial on lettuce (open leaf variety) compliant with the indoor GAP is still desirable to complete the data set (minor deficiency).

1.2.2. Magnitude of copper in plant resulting from soil uptake

Copper is a ubiquitous molecule which may also be present in plant commodities that are not supposed to undergo pesticide treatments with copper. As copper is a natural element, it is also present in soil, which is essential for normal plant growth development. Therefore, all soil-grown crops may contain copper. Although copper can have significant phytotoxicity at high soil concentrations, it is also known that plants can accumulate copper to various extents, depending on plant species and copper content in soils. Consequently, further investigation is needed to assess copper residues in rotational crops as well as endogenous levels of copper in plant commodities.

1.2.2.1. Magnitude of residues in rotational crops

According to the scientific literature, there is a significant background concentration of copper in soil. In a previous assessment of confirmatory data submitted for the active substance copper, the soil concentration in arable field was estimated at around 32 mg/kg of soil (EFSA, 2013). This concentration may be due to natural presence of copper in soil but also to pesticides and fertilisers uses. Considering the maximum annual application rate of copper on crops and the conservative assumption that 100% of the applied copper reaches the soil surface, the critical uses of copper as plant protection product are expected to contribute to 3–11 mg/kg soil per year. Although this is lower than the background level of 32 mg/kg soil, it is noted that degradation of copper in soil is not expected. Therefore, this annual contribution is significant and needs to be considered in view of assessing the potential uptake of copper in succeeding crops.

Due to the ubiquitous property of copper, which naturally present in plants as an essential micronutrient, field trials on rotational crops according to the current OECD recommendations would not be helpful to assess residues in rotational crops. These studies are therefore not required.

Based on several scientific publications reported by the RMS, bioavailable copper is taken up by crops according to the plant needs. Therefore, independently from the copper contamination in soil, plants are not expected to absorb more than the essential nutritional amount. It is highlighted that an excess of copper absorption by plant may cause phytotoxic effects. Consequently, it is assumed that copper uptake is succeeding crop is naturally auto regulated by the crops.

Considering the above, it is concluded that copper can be present in succeeding crops (annual and permanent) as an endogenous compound, following natural soil absorption as a micronutrient. The RMS provided a comprehensive survey on the endogenous copper levels in all plant commodities. This survey is further discussed in Section 1.2.2.2 and is considered sufficient to cover the residue levels that may occur in succeeding crops. During the Annex I Renewal, the results of this survey were confirmed by the control samples taken from the residue field trials performed on the representative

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11 11 mg/kg soil per year: maximal copper concentration expected in soil after one year, assuming the maximum annual application of 8 kg/ha, soil depth of 5 cm and soil density of 1.5 g/cm³.
uses (EFSA, 2018a). Furthermore, these data were considered reliable by the experts (EFSA, 2018c). These data can be considered as a surrogate to rotational crops studies and could allow deriving MRLs and risk assessment values for plant commodities for which no GAPs are currently authorised within the EU (also referred to as ‘off-label’ crops).

1.2.2.2. Endogenous residue levels of copper in plant commodities

Due to its natural function of micronutrient taken up from soil (see also Section 1.2.2.1), copper is present in almost all plant commodities. As it was not possible to quantify the residue uptake from soil to crops, further investigations were carried out to assess the endogenous levels of copper in plant commodities. The RMS performed a literature search on the copper levels present in plant commodities. The outcome of this survey was then compared with the results of the available monitoring data. The monitoring data are generated by the EU National laboratories and are collected each year by EFSA in the framework of the monitoring program.

RMS survey on background residue levels (France, 2016):

In order to assess the background levels of copper in all plant commodities, the RMS performed a comprehensive literature survey. Details on this literature search are reported in the French evaluation report (France, 2016). The RMS was able to retrieve data on copper occurrence for almost all commodities included in the Annex I to Regulation (EC) No 396/2005. These figures give indication on the copper content in plant commodities without considerations on the history of the fields. Therefore, it is supposed to reflect the background levels of copper in plant commodities. An overview of this survey is reported in Annex A of the present opinion.

The available data shows that significant levels of copper can be found in almost all plant commodities, including the ones for which no pesticide uses are authorised. For instance, fairly high levels of copper are observed in tree nuts (4.5–37 mg/kg), pulses (10.9–17 mg/kg), oilseeds (1.3–21.5 mg/kg), cereals (2.8–10 mg/kg) and spices (3.4–13.7 mg/kg). These findings are consistent with several previous publications on consumer exposure to copper among which, the EFSA opinion of Panel on Dietetic Products, Nutrition and Allergies (NDA) (EFSA NDA Panel, 2015) can be highlighted: ‘rich dietary sources of copper are [...j nuts (particularly cashew) and seeds’. It is noted that this previous opinion of EFSA based its assessment on an ad-hoc survey on the copper nutrient content in food items (Roe et al., 2013; see also on Nutrient composition data base12).

In the RMS survey, the number of available data per commodity varies between 1 and 13 data; for a few minor commodities (e.g. medlar, star apples, American persimmon, oil palm fruits/kernels, kapok, land cress, etc.), no data are available. In order to consolidate the data sets, EFSA proposed to group the occurrence data for commodities belonging to the same crop group when similar ranges of copper levels are observed. For instance, background levels of grapefruits, oranges, lemons, limes and mandarins can all be considered in the same group to assess the endogenous levels of copper in citrus fruits. When no data were available for a commodity, extrapolation from the similar commodity was also proposed to complete the data set (e.g. from lettuce to ‘herbal infusions from leaves and herbs’). A presentation of the combined data sets resulting from this methodology is also available in Annex A.

In the aim of cross-checking the above survey with another source of information, EFSA extracted the monitoring data for copper compounds obtained from the national control programmes of years 2009–2015. It is noted that monitoring data for copper are available from a limited number of MSs. However, as the objective is to collect information on the endogenous level of copper, samples originating from EU and non-EU countries were all considered in this data collection. Overall, 7,002 individual data for 111 different plant commodities (unprocessed) are available. Residues at or above the LOQs were observed in a total of 5,368 samples, corresponding to 77% of the samples analysed. A detailed summary of these monitoring data is available in Annex B. It is noted that the data were collected and all expressed as copper, in accordance with the residue definition.

As in the RMS survey, significant levels of copper are observed in plant commodities for which no pesticide uses are authorised such as dry peas (max 10.9 mg/kg), linseeds, poppy seeds, sesame seeds, mustard seeds and pumpkins seeds (12.3–41 mg/kg), barley, rice, wheat (10.1–12.2 mg/kg), teas (21.8 mg/kg) and coffee beans (max 23.4 mg/kg).

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12 EFSA Nutrient composition data base: https://dwh.efsa.europa.eu/bi/asp/Main.aspx?rwrep=701
In general, the monitoring data corroborate the findings of the RMS survey on background levels; for most of the commodities similar ranges of copper levels are observed from the RMS survey and in the monitoring data. However, for a few commodities, monitoring data can indicate much higher levels compared to the background levels retrieved by the RMS. For those commodities where GAPs are authorised, this may be explained by the fact that authorised GAPs for foliar applications can induce higher residues (found in monitoring) compared to the background concentrations. However, for those commodities where no GAPs were reported in the framework of this review, this may indicate possible misuses or unexpected drift contaminations following foliar applications. For instance, maximum residues levels found in wild fungi (34.7 mg/kg) or in grape leaves (64 mg/kg) should probably not reflect the natural copper content expected in these commodities. Therefore, EFSA is of the opinion that the monitoring data should not be considered for setting MRLs in off-label commodities.

It is noted that the copper levels measured in the monitoring of a specific commodity mainly depend on the current authorisations associated to the relevant crops. Therefore, it was decided not to pool the monitoring data from commodities belonging to the same group, in opposition to what was proposed for the background levels.

1.2.3. Magnitude of residues in processed commodities

Studies investigating the magnitude of residues in processed commodities were initially reported in the framework of the first peer review (EFSA, 2008). Furthermore, new studies were assessed by the RMS under this MRL review (France, 2016); it is noted that some of these studies were also submitted under the Annex I Renewal of the active substance (France, 2017). An overview of all available processing studies is available in Appendix B.1.2.3.

Among others, robust PFs for enforcement and risk assessment were derived for peeled fruits (oranges, mandarins, kiwi fruits and melons), juices (orange, apples and wine grapes), canned commodities (peaches, cherries, peas without pods), dried fruits (plums and table grapes), olive oil and press cake, strawberries jam and orange marmalade, wines (red and white) and beer. With regard to feed processed commodities, however, only tentative PFs could be derived for oranges and apples pomaces as they were not sufficiently supported by studies (only 1 or 2 studies available). Based on two available data, a tentative PF of 0.73 could be proposed for apple wet pomace. However, the available data for orange pomaces indicate a potential residue concentration in citrus pomaces (wet and dry). It is noted that the RMS proposed a waiver for further investigations in citrus pomaces based on the assumption that copper residues which are not transferred to juice (PF = 0.94) would entirely be retrieved in the pomace fractions. A theoretical PF of 1.06 (=1/0.94) was then proposed by the RMS (France, 2016). However, this approach was not retained by EFSA because this calculation does not take into account the fact that the PF of 0.94 in juice may also be due to the concentration following juice pasteurisation step. Furthermore, the empirical PF derived from the single available study (PF = 8.6) should not be disregarded and is in contradiction with the theoretical calculation of the RMS. This empirical PF is rather consistent with default PF usually considered for citrus dried pulp (PF = 10) when no data on magnitude of residues in processed commodities are available. Consequently, the tentative PF derived from the available studies were considered for pomace commodities (apples and citrus).

Further processing studies are not required although they could allow to further refine the consumer risk assessment (e.g. for cereal processed commodities) or the dietary burden calculations (e.g. for citrus pomaces and potatoes by-products). If more robust PFs were to be required by risk managers, in particular for enforcement purposes, additional processing studies would be needed.

1.2.4. Proposed MRLs in plant commodities

Due to the endogenous occurrence of copper in soil and plant commodities, MRLs were derived for all commodities included in the Annex I to Regulation (EC) No 396/2005. Based on the initial proposal of the RMS, EFSA developed an ad-hoc methodology which is summarised in the decision tree presented in Appendix E.1. A major distinction is made between those commodities where a GAP is authorised in the EU and the other commodities for which no GAPs are authorised.

Commodities for which GAPs are authorised:

When sufficient residue data were available, MRL and risk assessment values were derived in accordance with the standard rules, thus considering the GAP-compliant residue trials and using the OECD calculator. For 99 out of 103 commodities for which an MRL could be derived according to this methodology, the proposed MRL was found to cover the background levels and the monitoring data...
reported in Annexes A and B. For the four remaining commodities (cashew nuts, coconuts, pine nuts and garlic), the background levels and/or the monitoring data indicate that higher copper levels could be retrieved in practice. For these commodities, tentative MRLs were then derived on the basis of the monitoring data\textsuperscript{13} and/or background levels,\textsuperscript{14} in accordance with the decision tree reported in Appendix E.1. For figs, passion fruits, mangoes, cherimoyas, head cabbages, beans (without pods), lentils (fresh), asparagus, cardoons, beans (dry), lentils (dry), sunflower seeds, rapeseeds, soya beans and sugar beets (roots and tops), residue data were not available or not sufficient to derive MRLs according to the standard procedure. Exceptionally, tentative MRLs were also derived from the monitoring data and/or background levels for these crops, highlighting that additional data are still required to confirm these values.

Commodities for which no GAPs are authorised:

It was demonstrated by the RMS as well as by other sources that copper is also present in several plant commodities which are not supposed to be treated with copper (see Section 1.2.2). It is acknowledged that the occurrence of copper in plant independently from the direct pesticide application is mainly due to the roots uptake of copper as a micronutrient into soil. Furthermore, the copper content of soil may be due to copper pesticides and fertilisers uses over the years as well as to natural presence of copper in the environment. Therefore, in order to accommodate with this situation, risk managers may have interest to also set MRLs on off-label commodities. In this eventuality and also to assess the consumer exposure accordingly, EFSA derived MRLs proposals and risk assessment values for all off-label commodities. For these commodities, it was decided to use only the background levels from the RMS survey. As discussed in Section 1.2.2.2, the monitoring data may bias the MRL proposal as they may also reflect misuses or avoidable cross-contaminations.

For all commodities of the Annex I to Regulation (EC) No 396/2005, MRL proposals derived in accordance with the above mentioned methodology are reported in Appendix F.1. For each MRL proposal, the rational is reported in the column ‘comment on MRL proposal’. Nevertheless, a risk management decision should still be taken on whether MRLs should be proposed for commodities for which no pesticides uses are authorised and on the period of their applicability.

2. Residues in livestock

Copper compounds are used on crops that might be fed to livestock such as citrus fruits, potatoes, apples and soya bean. Furthermore, copper naturally occurs in plant and is also an essential micronutrient for animals. Various copper compounds are authorised as feed additives.\textsuperscript{15} Many occurrence data collected in different frameworks indicate that copper is retrieved in significant levels in commodities of animal origin (EFSA NDA Panel, 2015; EFSA FEEDAP Panel, 2015). Therefore, a detailed assessment of copper residues in livestock is triggered under this review.

2.1. Nature of residues and methods of analysis in livestock

The metabolism of copper in livestock was not assessed during the peer review. However, copper is a monoatomic element which cannot be degraded, and thus, no metabolites are expected. Therefore, the residue definition proposed for plant as total copper is also applicable to products of animal origin. This residue definition is valid for both enforcement and risk assessment and is expected to cover copper residues arising from all forms of copper.

There are indications that the method described in the European Standard EN 14082:2003 can be used to analyse total copper in animal matrices. This method is based on dry washing of the foodstuffs at 450°C and quantification by flame AAS. Since analyses are performed after dry ashing, the method should in principle be applicable for all types of matrices, including food of animal origin. However, the performance characteristics of this method were not adequately demonstrated as it was highlighted during the peer review under the Annex I Renewal (EFSA, 2018a). This data gap should be addressed in order to validate the performance of this method. In the meanwhile, a LOQ ranging between 0.5 and 1 mg/kg is considered for livestock commodities in line with the previous assessment of EFSA (2014).

\textsuperscript{13} To derive MRL from the monitoring data, EFSA used the ‘spices approach’ based on the upper confidence interval of the percentile 95th; this approach is applicable when more than 58 data were available. For the commodities where the number of data was too limited, the MRL proposal is based on the highest value of the monitoring data.

\textsuperscript{14} The MRLs derived from background levels are based on the highest value of the data set given for a certain commodity.

\textsuperscript{15} Detailed uses are available in the EU Register for feed additives: https://ec.europa.eu/food/sites/food/files/safety/docs/animal-feed-eu-reg-comm_register_feed_additives_1831-03.pdf

www.efsa.europa.eu/efsajournal 15 EFSA Journal 2018;16(3):5212
2.2. Copper concentration in animal diets

2.2.1. Livestock exposure to pesticide residues of copper: ‘dietary burden’

Copper compounds are authorised for pesticide use on many crops that might be fed to livestock such as citrus fruits, apples, potatoes, head cabbages and several root crops. Furthermore, many major feed items which are not treated with copper as a fungicide (e.g. cereals and oilseeds; see also Section 1.2) may also contribute to the livestock dietary burdens. Therefore, the dietary burdens were calculated not only considering residues from the authorised uses, but also including the background residue levels and monitoring data. It is noted that such a calculation does also cover the residues expected from rotational crops. Livestock dietary burdens were calculated for different groups of livestock according to OECD guidance (OECD, 2013), which has now also been agreed upon at European level.

The selection of the input values followed the same rules as for the MRL proposals derived in Section 1.2.4 (see also decision tree in Appendix E.1). Therefore, for those commodities where MRLs were derived from the authorised GAPs, input values were derived from the supporting residue trials. When MRLs were based on the background levels data, the respective median and/or highest values were taken into account for the dietary burden assessment. If MRLs were derived from the monitoring data, the corresponding mean and/or highest values were considered. The detailed input values for this calculation are summarised in Appendix D.1. For the feed commodities for which no MRLs could be proposed in Section 1, background levels and monitoring data were considered in the calculation. For instance, as the residue levels in sugar beet (roots and tops) could not be properly assessed because of the limited residue trials supporting this GAP, the input values for these feed items were derived from the background levels.

The dietary burdens calculated for all groups of livestock were found to highly exceed the trigger value of 0.1 mg/kg dry matter (DM). The calculated dietary burdens range between 19.1 mg/kg DM (poultry layer) to 147.6 mg/kg DM (cattle) (see also Appendix B.2). For information purpose, EFSA also assessed the theoretical dietary burdens which would result from the authorised uses only, meaning without consideration of the background levels and monitoring data. The dietary burdens hereby calculated would range between 14.8 and 138.7 mg/kg DM, which is in the same range than the overall dietary burdens resulting from the above mentioned calculation. As this calculation is just theoretical, it was not reported in the list of end points of the present opinion. However, this result just shows that the residues arising from the direct authorised pesticide uses (in particular potatoes and by-products of potato industry) are the main drivers of the dietary burden compared to the background levels of copper.

2.2.2. Copper content authorised in complete feed

Copper is an essential micronutrient for animals and some specific copper compounds can also be used as feed additives in animal nutrition, when needed. For that purpose, maximum contents of copper in feedstuffs are currently in place in the framework of different Feed Regulations. The maximum contents of copper in feedstuffs defined in these Regulations were reported in Table 2. It is noted that the livestock categories defined in the Feed Regulations are more detailed than the ones considered for the pesticide dietary burden calculations. Therefore, in order to allow comparison with the dietary burdens calculated under the present review, EFSA made an attempt to aggregate the detailed species defined in the Feed Regulations to make them fit with the livestock groups considered for the dietary burden calculations. For example, while the Feed Regulations need to distinguish between ‘piglets up to 12 weeks’ and ‘other pigs’, these two subgroups were considered together under the category ‘swine (all diets)’. In addition, the original values were expressed on dry matter basis assuming that standard diets contain 88% of DM. It is noted that new proposals for maximum contents of copper were derived by EFSA in the context of the revision of the maximum authorised content of copper in feed (EFSA FEEDAP Panel, 2015). However, these values are not yet implemented in the Regulation and are not drastically different that the ones reported below.

16 Commission Regulation (EC) No 479/2006 of 23 March 2006 as regards the authorisation of certain additives belonging to the group compounds of trace elements. OJ L 86, 24.3.2006, p. 4–7. Commission Regulation (EC) No 349/2010 of 23 April 2010 concerning the authorisation of copper chelate of hydroxyl analogue of methionine as a feed additive for all animal species. OJ L 104, 24.4.2010, p. 31–33. Commission implementing Regulation (EC) (EU) No 1230/2014 of 17 November 2014 concerning the authorisation of copper blysinate as a feed additive for all animal species. OJ L 331, 18.11.2014, p. 18–21. Commission implementing Regulation (EC) (EU) 2016/2261 of 15 December 2016 concerning the authorisation of copper(III) oxide as a feed additive for all animal species. OJ L 342, 16.12.2016, p. 18–21.
2.2.3. Comparison between dietary burden and copper content in complete feed

A comparison between the maximum dietary burdens calculated under this review with the currently authorised maximum copper contents in feed (expressed on DM basis) is reported in Table 3 below. For cattle and sheep, it is remarkable that the maximum dietary burdens calculated from the pesticide residues are much higher than the currently authorised maximum copper contents in feed. This indicates that copper residues resulting from pesticides uses may theoretically induce exceedances of the authorised maximum contents of copper in feedstuffs. However, the available data from monitoring activities performed on complete feed in different European countries indicate that this may not often occur in practice. According to these data, maximum copper concentrations in feedstuffs prepared for cattle and sheep do not exceed 45 mg/kg DM\textsuperscript{17} (EFSA FEEDAP Panel, 2015). In practice, exceedances of the authorised maximum contents of copper in feedstuffs of cattle and sheep represent less than 6.5%\textsuperscript{18} of the samples (EFSA FEEDAP Panel, 2015). It is acknowledged that the monitoring data on copper concentration in feedstuff are still quite limited: data were available from only 14 MS and the number of data on dairy cows, cattle for fattening and sheep is small (number of samples analysed ranges between 8 and 111). Nevertheless, it is highlighted that the maximum contents of copper in complete feed set in the Feed Regulations are legal limits which are therefore expected to be monitored by feed business operators when completing the feed diets. Consequently, the maximum copper content in complete feed reported in the Feed Regulations should guarantee that the copper animal intake remain under these levels. In addition, it should also be noted that the theoretical maximal dietary burdens calculated under Section 2.2.1 are not expected to occur in practice because they would anyways not be tolerated by most of the animal species (see also EFSA FEEDAP Panel, 2015).

### Table 2: Currently authorised maximum copper contents in feed in the European Union

| Livestock group     | Maximum copper content\(^{(a)}\) (mg/kg complete feed) | Maximum copper content\(^{(b)}\) (mg/kg complete feed DM basis) |
|---------------------|---------------------------------------------------------|---------------------------------------------------------------|
| Cattle (all diets)  | 15 – 35                                                 | 17 – 39.8                                                    |
| Cattle (dairy only) | 15 – 35                                                 | 17 – 39.8                                                    |
| Sheep (all diets)   | 15                                                     | 17                                                           |
| Sheep (ewe only)    | 15                                                     | 17                                                           |
| Swine (all diets)   | 25 – 170                                                | 28.4 – 193                                                   |
| Poultry (all diets) | 25                                                     | 28.4                                                         |
| Poultry (layer only)| 25                                                     | 28.4                                                         |

DM: dry matter.

\(^{(a)}\): According to current Feed Regulations.\textsuperscript{16}

\(^{(b)}\): Assuming standard diets containing 88% of dry matter.

### Table 3: Comparison of the maximum dietary burdens with maximum copper contents to be authorised in complete feed

| Livestock group     | Max dietary burden (mg/kg DM)\(^{(a)}\) | Maximum copper content\(^{(b)}\) (mg/kg complete feed DM basis) |
|---------------------|-----------------------------------------|---------------------------------------------------------------|
| Cattle (all diets)  | 147.6                                   | 17 – 39.8                                                    |
| Cattle (dairy only) | 114.1                                   | 17 – 39.8                                                    |
| Sheep (all diets)   | 143.9                                   | 17                                                           |
| Sheep (ewe only)    | 143.9                                   | 17                                                           |
| Swine (all diets)   | 81.4                                    | 28.4 – 193                                                   |
| Poultry (all diets) | 22.5                                    | 28.4                                                         |

\textsuperscript{17} See appendix D of the EFSA FEEDAP Panel opinion of 2015: the copper content reported in feed for calves milk replacer, fattening cattle, dairy cows, sheep and goat ranges between 2 and 40 mg/kg feed, equivalent to a maximum of 45 mg/kg DM.

\textsuperscript{18} See appendix D of the EFSA FEEDAP Panel opinion of 2015: the maximum rate of exceedance (6.5%) was identified for dairy cows.
Copper residues in feed commodities arising from pesticide uses can theoretically induce high dietary exposure of livestock to copper. However, copper compounds are routinely used as feed additives and concentrations of copper in complete feed shall not exceed the ones authorised by the Feed Regulations; if the concentrations are exceeded, the feed is non-compliant and must be withdrawn. It is noted that the maximum dietary burden resulting from the calculation derived in the present review is a worst-case scenario which is not expected to frequently occur in practice. Furthermore, the conservative assumptions behind this calculation such as use of default processing factors could be refined if further data on the effect of magnitude of residue in processed commodities (in particular for potatoes dried pulp and potatoes processed waste) would be available.

Nevertheless, if risk manager wish to reduce the probability that residues arising from pesticide uses may induce concerns to feed producers, restriction measures on pesticide uses can be proposed to lower the potential copper residues arising from pesticide uses. The main contributors to the dietary burden are potatoes and potato processed commodities, thus withdrawal of the most cGAP reported for potatoes (i.e. deriving an MRL based on the southern GAP instead of considering the northern GAP; see also scenario 2 in Section 3) would decrease the livestock dietary burden of around 30% for cattle, sheep and swine.

### 2.3. Magnitude of residues in livestock

In a scenario where the currently authorised maximum copper contents in complete feed were respected, it can reasonably be assumed that livestock exposure to copper residues has remained constant over the last years. Therefore, copper levels observed in the monitoring data or in any other reliable sources dealing with copper occurrence in food commodities are good indicators to estimate MRL and risk assessment values in commodities of animal origin.

#### 2.3.1. Available data on copper occurrence in animal commodities

Due to its presence in the animal diets (as an essential nutrient, as a feed additive and as a residue of pesticide uses), copper is expected to be retrieved in almost all livestock commodities. Further investigations were then carried out to quantify the copper levels in livestock commodities. First, EFSA considered the results of residue analysis performed on livestock commodities in the framework of European monitoring programmes. These data are generated by the EU National laboratories and are collected each year by EFSA in the framework of the monitoring programme. In addition, the literature search on the copper background levels in animal commodities provided by the RMS was also considered in this Section.

**Monitoring data on copper:**

EFSA extracted the monitoring data for copper compounds in animal commodities obtained from the national control programmes of years 2009–2015. As for plant commodities, monitoring data for copper comes from a limited number of MSs. In total, 1,730 individual data taken from 17 different animal commodities (unprocessed) are available. Residues at or above the LOQs were observed in a total of 1,402 samples, corresponding to 81% of the samples analysed. A detailed summary of these monitoring data is available in Annex B. It is noted that the data were collected and all expressed as copper, in accordance with the residue definition.

Over the period 2009–2015, the most controlled commodities were milks (n = 433), bovine liver (n = 206), eggs (n = 145) and meat/muscle from different ruminants (n = 925). It is noted that monitoring data are available for both meat and muscle because meat was still considered a relevant commodity during the first part of the period 2009–2015. However, considering that MRLs should now be set for muscle only (no longer for meat), it was considered appropriate to use only the data reported for muscle. The highest levels of copper are observed in bovine and swine liver.
(max 454 mg/kg and 19.2 mg/kg, respectively) and in bovine kidney (3.5 mg/kg). The maximum results observed in muscles range between 1.3 and 3 mg/kg (all animal considered). No data are available for fat tissues. Compared to the other commodities, residues levels observed in milk and eggs are quite low.

In addition to the data extracted by EFSA, monitoring results from a previous survey provided by Germany were also taken on board to consider the copper residues in wild terrestrial vertebrate. This survey was conducted in Germany in 2012 and reported to EFSA in the framework of an application for setting MRL for copper compounds in wild game (EFSA, 2014). The detailed results of this survey are also reported in Annex B.

RMS survey on background residue levels (France, 2016):

The RMS has performed a comprehensive literature survey for which all detailed sources are available in the French evaluation report (France, 2016). The RMS was able to retrieve data on copper occurrence for all animal commodities relevant in the framework of the MRL review. An overview of this survey is reported in Annex A of the present opinion.

The data provided by RMS are consistent with the monitoring data presented above. Very high levels of copper in animal liver are confirmed (max values from 75 to 374 mg/kg) and similar ranges of copper concentrations were reported for muscle (2.2–6 mg/kg). Low levels in milks and eggs are also reported in this survey (max 1.1 mg/kg). Some differences between background data and monitoring data were observed for the commodities for which number of monitoring data was very poor (e.g. poultry liver and bovine kidney, n = 1). Therefore, the comparison for these commodities is limited.

As for plant commodities, EFSA proposed a consolidation of these data by grouping the figures for similar commodities when equivalent residue levels are observed. For examples, background levels observed in sheep and goat liver were considered together to assess the residues in ovine and caprine liver while data for bovine were combined with the ones of equine. This approach is in line with the current rules of extrapolations for livestock. The same was done for the other tissues. For milks, however, as data for bovine, sheep, goat and horses showed similar results, all below the LOQ of 1 mg/kg, they were all combined in order to obtain a consolidated data set. When no data are available for a commodity, extrapolations from a similar commodity were proposed to complete the data set (e.g. from bovine tissues to horse tissues). A presentation of the combined data sets resulting from this methodology is also available in Annex A.

Additional sources:

Overall, both sources of data (monitoring data and RMS survey) are consistent. Furthermore, it is noted that these figures are also in line with previous works performed on copper. In the EFSA opinion of Panel on Dietetic Products, Nutrition and Allergies (NDA) (EFSA NDA Panel, 2015), liver was already identified as a potential dietary source of copper and, according to the EFSA Nutrient composition data base 19 (Roe et al., 2013) contains in average 55 mg/kg. For the other commodities of animal origin, the Nutrient composition data base also indicates consistent average values with regards to the data reported above. Some information on copper concentrations in swine and ruminant liver was also reported under the revision of maximum authorised content of copper in feed (EFSA FEEDAP Panel, 2015) with concentrations ranging between 30.6 and 356 mg/kg. For all of these reasons, EFSA considers that the data reported by the RMS and the monitoring data constitute a relevant basis to derive MRLs and risk assessment values.

2.3.2. Proposed MRLs in livestock commodities

MRLs can be derived for all relevant tissues of swine, ruminants, equine and poultry as well as for milk and eggs on the basis of the monitoring data and/or background levels in accordance with the decision tree reported in Appendix E.2.

For those commodities where sufficient monitoring data were available, MRLs were first derived from these data.20 When the MRL derived from monitoring data was found to cover the background data, it was confirmed as the final recommendation. Following this criterion, MRL for bovine liver (400 mg/kg), poultry muscle (7 mg/kg), milk (1 mg/kg), eggs (1 mg/kg) and wild terrestrial animal

19 EFSA Nutrient composition data base: https://dwh.efsa.europa.eu/bi/asp/Main.aspx?rwtrep=701
20 To derive MRL from the monitoring data, EFSA attempted to use the ‘spices approach’ based on the upper confidence interval of the percentile 95th; this approach was applicable when more than 58 data were available. For the commodities where the number of data was too limited, the MRL proposal was based on the highest value of the monitoring data.
Vertebrate (3 mg/kg) were derived from the monitoring data (see details in Appendix F.2). For this later, it is noted that an MRL of 4 mg/kg was previously proposed in reasoned opinion of EFSA on setting MRL for copper compounds in wild game (EFSA, 2014). The data used in this previous assessment were exactly the same as the ones considered in the present opinion (see also Annex B) but the MRL proposal of 4 mg/kg was based on the highest residue level observed in the survey. For sake of consistency with the other MRL proposals based on monitoring data, EFSA considers that a MRL of 3 mg/kg, based on the upper confidence interval of the 95th percentile, can now be proposed for this commodity.

When the MRL derived from monitoring data was below the maximum of the background levels retrieved from the survey of the RMS, an MRL proposal was then derived from the background levels. Therefore, MRL for swine muscle, swine liver, bovine muscle, bovine kidney, sheep muscle and poultry liver were derived from the background data (see details in Appendix F.2).

For the remaining commodities, MRLs were directly derived from the background levels as no monitoring data were available (see details in Appendix F.2). All MRL proposals derived in accordance with the above mentioned methodology are reported in Appendix F.2. For each MRL proposal, the rational is reported in the column ‘comment on MRL proposal’.

It is noted that the need for MRLs for copper in livestock commodities was already discussed in the framework of other legislations. In the feed additives area, it was previously considered that MRL should not be proposed for essential trace elements such as copper because it was assumed that the maximum copper contents in feedstuffs set by EU Feed legislations should be sufficient to regulate the copper levels that may occur in livestock commodities (EFSA FEEDAP Panel, 2016). In the veterinary medicines area, no MRLs in food of animal origin were required for the copper compounds that are used as pharmacologically active substances (copper chloride, gluconate, heptanoate, methionate, oxide, sulfate). Therefore, a risk management decision should still be taken on whether MRLs for animal commodities should be set in the Pesticide Regulation and on the period of applicability of such MRLs. In any cases, these MRLs should be considered on a tentative and temporary basis because they may need to be updated regularly considering any eventual monitoring data provided in the future. It is also noted that if copper MRLs would be set in livestock commodities, a data gap for the performance characteristic of the available analytical method for animal matrices should be set (see also Section 2.1).

3. Consumer risk assessment

3.1. Risk assessment considering all commodities of plant and animal origin

In the framework of this review, MRLs were derived for all commodities of plant and animal origin. This covers the crops for which pesticide uses are authorised (see Appendix A) as well as all other crops where a background concentration of copper is expected on the basis of monitoring data and/or additional surveys (see Sections 1.2.4 and 2.3.2). The consumer exposure resulting from these MRLs was therefore calculated with consideration of residues arising from authorised uses as well as from any other sources (background concentrations, uptake from soil, etc.). It is noted that this calculation also covers residues that may be up-taken in rotational crops.

Chronic exposure calculations were performed using revision 2 of the EFSA PRIMo (EFSA, 2007). The selection of the input values followed the same rules as for the MRL proposals derived in Sections 1.2.4 and 2.3.2 (see also decision trees in Appendix E.1 and E.2). For those commodities where MRLs were derived from the authorised GAPs, input values were derived from the supporting residue trials in accordance with the standard internationally agreed methodologies (FAO, 2009). For all other commodities expect oil palm kernels, oil palm fruits and kapok, risk assessment values were derived from monitoring data and/or from background levels. For oil palm kernels, oil palm fruits and kapok, the current EU MRLs were used for an indicative calculation as no GAPs are authorised and neither monitoring data nor background levels were available for these commodities. When MRLs were derived from the monitoring data, the corresponding mean values were considered and when MRLs were derived from the background data, the respective median values were considered. The issue on whether to use the median or mean values of the background levels was discussed in the framework of the Annex I Renewal (EFSA, 2018a,c); the meeting of experts concluded that the median values

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21 See 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 15, 20.1.2010, p. 1–72.
were more relevant, especially for those small data sets where the extreme values may bias the results. Furthermore, it was also demonstrated by the RMS that considering median or mean values would not impact significantly the outcome of the calculations. This approach was followed for plant and animal commodities.

The input values correspond the residues in raw commodities expect for citrus fruits, cucurbits with inedible peel, wine grapes, rapeseed and olives for oil production where refined input values were considered based on processing factors. For citrus fruits and cucurbits with inedible peel, the relevant peeling factors were applied to only consider the edible part of these commodities (pulp). As the consumption of wine grapes refers to grape juice (children) and wine (adults), the PF derived in Section 1.2.3 could be used to refine the input values for wine grapes. It is noted that the median PF for grape juice (0.39) is higher than the PF for wine production (0.04). However, as many of the chronic diets do not distinguish between children and adults, it was preferred to use the more conservative PF (i.e. grape juice) for the refined chronic exposure. Furthermore, the consumption data of wine grapes was corrected by using the yield factor of juice (0.75). These considerations allowed EFSA to propose a refined input value for wine grapes. A similar approach was proposed for rapeseed and olives for oil production, considering the PF for oil processing (< 0.1) which was derived from studies performed on olive oil (see Section 1.2.3). For other oilseeds (e.g. sunflower seeds, soya bean, poppy seeds, etc.), the effect of oil processing was not considered in this assessment as these commodities are not exclusively used for oil production. It is highlighted that, due to the high LOQ reported in the residue trials supporting the GAPs for melons (10 mg/kg), fairly high risk assessment values were considered for this commodity. It was not possible to refine this value as there is no detailed data on the expected residue levels in this commodity. However, further refined would be possible in the future if trials performed with a lower LOQ would be provided for this crop. The detailed input values for the chronic exposure are summarised in Appendix D.2.

The exposures calculated were compared with the acceptable daily intake (ADI) for copper, derived by EFSA (2008) and confirmed in the EFSA renewal (EFSA, 2018a) under Regulation (EC) No 1107/2009. It is noted that acute exposure calculations were not carried out because an acute reference dose (ARfD) was not deemed necessary for this active substance. In this first scenario (also reported as scenario 1), the highest chronic exposure was calculated for WHO Cluster diet B, for which a chronic intake concern was identified as the highest chronic exposure represented 109% of the ADI. It is noted that for all other diets, the chronic exposures are below the ADI, ranging from 14% to 86% of the ADI.

In the present opinion, it was not possible to assess separately the exposure due to pesticide residues from the background exposure since copper concentrations assessed in the background levels and in the monitoring data may also reflect the possible uptake from soil. However, an assessment of the total background exposure to copper was performed in the context of the scientific opinion on dietary reference values for copper (EFSA NDA Panel, 2015). In this opinion, the average dietary intake of copper for different age classes, based on the nutrient composition of food items, was estimated between 11% and 66% of the ADI. This result implies that the background exposure to copper may already contribute to a significant part of the ADI. However, risk manager still have a margin to mitigate the total exposure calculated in this review.

### 3.2. Assessment of risk mitigation options

In order to assist risk managers in the view of potential risk mitigation measures, EFSA identified the main contributors to this highest chronic exposure calculated under scenario 1; these commodities are reported in Tables 4 and 5 below. For two of the most important contributors (wheat and maize), the copper levels assessed in this calculation are not associated with a pesticide use in particular as no GAPs are authorised for these commodities. The consumer intake of copper via wheat and maize is due to the background occurrence of copper in these commodities, which was already well documented in the literature (see also Section 1.2.2.2). It is acknowledged that the calculation performed under this review is not refined for cereal-based products as it does not consider the potential effect of processing on the magnitude of residues in processed commodities of cereals. However, the intake of copper through cereal commodities was also assessed in the scientific opinion of dietary reference values for copper (EFSA NDA Panel, 2015). In this opinion, detailed values for each food item of the category ‘grain and grain-based products’ were taken into account. The outcome

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22. Yield factor of 0.75, assuming that 1 kg of wine grapes produce 0.75 kg of juice.

23. The maximal average copper intake was calculated for German infants (survey VELS) and equal to 0.099 mg/ kg bw per day, corresponding to an intake of 0.495 mg per day with an average weight of 5 kg (EFSA NDA Panel, 2015).
of this calculation also indicated that grain and grain-based products were main contributors of the total intake (equivalent to 15% of the ADI). The natural content of copper in cereals, the potential uptake from soil as well as its use as a fertiliser may explain the high concentrations of copper in these crops. However, in the absence of detailed information on it, possibilities for risk mitigation measures in cereal commodities are very limited. A similar situation is identified for bovine liver, which may contain copper residues not only arising from a pesticide use in particular (see also Section 2.3) and which were also identified as important contributors to the total exposure in the scientific opinion of dietary reference values for copper (EFSA NDA Panel, 2015).

For sunflower seeds and soya bean, risk migration measures (e.g. withdrawing of the current authorisations) could be proposed. However it is not possible to quantify the effect of such a risk mitigation measure since, as no GAP-compliant trials are available, EFSA is not in position to conclude whether the residue levels observed in monitoring data and background levels are directly linked to the current authorisations or to the inherent copper concentrations in these crops. Detailed considerations for these commodities are reported in Table 4.

**Table 4:** Main contributors to the chronic exposure (with limited risk mitigation possibilities)

| Commodity         | Contribution to diet (ADI) | Input value from | Comment                                                                                                                                                                                                 |
|-------------------|---------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wheat             | 23.6%                     | Monitoring data  | Intake resulting from endogenous levels. Further refinement could be possible considering detailed copper concentrations in wheat-based processed products Risk mitigation measures are very limited since no GAP is authorised on this crop (monitoring data reflect the background levels) |
| Maize             | 6.8%                      | Background levels| Intake resulting from endogenous levels. Further refinement could be possible considering detailed copper concentrations in maize-based processed products Risk mitigation measures are very limited since no GAP is authorised on this crop |
| Bovine liver      | 4.2%                      | Monitoring data  | Intake resulting from endogenous levels Risk mitigation measures are very limited since monitoring data reflect the background levels (copper concentration in bovine liver may not only be due to pesticide residues in feed items, but also to the use as feed additive or any other source of copper feed items) |

**Main contributors with limited possibilities for efficient risk mitigation measures**

**Main contributors with possibilities for risk mitigation measures, but not quantifiable**

| Commodity         | Contribution to diet (ADI) | Input value from | Comment                                                                                                                                                                                                 |
|-------------------|---------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sunflower seed    | 9.1%                      | Monitoring data  | Intake resulting from GAP and/or endogenous levels (GAP is authorised but GAP compliant residue trials are not available). Refinement is not possible as it cannot be excluded that sunflower seed may be eaten unprocessed Impact of risk mitigation measures cannot be quantified in this absence of GAP-compliant trials |
| Soya bean         | 4.9%                      | Background levels| Intake resulting from GAP and/or endogenous levels (GAP is authorised but GAP-compliant residue trials are not available). Refinement is not possible as it cannot be excluded that soya bean are not exclusively eaten as oil Impact of risk mitigation measures cannot be quantified in this absence of GAP-compliant trials |

ADI: acceptable daily intake; GAP: Good Agricultural Practice.

(a): Percentage of ADI calculated for the most critical chronic exposure (WHO Cluster diet B).

The other main drivers of the chronic exposure reported in Table 5 (lettuce, tomatoes, wine grapes and potatoes) contribute together to 19.9% of the ADI. For these crops, several GAPs were reported and EFSA made an attempt to assess the possible impact of eventual risk mitigation measures which could be taken on these crops. For potatoes, the available data would allow deriving lower MRLs on the
basis of less critical GAP reported in this review. Proposing an MRL of 4 mg/kg\(^{24}\) (instead of 7 mg/kg) for potatoes would slightly reduce the chronic exposure (see details in Table 5). For lettuce, tomatoes and wine grapes, however, the fall-back GAPs and residue trials reported in this review do not allow to derive (lower) MRLs (see details in Section 1.2 and Appendix B.1.2.1). Therefore, for these commodities the only risk mitigation option identified would be to lower the MRL to the background levels, which could correspond to the withdrawal of the current authorisations of copper as a plant protection product. Such a decision would reduce the contribution of lettuce (from 8.2% to 0.20% ADI), tomatoes (from 5.1% to 1.5%) and of wine grapes (from 3.0% to 0.41% ADI). A theoretical exposure calculation considering all the above risk mitigation measures was performed. According to the results of this calculation, the highest chronic exposure declined to 93.4% of the ADI for WHO Cluster diet B.

Based on the same principle, further minor decreases of the chronic exposure could be obtained by withdrawing (or modifying) the current authorisations on table grapes, watermelons, spinach, melons, tropical root and tuber vegetable, peppers, fresh herbs, which individually contribute to 1–2% of the ADI.

### Table 5: Main contributors to the chronic exposure (with possible risk mitigation measures)

| Commodity      | Contribution to diet (ADI) before risk mitigation\(^{(a)}\) | Input value from | Comment                                                                 | Contribution to diet (ADI) after risk mitigation\(^{(a)}\) | Input value from |
|----------------|------------------------------------------------------------|------------------|-------------------------------------------------------------------------|------------------------------------------------------------|------------------|
| Lettuce        | 8.2% STMR (indoor)                                        |                  | Possible risk mitigation measure excluding critical GAPs authorised on lettuce (no fall-back GAP identified) | 0.20% Background levels                                  |                  |
| Tomatoes       | 5.1% STMR (outdoor)                                       |                  | Possible risk mitigation measure: excluding critical GAPs on tomatoes (no fall-back GAP identified) | 1.5% Background levels                                    |                  |
| Potatoes       | 3.6% STMR (NEU)                                           |                  | Possible risk mitigation measure: excluding the northern GAP on potatoes; a fall-back option is identified with the southern GAP (MRL of 4 mg/kg) | 2.3% STMR (SEU)                                           |                  |
| Wine grapes    | 3.0% STMR (NEU) \(\times PF \times \text{yield factor}\) |                  | Possible risk mitigation measure: excluding critical GAPs authorised on wine grapes (no fall-back GAP identified) | 0.41% Background levels \(\times PF \times \text{yield factor}\) |                  |
| **Total**      | 19.9%                                                      |                  |                                                                         | 4.4%                                                       |                  |

ADI: acceptable daily intake; STMR: supervised trials median residue; GAP: Good Agricultural Practice; NEU: northern European Union; SEU: southern European Union.

\(^{(a)}\): Percentage of ADI calculated for the most critical chronic exposure (WHO Cluster diet B).

### 3.3. Consumer exposure to copper via drinking water

In addition to food of plant and animal origin, drinking water can be another significant source of exposure to copper. As the estimation of the consumer exposure should investigate all the potential sources of exposure, assessment of the chronic exposure to copper via drinking water is considered relevant in the framework of this review.

**Occurrence data:**

In the EU, the maximum permitted concentration of copper in water intended for human consumption is 2 mg/L. However, the mineral content in drinking water is very variable. Factors such as natural mineral content, pH and a copper or non-copper plumbing system determine copper concentration in water (EFSA NDA Panel, 2015). For the purpose of the present review, RMS has reported data from measurements performed in France between 2009 and 2013. These data come

\(^{24}\) A MRL of 4 mg/kg can be derived from the southern GAP reported for potatoes (see Appendix B.1.2.1).
from ‘SISE-Eaux database’, which is managed by the French Ministry of Health. The database includes analytical results from sanitary control on the tap water from 16,300 treatment stations and 25,300 drinking water distribution units. Detailed results were reported in the evaluation of the RMS (France, 2016) as well as in the framework of the Annex I Renewal (see Table 6) (France, 2017; EFSA, 2018c). The data reported by France show a wide distribution of the concentration levels with highest values up to the legal limit of 2 mg/L or above (0.53% of the samples exceed the legal limit).

Table 6: Copper levels in tap water measured in France (2016)

| n= | Median (mg/L) | Average (mg/L) | 95th percentile (mg/L) | Source |
|----|---------------|----------------|------------------------|--------|
| 85,892 | 0.028 | 0.151 | 0.434 mg/L | SISE-Eaux database – 1/1/2009 to 31/12/2013 (France, 2016) |

Consumption data:

To assess the copper exposure from drinking water, EFSA used the default consumption values for water recommended in the European Guidance on Assessment of the Relevance of Metabolites in Groundwater of Substances Regulated under Council Directive 91/414/EEC (European Commission, 2003). Different values are considered for adults (0.03 L/kg body weight (bw) per day), children (0.10 L/kg bw per day) and infant (0.15 L/kg bw per day), corresponding to 2, 1 and 0.75 L/day, respectively.

Exposure:

Assuming that the occurrence data reported by the RMS would be representative of the concentrations expected in different MS, and assuming a conservative scenario where drinking water would exclusively correspond to tap water, the copper exposure through drinking water can be estimated according to different assumptions on the concentration (median, mean and percentile 95) and considering the respective consumption data of adults, children and infants. The results of these calculations are reported in Table 7. The calculated exposures to copper through drinking water range between 0.62% and 15.1% of the ADI when considering a median or an average concentration of copper in tap water. However, considering that local concentrations in tap water may be higher (see 95th percentile), it cannot be excluded that local exposures to tap water may be higher than these values (9.6 – 43.4% ADI).

Table 7: Copper exposure from drinking water

| Copper concentration in water | Water consumption | Exposure (% ADI) |
|------------------------------|-------------------|------------------|
| Value (mg/L) | Comment | Value (L/kg bw per day) | Comment | Value (L/kg bw per day) | Comment | Value (L/kg bw per day) | Comment | Value (L/kg bw per day) | Comment |
|----------------|---------|------------------------|---------|------------------------|---------|------------------------|---------|------------------------|---------|
| 0.028 | Median French data | 0.033 | Adults 60 kg – 2 L/day | 0.62 |
| 0.028 | Median French data | 0.100 | Child 10 kg – 1 L/day | 1.87 |
| 0.028 | Median French data | 0.150 | Infant 5 kg – 0.75 L/day | 2.80 |
| 0.151 | Mean French data | 0.033 | Adults 60 kg – 2 L/day | 3.36 |
| 0.151 | Mean French data | 0.100 | Child 10 kg – 1 L/day | 10.1 |
| 0.151 | Mean French data | 0.150 | Infant 5 kg – 0.75 L/day | 15.1 |
| 0.434 | P95 French data | 0.033 | Adults 60 kg – 2 L/day | 9.64 |
| 0.434 | P95 French data | 0.100 | Child 10 kg – 1 L/day | 28.9 |
| 0.434 | P95 French data | 0.150 | Infant 5 kg – 0.75 L/day | 43.4 |

P95: 95th percentile; bw: body weight; ADI: acceptable daily intake.

It is noted that the copper exposure from ‘water and water-based beverages’ was also calculated in the scientific opinion on dietary reference values for copper (EFSA NDA Panel, 2015). In this opinion, the group water and water-based beverages included not only tap water but also, among others, natural mineral water, bottled drinking water, soft drinks, flavoured waters. The average copper concentrations in water and water-based beverages reported from different countries were used to assess the exposure of each respective population. The outcome of this assessment was that water

25 http://social-sante.gouv.fr/sante-et-environnement/eaux/article/le-controle-de-la-qualite-de-l-eau-du-robinet
and water-based beverages may drive between 0.2% and 5.4% of the ADI, contributing for up to 12% of the total copper intake calculated in this previous opinion. These figures are considered more refined than the global assessment reported above. However, they also do not reflect the possible higher chronic exposures which may be due to local high concentration of copper in tap water.

3.4. Overall conclusion on risk assessment

Based on the above calculations, a chronic intake concern cannot be excluded when considering copper intake from food (109% ADI) plus through drinking water (3.36–15.1% in average). Furthermore, higher concentrations in tap water may locally induce higher chronic exposures in certain cases. Therefore, a risk management decision needs to be taken on which MRLs should be implemented and on the period of their applicability.

Major contributors and different options for risk mitigations measures were identified in Section 3.2. It was shown that lettuces, tomatoes, wine grapes and potatoes were the main commodities for which efficient risk mitigations measures could be possible. For potatoes, a fall-back GAP was identified and a lower MRL could be proposed. It is also highlighted that proposing a lower MRL for potatoes would also decrease the livestock dietary burden of 30% for cattle, sheep and swine (see Section 2.2.3). For lettuce, tomatoes and wine grapes, however, no fall-back GAPs were identified and lower MRLs could be derived from the background levels. Nevertheless, it is highlighted that the scenario 2 assessed by EFSA is not necessarily the only alternative to reduce the chronic exposure to copper. Other minor contributors were also identified (table grapes, watermelons, spinach, melons, tropical root and tuber vegetable, peppers, fresh herbs). For the other major contributors (wheat, maize, sunflower seed, soya bean and bovine liver), risk mitigation measures are very limited because MRL and risk assessment values derived for these commodities are not associated to an agricultural practice in particular. Consequently, lowering the MRL to LOQ for these commodities may not be applicable in practice.

Conclusions

Copper is a monoatomic element and therefore inherently stable. As no metabolites are expected, the nature of residues in primary crops, rotational crops and processed commodities as well as the storage stability are considered addressed and specific studies are not required. The relevant residue for monitoring and risk assessment was defined as total copper, including copper residues arising from all forms of copper. Analytical methods for enforcement of mineral copper independently from its chemical form are available for high water and high acid content commodities. However, these are still missing for commodities with high oil content, dry commodities as well as for any other complex matrices (hops, herbal infusions, etc.).

Due to the endogenous occurrence of copper in soil and plant commodities, MRLs were derived for all plant commodities included in the Annex I to Regulation (EC) No 396/2005.

For those commodities for which GAPs are authorised, MRL and risk assessment values were derived in accordance with the standard procedure. However, for certain commodities, the derived MRL was found to be lower than the background levels expected in the commodity itself. For these commodities and for the commodities where trials were not sufficient to derive MRLs, tentative MRLs were then derived on the basis of the monitoring data and/or background levels. For these commodities for which no GAPs are authorised, EFSA derived tentative MRLs. For those commodities for which no GAPs are authorised, EFSA derived MRLs proposals and risk assessment values on the basis of background levels. For the purpose of risk assessments, EFSA used the results of a comprehensive survey performed by the RMS. It was noted that these MRLs would also cover the possible residue uptakes that may occur in succeeding crops.

Copper compounds are used on many crops that might be fed to livestock and may also be present in feed commodities for which no GAPs are authorised. Thus, the calculated dietary burdens highly exceed the trigger value for all groups of livestock. For the same reason as reported for the nature of residues in plant commodities, the residue definition for livestock commodities can be defined as total copper for both enforcement and risk assessment without requiring further studies. This residue definition includes copper residues arising from all forms of copper. An analytical method for enforcement in livestock commodities is available but its performance characteristic should still be demonstrated.

Copper is an essential micronutrient for animals and can also be used as a feed additive. For that purpose, maximum contents of copper in feedstuffs are currently in place in the framework of the feed legislation. Since these levels are legal values which are not supposed to be exceeded, MRL and risk
assessment values were derived assuming that the current maximum contents of copper in feedstuffs are respected. As this would imply that livestock exposure to copper residues has remained constant over the last years, the monitoring data as well as the survey on background levels were considered as reliable sources to estimate MRL and risk assessment values in commodities of animal origin. When possible, MRLs were derived from monitoring data unless the background levels reported by the RMS indicated higher residues. In this latter case, MRLs were then derived from the background levels. For those commodities where no monitoring data were available, MRLs were directly derived from the background levels.

Chronic exposure calculations were performed using revision 2 of the EFSA PRIMo and were compared with the ADI for copper previously derived by EFSA (EFSA, 2008) and confirmed in the EFSA renewal (2018a) under Regulation (EC) No 1107/2009. Acute exposure calculations were not carried out because an ARfD was not deemed necessary for this active substance. A first calculation was performed considering the MRLs derived for all commodities of plant and animal origin, including the crops for which pesticide uses are authorised as well as all other crops where a significant background concentration of copper is expected. It is noted that this calculation would then cover residues arising from the authorised GAPs as well as from any other sources of residues, including among others residues from rotational crops. The highest chronic exposure was calculated for WHO Cluster diet B, for which a chronic intake concern was identified as the highest chronic exposure represented 109% of the ADI. It is noted that for all other diets, the chronic exposures were below the ADI, ranging from 14% to 86% of the ADI.

The major contributors to the calculated exposure were identified and different options for risk mitigations measures to reduce the chronic exposure were assessed by EFSA. It was shown that lettuces (8.2% ADI), tomatoes (5.1% ADI), wine grapes (3% ADI) and potatoes (3.6% ADI) were the main commodities for which efficient risk mitigations measures could be possible. For potatoes, a fall-back GAP was identified and a lower MRL could be proposed. For lettuce, tomatoes and wine grapes however, no fall-back GAPs were identified. Chronic exposures were recalculated in accordance with a second scenario where risk mitigation would be taken on the above mentioned crops. In this calculation, the highest chronic exposure declined to 93.4% of the ADI for WHO Cluster diet B. It is highlighted that this scenario is not necessarily the only alternative to reduce the chronic exposure to copper and other minor contributors were also identified. Finally, it was noted that for the most important contributors (wheat, maize, sunflower seed, soya bean and bovine liver), risk mitigation measures were very limited because MRL and risk assessment values derived for these commodities are not necessarily associated to an agricultural practice in particular. Consequently, lowering the MRL to LOQ for these commodities may not be applicable in practice.

In addition to food of plant and animal origin, an estimation of the consumer exposure that would results from copper present in drinking water was also provided. The exposures calculated with the occurrence data in tap water (reported by the RMS) and the WHO default consumption values for water indicate that copper intake through drinking water range between 0.62% and 15.1% of the ADI when considering median/average concentrations. Reference was also made to a previous assessment of EFSA where the average copper intake associated to water and water-based beverages was equivalent to 0.2 – 4.6% of the ADI. However, the above figures do not consider the possible higher chronic exposure which may be due to local high concentration of copper in tap water.

**Recommendations**

Due to the inherent content of copper observed in many plant commodities as well as in livestock commodities, MRLs were derived for almost all commodities included in the Annex I to Regulation (EC) No 396/2005. In the framework of this specific assessment, EFSA developed an ad-hoc methodology which is summarised in the decision trees reported in Appendices E.1 and E.2. MRL recommendations were derived in compliance with these decision trees (see summary Table 8). The MRL values listed as ‘Recommended’ in the table are sufficiently supported by data and are therefore proposed for inclusion in Annex II to the Regulation. The remaining MRL values listed in the table are not recommended for inclusion in Annex II because they require further consideration by risk managers (see summary table footnotes for details).

For many crops for which GAPs are authorised, some tentative MRLs and/or existing EU MRLs need to be confirmed by the following data:

- Analytical methods for enforcement in commodities with high oil content, dry commodities as well as for any other complex matrices (hops, herbal infusions, spices, etc.).
• Validation of the performance characteristic of the analytical method for enforcement in commodities of animal origin;
• Residue trials supporting the GAPs on figs, passion fruits, mangoes, cherimoyas, beans (without pods), lentils (fresh), asparagus, cardoons, beans (dry) and lentils (dry), sunflower seeds, rapeseeds, soya beans, sugar beets;
• Additional residue trials supporting the GAPs on citrus fruits, plums, kiwi fruits, carrots, beetroots, celeriacs, horseradishes, Jerusalem artichokes, parsnips, parsley roots, radishes, salsifies, swedes and turnips, cucurbits with inedible peel, head cabbages, watercress, beans (with pods) and peas (with pods), peas (without pods) and hops.

It is highlighted that some of the MRLs derived result from a GAP in one climatic zone only, whereas other GAPs reported in this review were not fully supported by data. EFSA therefore identified the following data gaps which are not expected to impact on the validity of the MRLs derived but which might have an impact on national authorisations:

• additional residue trials supporting the GAPs on almonds, chestnuts, hazelnuts, walnuts, apples, pears and quinces, apricots, cherries, jambuls/jambolans, peaches, table and wine grapes, blueberries, onions, garlic, shallots, tomatoes, aubergines, peppers, cucurbits with edible peel, lettuce and other leafy crops.

If the above reported data gaps are not addressed in the future, Member States are recommended to withdraw or modify the relevant authorisations at national level.

Minor deficiencies were also identified in the assessment but these deficiencies are not expected to impact either on the validity of the MRLs derived or on the national authorisations. The following data are therefore considered desirable but not essential:

• additional residue trials supporting the northern GAP on potatoes (one trial) and the indoor GAP on lettuce (one trial);
• Additional trials performed on turnips providing analysis on turnip tops.

Furthermore, it is highlighted that a chronic exposure concern was identified when considering copper residues associated to the MRLs derived in this opinion plus the average contributions of drinking water. Therefore, a risk management decision should be taken regarding the optional MRLs proposed for some major contributing commodities identified by EFSA: potatoes, tomatoes, lettuces and wine grapes. It is however highlighted that the risk mitigations identified by EFSA are not necessarily the only alternative to reduce the chronic exposure to copper. Other minor contributors were also identified (table grapes, watermelons, spinach, melons, tropical root and tuber vegetable, peppers, fresh herbs) and further fall-back options may be proposed by Member States. In any case, consequently to the future risk management decision on MRL values, Member States should assess the need to reconsider or withdraw their national authorisations on these crops in order to ensure compliance with the future MRLs. It is also noted that depending on the MRL proposal retained for potatoes, tomatoes, lettuce and wine grapes, some of the data gaps identified for these crops may need to be reconsidered.

Finally, it is noted that some MRLs were also proposed to accommodate with the inherent content of copper in certain plant and animal commodities. These MRLs would not be helpful to enforce misuses but risk managers may have interest to set these MRLs as it could help to monitor the consumer exposure to copper. Therefore, a risk management decision should still be taken on whether these MRLs should be taken into account and on the period of their applicability. In any case, these MRLs are proposed on a tentative basis as they may need to be updated regularly in view of the future monitoring results.
### Table 8: Summary table

| Code number | Commodity       | Existing EU MRL (mg/kg) | MRL (mg/kg) | Comment                          |
|-------------|----------------|------------------------|-------------|----------------------------------|
| 110010      | Grapefruits    | 20                     | 15          | Further consideration needed(a)  |
| 110020      | Oranges        | 20                     | 15          | Further consideration needed(a)  |
| 110030      | Lemons         | 20                     | 15          | Further consideration needed(a)  |
| 110040      | Limes          | 20                     | 15          | Further consideration needed(a)  |
| 110050      | Mandarins      | 20                     | 15          | Further consideration needed(a)  |
| 120010      | Almonds        | 30                     | 40          | Further consideration needed(a)  |
| 120020      | Brazil nuts    | 30                     | 40          | Further consideration needed(a)  |
| 120030      | Cashew nuts    | 30                     | 40          | Further consideration needed(b)  |
| 120040      | Chestnuts      | 30                     | 40          | Further consideration needed(a)  |
| 120050      | Coconuts       | 30                     | 5           | Further consideration needed(b)  |
| 120060      | Hazelnuts/cobnuts | 30                 | 40          | Further consideration needed(a)  |
| 120070      | Macadamias     | 30                     | 40          | Further consideration needed(a)  |
| 120080      | Pecans         | 30                     | 40          | Further consideration needed(a)  |
| 120090      | Pine nut kernels | 30                  | 40          | Further consideration needed(b)  |
| 120100      | Pistachios     | 30                     | 40          | Further consideration needed(a)  |
| 120110      | Walnuts        | 30                     | 40          | Further consideration needed(a)  |
| 130010      | Apples         | 5                      | 6           | Recommended(c)                  |
| 130020      | Pears          | 5                      | 6           | Recommended(c)                  |
| 130030      | Quinces        | 5                      | 6           | Recommended(c)                  |
| 130040      | Medlars        | 5                      | 6           | Recommended(c)                  |
| 130050      | Loquats/Japanese medlars | 5 | 6 | Recommended(c) |
| 140010      | Apricots       | 5                      | 3           | Recommended(c)                  |
| 140020      | Cherries (sweet) | 5                     | 10          | Recommended(c)                  |
| 140030      | Peaches        | 5                      | 8           | Recommended(c)                  |
| 140040      | Plums          | 5                      | 4           | Further consideration needed(a)  |
| 151010      | Table grapes   | 50                     | 100/2       | Further consideration needed(g)  |
| 151020      | Wine grapes    | 50                     | 100/2       | Further consideration needed(g)  |
| 152000      | Strawberries   | 5                      | 15          | Recommended(c)                  |
| 153010      | Blackberries   | 5                      | 5*          | Recommended(c)                  |
| 153020      | Dewberries     | 5                      | 5*          | Recommended(c)                  |
| 153030      | Raspberries (red and yellow) | 5 | 5* | Recommended(c) |
| 154010      | Blueberries    | 5                      | 5*          | Recommended(c)                  |
| 154020      | Cranberries    | 5                      | 5*          | Recommended(c)                  |
| 154030      | Currants (black, red and white) | 5 | 5* | Recommended(c) |
| 154040      | Gooseberries (green, red and yellow) | 5 | 5* | Recommended(c) |
| 154050      | Rose hips      | 5                      | 5*          | Recommended(c)                  |
| 154060      | Mulberries (black and white) | 5 | 5* | Recommended(c) |
| 154070      | Azaroles/Mediterranean medlars | 5 | 5* | Recommended(c) |
| 154080      | Elderberries   | 5                      | 5*          | Recommended(c)                  |
| 161010      | Dates          | 20                     | 2*          | Further consideration needed(e)  |
| 161020      | Figs           | 20                     | 30          | Further consideration needed(f)  |
| 161030      | Table olives   | 30                     | 20          | Further consideration needed(g)  |
| 161040      | Kumquats       | 20                     | 2*          | Further consideration needed(e)  |
| 161050      | Carambolas     | 20                     | 2*          | Further consideration needed(e)  |
| 161060      | Kaki/Japanese persimmons | 20 | 2* | Further consideration needed(e) |
| Code number | Commodity | Existing EU MRL (mg/kg) | MRL (mg/kg) | Outcome of the review | Comment |
|-------------|-----------|------------------------|-------------|-----------------------|---------|
| 161070      | Jambuls/jambolans | 20 | 10 | Recommended<sup>(c)</sup> | |
| 162010      | Kiwi fruits (green, red, yellow) | 20 | 30 | Further consideration needed<sup>(a)</sup> | |
| 162020      | Litchis/lychees | 20 | 2* | Further consideration needed<sup>(a)</sup> | |
| 162030      | Passion fruits/maracujas | 20 | 4 | Further consideration needed<sup>(f)</sup> | |
| 162040      | Prickly pears/cactus fruits | 20 | 2* | Further consideration needed<sup>(c)</sup> | |
| 162050      | Star apples/cainitos | 20 | 2* | Further consideration needed<sup>(c)</sup> | |
| 162060      | American persimmons/Virginia kaki | 20 | 2* | Further consideration needed<sup>(c)</sup> | |
| 163010      | Avocados | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163020      | Bananas | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163030      | Mangoes | 20 | 6 | Further consideration needed<sup>(f)</sup> | |
| 163040      | Papayas | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163050      | Granate apples/pomegranates | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163060      | Cherimoyas | 20 | 6 | Further consideration needed<sup>(f)</sup> | |
| 163070      | Guavas | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163080      | Pineapples | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163090      | Breadfruits | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163100      | Durians | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 163110      | Soursops/guanabanas | 20 | 6 | Further consideration needed<sup>(e)</sup> | |
| 211000      | Potatoes | 5 | 7/4 | Further consideration needed<sup>(d)</sup> | |
| 212010      | Cassava roots/manioc | 5 | 4 | Recommended<sup>(c)</sup> | |
| 212020      | Sweet potatoes | 5 | 4 | Recommended<sup>(c)</sup> | |
| 212030      | Yams | 5 | 4 | Recommended<sup>(c)</sup> | |
| 212040      | Arrowroots | 5 | 4 | Recommended<sup>(c)</sup> | |
| 213010      | Beetroots | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213020      | Carrots | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213030      | Celeriacs/tumip rooted celeries | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213040      | Horseradishes | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213050      | Jerusalem artichokes | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213060      | Parsnips | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213070      | Parsley roots/Hamburg roots parsley | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213080      | Radishes | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213090      | Salsifies | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213100      | Swedes/rutabagas | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 213110      | Turnips | 5 | 3 | Further consideration needed<sup>(a)</sup> | |
| 220010      | Garlic | 5 | 4 | Further consideration needed<sup>(b)</sup> | |
| 220020      | Onions | 5 | 2* | Recommended<sup>(c)</sup> | |
| 220030      | Shallots | 5 | 2* | Recommended<sup>(c)</sup> | |
| 220040      | Spring onions/green onions and Welsh onions | 5 | 70 | Recommended<sup>(c)</sup> | |
| 231010      | Tomatoes | 5 | 10/2 | Further consideration needed<sup>(d)</sup> | |
| 231020      | Sweet peppers/bell peppers | 5 | 20 | Recommended<sup>(c)</sup> | |
| 231030      | Aubergines/eggplants | 5 | 10 | Recommended<sup>(c)</sup> | |
| 231040      | Okra/lady’s fingers | 5 | 2* | Further consideration needed<sup>(c)</sup> | |
| 232010      | Cucumbers | 5 | 5 | Recommended<sup>(c)</sup> | |
| 232020      | Gherkins | 5 | 5 | Recommended<sup>(c)</sup> | |
| 232030      | Courgettes | 5 | 5 | Recommended<sup>(c)</sup> | |
| 233010      | Melons | 5 | 10 | Further consideration needed<sup>(a)</sup> | |
| 233020      | Pumpkins | 5 | 10 | Further consideration needed<sup>(a)</sup> | |
| Code number | Commodity                          | Existing EU MRL (mg/kg) | Outcome of the review | Comment          |
|-------------|-----------------------------------|-------------------------|-----------------------|------------------|
| 233030      | Watermelons                       | 5                       | 10                    | Further consideration needed (a) |
| 234000      | Sweet corn                        | 10                      | 2*                    | Further consideration needed (e) |
| 241010      | Broccoli                          | 20                      | 5                     | Recommended (c)   |
| 241020      | Cauliflowers                      | 20                      | 5                     | Recommended (c)   |
| 242010      | Brussels sprouts                  | 20                      | 2*                    | Further consideration needed (e) |
| 242020      | Head cabbages                     | 20                      | 2*                    | Further consideration needed (f) |
| 243010      | Chinese cabbages/pe-tsai          | 20                      | 3                     | Further consideration needed (e) |
| 243020      | Kales                             | 20                      | 3                     | Further consideration needed (e) |
| 244000      | Kohlrabies                        | 20                      | 3                     | Further consideration needed (e) |
| 251010      | Lamb’s lettuces/corn salads       | 100                     | 150                   | Recommended (c)   |
| 251020      | Lettuces                          | 100                     | 150/4                 | Further consideration needed (d) |
| 251030      | Escaroles/broad-leaved endives    | 100                     | 150                   | Recommended (c)   |
| 251040      | Cresses and other sprouts and shoots | 100                 | 150                   | Recommended (c)   |
| 251050      | Land cresses                      | 100                     | 150                   | Recommended (c)   |
| 251060      | Roman rocket/rucola               | 100                     | 150                   | Recommended (c)   |
| 251070      | Red mustards                      | 100                     | 150                   | Recommended (c)   |
| 251080      | Baby leaf crops (including brassica species) | 100         | 150                   | Recommended (c)   |
| 252010      | Spinaches                         | 20                      | 150                   | Recommended (c)   |
| 252020      | Purslanes                         | 20                      | 150                   | Recommended (c)   |
| 252030      | Chards/beet leaves                | 20                      | 150                   | Recommended (c)   |
| 253000      | Grape leaves and similar species  | 20                      | 5                     | Further consideration needed (e) |
| 254000      | Watercresses                      | 20                      | 150                   | Further consideration needed (e) |
| 255000      | Witloofs/Belgian endives          | 20                      | 2*                    | Further consideration needed (e) |
| 256010      | Chervil                           | 20                      | 150                   | Recommended (c)   |
| 256020      | Chives                            | 20                      | 150                   | Recommended (c)   |
| 256030      | Celery leaves                     | 20                      | 150                   | Recommended (c)   |
| 256040      | Parsley                           | 20                      | 150                   | Recommended (c)   |
| 256050      | Sage                              | 20                      | 150                   | Recommended (c)   |
| 256060      | Rosemary                          | 20                      | 150                   | Recommended (c)   |
| 256070      | Thyme                             | 20                      | 150                   | Recommended (c)   |
| 256080      | Basil and edible flowers          | 20                      | 150                   | Recommended (c)   |
| 256090      | Laurel/bay leaf                   | 20                      | 150                   | Recommended (c)   |
| 256100      | Tarragon                          | 20                      | 150                   | Recommended (c)   |
| 260010      | Beans (with pods)                 | 20                      | 10                    | Further consideration needed (a) |
| 260020      | Beans (without pods)              | 20                      | 4                     | Further consideration needed (f) |
| 260030      | Peas (with pods)                  | 20                      | 10                    | Further consideration needed (a) |
| 260040      | Peas (without pods)               | 20                      | 7                     | Further consideration needed (a) |
| 260050      | Lentils (fresh)                   | 20                      | 4                     | Further consideration needed (f) |
| 270010      | Asparagus                         | 5                       | 7                     | Further consideration needed (f) |
| 270020      | Cardoons                          | 20                      | 7                     | Further consideration needed (f) |
| 270030      | Celeries                          | 20                      | 7                     | Further consideration needed (e) |
| 270040      | Florence fennels                  | 20                      | 7                     | Further consideration needed (e) |
| 270050      | Globe artichokes                  | 20                      | 30                    | Recommended (c)   |
| 270060      | Leeks                             | 20                      | 70                    | Recommended (c)   |
| 270070      | Rhubarbs                          | 20                      | 7                     | Further consideration needed (e) |
| 270080      | Bamboo shoots                     | 20                      | 7                     | Further consideration needed (e) |
| 270090      | Palm hearts                       | 20                      | 7                     | Further consideration needed (e) |
| Code number | Commodity                        | Existing EU MRL (mg/kg) | Outcome of the review | Comment        |
|-------------|----------------------------------|-------------------------|-----------------------|----------------|
| 280010      | Cultivated fungi                | 20                      | 6                     | Further consideration needed (e) |
| 280020      | Wild fungi                       | 20                      | 6                     | Further consideration needed (e) |
| 290000      | Algae and prokaryotes organisms | 20                      | 3                     | Further consideration needed (e) |
| 300010      | Beans (dry)                      | 20                      | 15                    | Further consideration needed (f) |
| 300020      | Lentils (dry)                    | 20                      | 15                    | Further consideration needed (f) |
| 300030      | Peas (dry)                       | 20                      | 15                    | Further consideration needed (f) |
| 300040      | Lupins/lupini beans (dry)       | 20                      | 15                    | Further consideration needed (f) |
| 401010      | Linseeds                         | 30                      | 30                    | Further consideration needed (g) |
| 401020      | Peanuts/groundnuts               | 30                      | 30                    | Further consideration needed (g) |
| 401030      | Poppy seeds                      | 30                      | 30                    | Further consideration needed (g) |
| 401040      | Sesame seeds                     | 30                      | 30                    | Further consideration needed (g) |
| 401050      | Sunflower seeds                  | 40                      | 30                    | Further consideration needed (g) |
| 401060      | Rapeseeds/canola seeds           | 30                      | 30                    | Further consideration needed (g) |
| 401070      | Soya beans                       | 40                      | 30                    | Further consideration needed (g) |
| 401080      | Mustard seeds                    | 30                      | 30                    | Further consideration needed (g) |
| 401090      | Cotton seeds                     | 30                      | 30                    | Further consideration needed (g) |
| 401100      | Pumpkin seeds                    | 30                      | 30                    | Further consideration needed (g) |
| 401110      | Safflower seeds                  | 30                      | 30                    | Further consideration needed (g) |
| 401120      | Borage seeds                     | 30                      | 30                    | Further consideration needed (g) |
| 401130      | Gold of pleasure seeds           | 30                      | 30                    | Further consideration needed (g) |
| 401140      | Hemp seeds                       | 30                      | 30                    | Further consideration needed (g) |
| 401150      | Castor beans                     | 30                      | 30                    | Further consideration needed (g) |
| 402010      | Olives for oil production        | 30                      | 20                    | Further consideration needed (g) |
| 402020      | Oil palms kernels                | 30                      | 30                    | Further consideration needed (g) |
| 402030      | Oil palms fruits                 | 30                      | 30                    | Further consideration needed (g) |
| 402040      | Kapok                             | 30                      | 30                    | Further consideration needed (g) |
| 500010      | Barley grains                    | 10                      | 10                    | Further consideration needed (e) |
| 500020      | Buckwheat and other pseudo-cereal grains | 10          | 15                    | Further consideration needed (e) |
| 500030      | Maize/corn grains                | 10                      | 10                    | Further consideration needed (e) |
| 500040      | Common millet/proso millet grains | 10                     | 10                    | Further consideration needed (e) |
| 500050      | Oat grains                       | 10                      | 10                    | Further consideration needed (e) |
| 500060      | Rice grains                      | 10                      | 10                    | Further consideration needed (e) |
| 500070      | Rye grains                       | 10                      | 10                    | Further consideration needed (e) |
| 500080      | Sorghum grains                   | 10                      | 10                    | Further consideration needed (e) |
| 500090      | Wheat grains                     | 10                      | 10                    | Further consideration needed (e) |
| 610000      | Teas                             | 40                      | 30                    | Further consideration needed (e) |
| 620000      | Coffee beans                     | 50                      | 20                    | Further consideration needed (e) |
| 631000      | Herbal infusions from flowers    | 100                     | 5*                    | Further consideration needed (e) |
| 632000      | Herbal infusions from leaves and herbs | 100             | 5*                    | Further consideration needed (e) |
| 633000      | Herbal infusions from roots      | 100                     | 5*                    | Further consideration needed (e) |
| 640000      | Cocoa beans                      | 50                      | 5*                    | Further consideration needed (e) |
| 650000      | Carobs/Saint John’s breads       | 20                      | 6                     | Further consideration needed (e) |
| 700000      | Hops                             | 1000                    | 1500                  | Further consideration needed (e) |
| 810000      | Seed spices                      | 40                      | 15                    | Further consideration needed (e) |
| 820000      | Fruit spices                     | 40                      | 15                    | Further consideration needed (e) |
| 830000      | Bark spices                      | 40                      | 5*                    | Further consideration needed (e) |
| 840000      | Root and rhizome spices          | 40                      | 5*                    | Further consideration needed (e) |
| Code number | Commodity               | Existing EU MRL (mg/kg) | Outcome of the review |
|------------|-------------------------|-------------------------|-----------------------|
| 850000     | Bud spices              | 40                      | MRL (mg/kg) 5*        | Further consideration needed<sup>(e)</sup> |
| 860000     | Flower pistil spices    | 40                      | MRL (mg/kg) 5*        | Further consideration needed<sup>(e)</sup> |
| 870000     | Aril spices             | 40                      | MRL (mg/kg) 30        | Further consideration needed<sup>(e)</sup> |
| 900010     | Sugar beet roots        | 5                       | MRL (mg/kg) 2*        | Further consideration needed<sup>(e)</sup> |
| 900020     | Sugar canes             | 5                       | MRL (mg/kg) 2*        | Further consideration needed<sup>(e)</sup> |
| 900030     | Chicory roots           | 5                       | MRL (mg/kg) 2*        | Further consideration needed<sup>(e)</sup> |
| 1011010    | Swine muscle            | 5                       | MRL (mg/kg) 7         | Further consideration needed<sup>(i)</sup> |
| 1011020    | Swine fat tissue        | 5                       | MRL (mg/kg) 2         | Further consideration needed<sup>(i)</sup> |
| 1011030    | Swine liver             | 30                      | MRL (mg/kg) 90        | Further consideration needed<sup>(i)</sup> |
| 1011040    | Swine kidney            | 30                      | MRL (mg/kg) 10        | Further consideration needed<sup>(i)</sup> |
| 1012010    | Bovine muscle           | 5                       | MRL (mg/kg) 3         | Further consideration needed<sup>(i)</sup> |
| 1012020    | Bovine fat tissue       | 5                       | MRL (mg/kg) 0.6*      | Further consideration needed<sup>(i)</sup> |
| 1012030    | Bovine liver            | 30                      | MRL (mg/kg) 400       | Further consideration needed<sup>(k)</sup> |
| 1012040    | Bovine kidney           | 30                      | MRL (mg/kg) 10        | Further consideration needed<sup>(i)</sup> |
| 1013010    | Sheep muscle            | 5                       | MRL (mg/kg) 3         | Further consideration needed<sup>(i)</sup> |
| 1013020    | Sheep fat tissue        | 5                       | MRL (mg/kg) 0.6*      | Further consideration needed<sup>(i)</sup> |
| 1013030    | Sheep liver             | 30                      | MRL (mg/kg) 150       | Further consideration needed<sup>(i)</sup> |
| 1013040    | Sheep kidney            | 30                      | MRL (mg/kg) 6         | Further consideration needed<sup>(i)</sup> |
| 1014010    | Goat muscle             | 5                       | MRL (mg/kg) 3         | Further consideration needed<sup>(i)</sup> |
| 1014020    | Goat fat tissue         | 5                       | MRL (mg/kg) 0.6*      | Further consideration needed<sup>(i)</sup> |
| 1014030    | Goat liver              | 30                      | MRL (mg/kg) 150       | Further consideration needed<sup>(i)</sup> |
| 1014040    | Goat kidney             | 30                      | MRL (mg/kg) 6         | Further consideration needed<sup>(i)</sup> |
| 1015010    | Equine muscle           | 5                       | MRL (mg/kg) 3         | Further consideration needed<sup>(i)</sup> |
| 1015020    | Equine fat tissue       | 5                       | MRL (mg/kg) 0.6*      | Further consideration needed<sup>(i)</sup> |
| 1015030    | Equine liver            | 30                      | MRL (mg/kg) 400       | Further consideration needed<sup>(i)</sup> |
| 1015040    | Equine kidney           | 30                      | MRL (mg/kg) 10        | Further consideration needed<sup>(i)</sup> |
| 1016010    | Poultry muscle          | 5                       | MRL (mg/kg) 7         | Further consideration needed<sup>(i)</sup> |
| 1016020    | Poultry fat tissue      | 5                       | MRL (mg/kg) 1*        | Further consideration needed<sup>(i)</sup> |
| 1016030    | Poultry liver           | 30                      | MRL (mg/kg) 80        | Further consideration needed<sup>(i)</sup> |
| 1020010    | Cattle milk             | 2                       | MRL (mg/kg) 1*        | Further consideration needed<sup>(i)</sup> |
| 1020020    | Sheep milk              | 2                       | MRL (mg/kg) 1*        | Further consideration needed<sup>(i)</sup> |
| 1020030    | Goat milk               | 2                       | MRL (mg/kg) 1*        | Further consideration needed<sup>(i)</sup> |
| 1020040    | Horse milk              | 2                       | MRL (mg/kg) 1*        | Further consideration needed<sup>(i)</sup> |
| 1030000    | Birds eggs              | 2                       | MRL (mg/kg) 1*        | Further consideration needed<sup>(i)</sup> |
| 1070000    | Other terrestrial animal products | 0.01*               | MRL (mg/kg) 3         | Further consideration needed<sup>(i)</sup> |

**MRL**: maximum residue level.

*Indicates that the MRL is set at the limit of quantification.

(a): Tentative MRL is derived from a GAP evaluated at EU level, which is not fully supported by data but for which no risk to consumers was identified; no CXL is available (case A2 in the decision tree reported in Appendix E.1).

(b): Tentative MRL is derived from monitoring data and/or background levels; GAP evaluated as EU level is expected to lead to lower residues compared to endogenous levels; no risk to consumers was identified; no CXL is available (case B in the decision tree reported in Appendix E.1).

(c): MRL is derived from a GAP evaluated at EU level, which is fully supported by data and for which no risk to consumers is identified; no CXL is available (case A1 in the decision tree reported in Appendix E.1).

(d): GAP evaluated at EU level is fully supported by data but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available. A lower MRL derived from a fallback GAP or from the background levels may be considered (equivalent to cases A1/A2 or D1 in the decision tree reported in Appendix E.1).

(e): There are no relevant authorisations or import tolerances reported at EU level but tentative MRL is derived from background levels, for which no risk to consumers is identified; no CXL is available (cases D1 and D2 in the decision tree reported in Appendix E.1).
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(f): Tentative MRL is derived from monitoring data and/or background levels; GAP evaluated at EU level is not supported by data; no risk to consumers was identified; no CXL is available (case C in the decision tree reported in Appendix E.1).

(g): GAP evaluated at EU level is not supported by data; a tentative MRL can be derived from monitoring data and/or background levels but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available (equivalent to case C in the decision tree reported in Appendix E.1).

(h): There are no relevant authorisations or import tolerances reported at EU level but no risk to consumers was identified for the existing EU MRL; no CXL is available (case E in the decision tree reported in Appendix E.1).

(i): There are no relevant authorisations or import tolerances reported at EU level; tentative MRL can be derived from background levels but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available (equivalent to cases D1/D2 in the decision tree reported in Appendix E.1).

(j): Tentative MRL is derived from monitoring data and/or background levels for all food commodities of animal origin; no risk to consumers was identified for this commodity; no CXL is available (case F in the decision tree reported in Appendix E.2).

(k): Tentative MRL can be derived from monitoring data and/or background levels for all food commodities of animal origin but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available (equivalent to case F in the decision tree reported in Appendix E.2).

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Abbreviations

| Abbreviation | Description |
|--------------|-------------|
| AAS          | atomic Absorption Spectrometry |
| ADI          | acceptable daily intake |
| a.i.         | active ingredient |
| ARfD         | acute reference dose |
| a.s.         | active substance |
| BBCH         | growth stages of mono- and dicotyledonous plants |
| bw           | body weight |
| cGAP         | critical GAP |
| CXL          | codex maximum residue limit |
| DAT          | days after treatment |
| DB           | dietary burden |
| DM           | dry matter |
| DS           | powder for dry seed treatment |
| DT90         | period required for 90% dissipation (define method of estimation) |
| EMS          | evaluating Member State |
| FAO          | Food and Agriculture Organization of the United Nations |
| FEEDAP       | EFSA Scientific Panel on Additives and Products or Substances used in Animal Feed |
| GAP          | Good Agricultural Practice |
| HR           | highest residue |
| IEDI         | international estimated daily intake |
| IESTI        | international estimated short-term intake |
| ILV          | independent laboratory validation |
| ISO          | International Organisation for Standardization |
| IUPAC        | International Union of Pure and Applied Chemistry |
| LOQ          | limit of quantification |
| MRL          | maximum residue level |
| MS           | Member States |
| NEU          | northern European Union |
| NDA          | EFSA Panel on Dietetic Products, Nutrition and Allergies |
| OECD         | Organisation for Economic Co-operation and Development |
| PBI          | plant-back interval |
| PF           | processing factor |
| PHI          | preharvest interval |
| PRImo        | (EFSA) Pesticide Residues Intake Model |
| PROFile      | (EFSA) Pesticide Residues Overview File |
| RA           | risk assessment |
| RAC          | raw agricultural commodity |
| RD           | residue definition |
| RMS          | rapporteur Member State |
| SANCO        | Directorate-General for Health and Consumers |
| SC           | suspension concentrate |
| SEU          | southern European Union |
| ST           | water-soluble tablet |
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STMR  supervised trials median residue
WG  water-dispersible granule
WHO  World Health Organization
WP  wettable powder
### Appendix A – Summary of authorised uses considered for the review of MRL

#### A.1. Authorised uses in northern outdoor EU

| Crop and/or situation | NEU, SEU, MS or country | F G or T(a) | Pests or Group of pests controlled | Preparation | Method | Type(b) | Conc. a.s. | Method kind | Range of growth stages & season(c) | Number min-max | Interval between application (min) | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|------------|------------------------------------|-------------|--------|---------|-----------|----------|-----------------------------|---------|-----------------------------|-----------------------------|----------|---------|
| Almonds               | HU                      | F          | Bacteria, fungus                   | WG          | Foliar treatment – spraying | 500 g/kg   | Foliar treatment – spraying | –        | 3               | 7               | –             | 1.5 kg a.i./ha              | 21      | –       |
| Chestnuts             | HU                      | F          | Bacteria, fungus                   | WG          | Foliar treatment – spraying | 500 g/kg   | Foliar treatment – spraying | –        | 3               | 7               | –             | 1.5 kg a.i./ha              | 21      | –       |
| Hazelnuts             | HU                      | F          | Bacteria, fungus                   | WG          | Foliar treatment – spraying | 500 g/kg   | Foliar treatment – spraying | –        | 3               | 7               | –             | 1.5 kg a.i./ha              | 21      | –       |
| Walnuts               | DE                      | F          | Xanthomonas juglandis              | SC          | Foliar treatment – spraying | 200 g/L   | Foliar treatment – spraying | 1–87     | 3               | 7               | –             | 1.05 kg a.i./ha             | 14      | –       |
| Apples                | DE                      | F          | Venturia spp.                      | SC          | Foliar treatment – spraying | 200 g/L   | Foliar treatment – spraying | –        | 8               | 14              | –             | 0.375 kg a.i./ha            | 14      | –       |
| Pears                 | DE                      | F          | Venturia spp.                      | SC          | Foliar treatment – spraying | 200 g/L   | Foliar treatment – spraying | –        | 8               | 14              | –             | 0.375 kg a.i./ha            | 14      | –       |
| Quinces               | DE                      | F          | Venturia spp.                      | SC          | Foliar treatment – spraying | 200 g/L   | Foliar treatment – spraying | –        | 8               | 14              | –             | 0.375 kg a.i./ha            | 14      | –       |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|-----------------------------------|-------------|------------|-------------------------------|-----------|--------|
|                       |                         |                                    | Type(b)     | Conc. a.s. | Method kind                   | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL min-max | Water L/ha min-max | Rate & Unit | Remarks |
| Apricots              | FR, HU, DE              | Taphrina, Monilia, Coryneum, Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | – –         | Foliar treatment – spraying | 95–53 | 3 | 14 | – – | 1.2 kg a.i./ha | n.a. | Pre-flowering: no treatment between BBCH 53 and harvest. |
| Cherries              | FR                      | Bacteria                          | – –         | Foliar treatment – spraying | 73–85 | 3 | 14 | – – | 0.8 kg a.i./ha | 21 | – |
| Peaches               | HU                      | Bacteria, fungus                  | WG          | 350 g/kg | Foliar treatment – spraying | 85 | 3 | 7 | – – | 1 kg a.i./ha | 21 | – |
| Plums                 | CZ                      | Taphrina pruni                    | WP          | 840 g/kg | Foliar treatment – spraying | 1–7 | – | – | – – | 3 kg a.i./ha | n.a. | Pre-flowering |
| Table grapes          | FR                      | Bacteria, Plasmopara viticola, Elsinoe ampelina, Anthracnose | – –         | Foliar treatment – spraying | 15–91 | 4 | 7 | – – | 2 kg a.i./ha | 21 | BBCH 15–81 & 91 CZ GAP with PHI 7 is not supported by data. |
| Wine grapes           | FR, AT                  | Bacteria, Plasmopara viticola, Elsinoe ampelina, Anthracnose | – –         | Foliar treatment – spraying | 15–91 | 4 | 7 | – – | 2 kg a.i./ha | 21 | BBCH 15–81 & 91 CZ GAP with application rate 25 kg as/ha; PHI 35 is not supported by data. |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | Remarks |
|-----------------------|--------------------------|------------------------------------|-------------|------------|-----------------------------|---------|
|                       |                          |                                    |             |            | Type(b) | Conc. a.s. | Method kind | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL min-max | Water L/ha min-max | Rate & Unit | PHI (days) |                      |
| Strawberries          | FR, HU                   | Mycosphaerella, Bacteria, Colletotrichum | –            | Foliar treatment – spraying | 13–85    | 4        | 7          | –           | –            | 0.8 kg a.i./ha | n.a.                  | 3         | –          |                      |
| Blackberries          | FR, HU, DE               | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –            | Foliar treatment – spraying | 13–57    | 2        | 7          | –           | –            | 1.2 kg a.i./ha | n.a.                  | Pre-flowering |          |                      |
| Dewberries            | FR, HU                   | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –            | Foliar treatment – spraying | 13–57    | 2        | 7          | –           | –            | 1.2 kg a.i./ha | n.a.                  | Pre-flowering |          |                      |
| Raspberries           | FR, HU, DE               | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –            | Foliar treatment – spraying | 13–57    | 2        | 7          | –           | –            | 1.2 kg a.i./ha | n.a.                  | Pre-flowering |          |                      |
| Blueberries           | FR, HU, DE               | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –            | Foliar treatment – spraying | 13–57    | 2        | 7          | –           | –            | 1.2 kg a.i./ha | n.a.                  | Pre-flowering |          |                      |
| Crop and/or situation | NEU, SEU, MS or country | FG or T(1) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|--------------------------|------------|-----------------------------------|-------------|------------|-------------------------------|------------|---------|
|                       |                          |            |                                    | Type(b)     | Conc. a.s. | Method kind                    | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL min-max | Water L/ha min-max | Rate & Unit | Remarks |
| Cranberries           | FR, HU, DE               | F          | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –           | –         | Foliar treatment – spraying    | 13–57     | 2   | 7   | –   | –   | 1.2 kg a.i./ha | n.a. | Pre-flowering |
| Currants              | FR, HU, DE               | F          | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –           | –         | Foliar treatment – spraying    | 13–57     | 2   | 7   | –   | –   | 1.2 kg a.i./ha | n.a. | Pre-flowering |
| Gooseberries          | FR, HU, DE               | F          | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –           | –         | Foliar treatment – spraying    | 13–57     | 2   | 7   | –   | –   | 1.2 kg a.i./ha | n.a. | Pre-flowering |
| Rose hips             | FR, DE                   | F          | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –           | –         | Foliar treatment – spraying    | 13–57     | 2   | 7   | –   | –   | 1.2 kg a.i./ha | n.a. | Pre-flowering |
| Mulberries            | FR, DE                   | F          | Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | –           | –         | Foliar treatment – spraying    | 13–57     | 2   | 7   | –   | –   | 1.2 kg a.i./ha | n.a. | Pre-flowering |
| Crop and/or situation | NEU, SEU, MS or country | F or G or T | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|-------------------------|-------------|-----------------------------------|-------------|------------|--------------------------------|
|                       |                         |             |                                   | Type(b)     | Conc. a.s. | Method kind                     |
|                       |                         |             |                                   | PHI (days)(d) |           |                                  |
|                       |                         |             |                                   | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL min-max | Water L/ha min-max | Rate & Unit | Remarks |
| Azaroles              | FR, DE                  | F           | Pseudomonas, Stigmnia carpophila, Blumeriella, Bacteria, Leucostoma | –           | –         | Foliar treatment – spraying     | 13–57             | 2          | 7        | –         | –            | 1.2 kg a.i./ha | n.a. | Pre-flowering |
| Elderberries          | FR, HU, DE              | F           | Pseudomonas, Stigmnia carpophila, Blumeriella, Bacteria, Leucostoma | –           | –         | Foliar treatment – spraying     | 13–57             | 2          | 7        | –         | –            | 1.2 kg a.i./ha | n.a. | Pre-flowering |
| Jambuls               | FR                      | F           | Bacteria                          | –           | –         | Foliar treatment – spraying     | 73–85             | 3          | 14       | –         | –            | 0.8 kg a.i./ha | 21   | –                                    |
| Potatoes              | DE                      | F           | Phytophthora infestans            | WP          | 537 g/kg | Foliar treatment – spraying     | 37–91             | 4          | 7        | –         | –            | 0.7 kg a.i./ha | 14   | –                                    |
| Beetroots             | FR                      | F           | Alternaria, Cercospora, bacterial diseases | –           | –         | Foliar treatment – spraying     | 15–47             | 4          | 7        | –         | –            | 1.2 kg a.i./ha | 14   | –                                    |
| Carrots               | FR, HU                  | F           | Alternaria, Cercospora, bacterial diseases | –           | –         | Foliar treatment – spraying     | 15–47             | 4          | 7        | –         | –            | 1.2 kg a.i./ha | 14   | –                                    |
| Celeriacs             | FR, HU, DE              | F           | Alternaria, Cercospora, bacterial diseases | –           | –         | Foliar treatment – spraying     | 15–47             | 4          | 7        | –         | –            | 1.2 kg a.i./ha | 14   | –                                    |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation Type(b) | Conc. a.s. | Method kind | Application Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hl min-max | Water L/ha min-max | Rate & Unit | PHI (days) | Remarks |
|-----------------------|--------------------------|-----------------------------------|---------------------|-----------|------------|-----------------------------------------------|----------------|-------------------------------|-----------------|----------------|-------------|-----------|---------|
| Horseradishes         | FR                       | F                                  | Alternaria, Cercospora, bacterial diseases | – –       | Foliar treatment – spraying | 15–47 | 4 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Jerusalem artichokes   | FR                       | F                                  | Alternaria, Cercospora, bacterial diseases | – –       | Foliar treatment – spraying | 15–47 | 4 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Parsnips              | FR                       | F                                  | Alternaria, Cercospora, bacterial diseases | – –       | Foliar treatment – spraying | 15–47 | 4 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Parsley roots         | FR, HU                   | F                                  | Alternaria, Cercospora, bacterial diseases | – –       | Foliar treatment – spraying | 15–47 | 4 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Radishes              | FR                       | F                                  | Alternaria, Cercospora, bacterial diseases | – –       | Foliar treatment – spraying | 15–47 | 4 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Salsifies             | FR                       | F                                  | Alternaria, Cercospora, bacterial diseases | – –       | Foliar treatment – spraying | 15–47 | 4 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Swedes                | FR                       | F                                  | Alternaria, Cercospora, bacterial diseases | – –       | Foliar treatment – spraying | 15–47 | 4 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Crop and/or situation | NEU, SEU, MS or country | F or G or T\(^{(1)}\) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|-------------------------|-----------------|---------------------------------|-------------|-----------------------------|------------------------------|
|                       |                         |                 |                                 | Type\(^{(b)}\) | Conc. a.s. | Method kind | Range of growth stages & season\(^{(c)}\) | Number min-max | Interval between application (min) | g a.s./ha min-max | Water L/ha min-max | Rate & Unit | PHI (days) \(^{(d)}\) | Remarks |
| Turnips               | FR                      | F               | Alternaria, Cercospora, bacterial diseases | – – | Foliar treatment – spraying | 15-47 | 4 | 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Garlic                | FR                      | F               | Alternaria, Anthracnose, Bacteria, Peronospora destructor, Stemphylium | – – | Foliar treatment – spraying | 14-47 | 4 | 7 | – – | 0.8 kg a.i./ha | 3 | – |
| Onions                | FR                      | F               | Alternaria, Anthracnose, Bacteria, Peronospora destructor, Stemphylium | – – | Foliar treatment – spraying | 14-47 | 4 | 7 | – – | 0.8 kg a.i./ha | 3 | – |
| Shallots              | FR                      | F               | Alternaria, Anthracnose, Bacteria, Peronospora destructor, Stemphylium | – – | Foliar treatment – spraying | 14-47 | 4 | 7 | – – | 0.8 kg a.i./ha | 3 | – |
| Tomatoes              | FR, HU                  | F               | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | – – | Foliar treatment – spraying | 15-89 | 6 | 7 | – – | 1.25 kg a.i./ha | 3 | – |
| Sweet peppers        | FR                      | F               | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | – – | Foliar treatment – spraying | 15-89 | 4 | 7 | – – | 0.8 kg a.i./ha | 3 | – |
| Crop and/or situation | NEU, SEU, MS or country | F G or T(a) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|------------------------|------------|-------------------------------------|-------------|------------|-------------------------------|-----------|--------|
|                       |                        |            |                                     | Type(b)     | Conc. a.s.| Method kind                  | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL min-max | Rate & Unit | Remarks |
| Aubergines            | FR, HU                 | F          | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | –           | –         | Foliar treatment – spraying | 15-89 | 6 | 7 | – | – | 1.25 kg a.i./ha | 3 | – |
| Cucumbers             | FR                     | F          | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89 | 5 | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Gherkins              | FR                     | F          | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89 | 5 | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Courgettes            | FR, DE                 | F          | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89 | 5 | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Melons                | HU                     | F          | Bacteria, fungus | WP 500 g/kg | Foliar treatment – spraying | – | 2-3 | 10 | – | – | 1.125 kg a.i./ha | 21 | – |
| Pumpkins              | HU                     | F          | Bacteria, fungus | WP 500 g/kg | Foliar treatment – spraying | – | 2-3 | 10 | – | – | 1.125 kg a.i./ha | 21 | – |
| Watermelons           | HU                     | F          | Bacteria, fungus | WP 500 g/kg | Foliar treatment – spraying | – | 2-3 | 10 | – | – | 1.125 kg a.i./ha | 21 | – |
### Crop and/or situation, NEU, SEU, MS or country, FG or T, Pests or Group of pests controlled

| Crop and/or situation | NEU, SEU, MS or country | FG or T | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|---------|------------------------------------|-------------|-------------|---------------------------------|-----------|---------|
|                       |                         |         |                                    | Type(b)     | Conc. a.s.  | Method kind                      | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL min-max | Water L/ha min-max | Rate & Unit | Remarks |
| Head cabbages         | DE                      | F       | Alternaria brassicae               | SC          | 200 g/L    | Foliar treatment – spraying      | 13        | 4       | 7       | –         | –         | 0.5 kg a.i./ha | 7 | –       |
| Lamb’s lettuces       | DE, FR                  | F       | Bremia, Alternaria, bacterial diseases | –          | –          | Foliar treatment – spraying      | 12–49    | 4       | 7       | –         | –         | 0.8 kg a.i./ha | 7 | –       |
| Lettuces              | FR                      | F       | Bremia, Alternaria, bacterial diseases | –          | –          | Foliar treatment – spraying      | 12–49    | 4       | 7       | –         | –         | 0.8 kg a.i./ha | 7 | –       |
| Escaroles             | FR                      | F       | Bremia, Alternaria, bacterial diseases | –          | –          | Foliar treatment – spraying      | 12–49    | 4       | 7       | –         | –         | 0.8 kg a.i./ha | 7 | –       |
| Cresses               | FR                      | F       | Bremia, Alternaria, bacterial diseases | –          | –          | Foliar treatment – spraying      | 12–49    | 4       | 7       | –         | –         | 0.8 kg a.i./ha | 7 | –       |
| Land cresses          | FR                      | F       | Bremia, Alternaria, bacterial diseases | –          | –          | Foliar treatment – spraying      | 12–49    | 4       | 7       | –         | –         | 0.8 kg a.i./ha | 7 | –       |
| Roman rocket          | FR                      | F       | Bremia, Alternaria, bacterial diseases | –          | –          | Foliar treatment – spraying      | 12–49    | 4       | 7       | –         | –         | 0.8 kg a.i./ha | 7 | –       |
| Red mustards          | FR                      | F       | Bremia, Alternaria, bacterial diseases | –          | –          | Foliar treatment – spraying      | 12–49    | 4       | 7       | –         | –         | 0.8 kg a.i./ha | 7 | –       |
### Table: Review of the existing MRLs for copper compounds

| Crop and/or situation | NEU, SEU, MS or country | F G or T(1) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|-------------|-----------------------------------|-------------|-------------|-------------------------------|------------|---------|
|                       |                         |             |                                   | Type(b)     | Conc. a.s.  | Method kind                    | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./ha min-max | Water L/ha min-max | Rate & Unit |                   |          |
| Baby leaf crops       | FR                      | F           | Bremia, Alternaria, bacterial diseases | –           | –           | Foliar treatment – spraying    | 12–49      | 4    | 7                        | –         | –                 | 0.8 kg a.i./ha | 7          | –            |
| Spinaches             | FR, HU                  | F           | Bremia, Alternaria, bacterial diseases | –           | –           | Foliar treatment – spraying    | 12–49      | 4    | 7                        | –         | –                 | 0.8 kg a.i./ha | 7          | –            |
| Purslanes             | FR                      | F           | Bremia, Alternaria, bacterial diseases | –           | –           | Foliar treatment – spraying    | 12–49      | 4    | 7                        | –         | –                 | 0.8 kg a.i./ha | 7          | –            |
| Chards                | FR                      | F           | Bremia, Alternaria, bacterial diseases | –           | –           | Foliar treatment – spraying    | 12–49      | 4    | 7                        | –         | –                 | 0.8 kg a.i./ha | 7          | –            |
| Chervil               | FR                      | F           | Bremia, Alternaria, bacterial diseases | –           | –           | Foliar treatment – spraying    | 12–49      | 4    | 7                        | –         | –                 | 0.8 kg a.i./ha | 7          | –            |
| Chives                | FR                      | F           | Bremia, Alternaria, bacterial diseases | –           | –           | Foliar treatment – spraying    | 12–49      | 4    | 7                        | –         | –                 | 0.8 kg a.i./ha | 7          | –            |
| Celery leaves         | FR                      | F           | Bremia, Alternaria, bacterial diseases | –           | –           | Foliar treatment – spraying    | 12–49      | 4    | 7                        | –         | –                 | 0.8 kg a.i./ha | 7          | –            |
| Crop and/or situation | NEU, SEU, MS or country | F G or 1(a) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|-------------------------|-------------|----------------------------------|-------------|------------|-------------------------------|
|                       |                         |             |                                  | Type(b) Conc. a.s. Method kind | Range of growth stages & season(c) Number min-max | Interval between application (min) g a.s./hL min-max | Water L/ha min-max | Rate & Unit (d) | Remarks |
| Parsley               | FR                      | F           | *Bremia,* Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 4 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Sage                  | FR                      | F           | *Bremia,* Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 4 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Rosemary              | FR                      | F           | *Bremia,* Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 4 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Thyme                 | FR                      | F           | *Bremia,* Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 4 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Basil                 | FR                      | F           | *Bremia,* Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 4 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Laurel                | FR                      | F           | *Bremia,* Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 4 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Tarragon              | FR                      | F           | *Bremia,* Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 4 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Crop and/or situation | NEU, SEU, MS or | F G or I(a) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|-----------------|-------------|------------------------------------|-------------|-------------|---------------------------------|
|                       | country         |             |                                    | Type(b)     | Conc. a.s.  | Method kind                      | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL min-max | Water L/ha min-max | Rate & Unit | PHI (days) | Remarks |
| Beans (with pods)     | FR F            | – –         | Foliar treatment – spraying        | 61–78       | 4           | 7 – – – –                           | 0.8 kg a.i./ha                    | 3 –           |
| Peas (with pods)      | FR F            | – –         | Foliar treatment – spraying        | 61–78       | 4           | 7 – – – –                           | 0.8 kg a.i./ha                    | 3 –           |
| Peas (without pods)   | FR F            | – –         | Foliar treatment – spraying        | 61–78       | 4           | 7 – – – –                           | 0.8 kg a.i./ha                    | 3 –           |
| Hops                  | CZ F            | WP 840 g/kg | Foliar treatment – spraying        | –           | 5           | 7 – – – –                           | 3.8 kg a.i./ha                    | 7 –           |
| Sugar beets           | FR, HU F        | Cercospora  | Foliar treatment – spraying        | 39–49       | 4           | 14 – – – –                          | 1.2 kg a.i./ha                    | 14 –          |

NEU: northern European Union; SEU: southern European Union; MS: Member State; MRL: maximum residue level; a.s.: active substance; a.i.: active ingredient; WG: water-dispersible granule; SC: suspension concentrate; GAP: Good Agricultural Practice; WP: wettable powder.

(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).
(b): CropLife International Technical Monograph no 2, 6th Edition. Revised May 2008. Catalogue of pesticide.
(c): Growth stage range from first to last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including, where relevant, information on season at time of application.
(d): PHI: minimum pre-harvest interval.
## A.2. Authorised uses in southern outdoor EU

| Crop and/or situation | NEU, SEU, MS or country | FG or Y(2) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|------------|------------------------------------|-------------|------------|--------------------------------|-----------|---------|
|                       |                         |            |                                    | Type(2) | Conc. a.s. | Method kind | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hl min-max | Water L/ha min-max | Rate & Unit | |
| Grapefruits FR        | F                       | F          | **Phytophthora citricola,** Pseudomonas syringae, Alternaria citricola | –        | –         | Foliar treatment – spraying | 15–89     | 3        | 30     | –       | –       | 1.25 kg a.i./ha | 14 | Other GAPs reported by EL (3 × 2.4 kg as/ha; PHI 21 days) and PT (5 × 1.1 kg as/ha; PHI 14 days) but are not supported by data |
| Oranges FR            | F                       | F          | **Phytophthora citricola,** Pseudomonas syringae, Alternaria citricola | –        | –         | Foliar treatment – spraying | 15–89     | 3        | 30     | –       | –       | 1.25 kg a.i./ha | 14 | See grapefruits |
| Lemons FR             | F                       | F          | **Phytophthora citricola,** Pseudomonas syringae, Alternaria citricola | –        | –         | Foliar treatment – spraying | 15–89     | 3        | 30     | –       | –       | 1.25 kg a.i./ha | 14 | See grapefruits |
| Limes FR              | F                       | F          | **Phytophthora citricola,** Pseudomonas syringae, Alternaria citricola | –        | –         | Foliar treatment – spraying | 15–89     | 3        | 30     | –       | –       | 1.25 kg a.i./ha | 14 | See grapefruits |
| Crop and/or situation | NEU, SEU, MS or country | FG or T(l) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|--------------------------|------------|-----------------------------------|-------------|-------------|--------------------------------|
|                       |                          |            |                                   | Type(b)     | Conc. a.s.  | Method kind | Range of growth stages & season(c) | Number min–max | Interval between application (min) | g a.s./hL min–max | Water L/ha min–max | Rate & Unit | PHI (days) (d) | Remarks |
| Mandarins             | FR                       | F          | Phytophthora citricola, Pseudomonas syringae, Alternaria citricola | –           | –          | Foliar treatment – spraying | 15–89                | 3                        | –               | –               | 1.25 kg a.i./ha | 14         | See grapefruits |
| Almonds               | EL, FR                   | F          | Alternaria, Anthracnose, Bacteria, Cytospora | –           | –          | Foliar treatment – spraying | 51–97                | 3                        | –               | –               | 1.2 kg a.i./ha | 14         | BBCH 51–79 & 91–97 |
| Brazil nuts           | FR                       | F          | Alternaria, Anthracnose, Bacteria, Cytospora | –           | –          | Foliar treatment – spraying | 51–97                | 3                        | –               | –               | 1.2 kg a.i./ha | 14         | BBCH 51–79 & 91–97 |
| Cashew nuts           | FR                       | F          | –                                  | –           | –          | Foliar treatment – spraying | 3–55                 | 3                        | –               | –               | 2 kg a.i./ha  | n.a.       | pre–flowering |
| Chestnuts             | FR                       | F          | Alternaria, Anthracnose, Bacteria, Cytospora | –           | –          | Foliar treatment – spraying | 51–97                | 3                        | –               | –               | 1.2 kg a.i./ha | 14         | BBCH 51–79 & 91–97 |
| Coconuts              | FR                       | F          | –                                  | –           | –          | Foliar treatment – spraying | 3–55                 | 3                        | –               | –               | 2 kg a.i./ha  | n.a.       | Pre–flowering |
| Hazelnuts             | FR, PT                   | F          | Alternaria, Anthracnose, Bacteria, Cytospora | –           | –          | Foliar treatment – spraying | 51–97                | 3                        | –               | –               | 1.2 kg a.i./ha | 14         | BBCH 51–79 & 91–97 |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|------------------------------------|-------------|-------------|--------------------------------|-----------|---------|
|                       | F G or T(1)             |                                    | Type(2) | Conc. a.s. | Method kind | Range of growth stages & season(3) | Number min-max | Interval between application (min) | g a.s./hl min-max | Water L/ha min-max | Rate & Unit |                     |            |
| Macadamias            | FR                      | Alternaria, Anthracnose, Bacteria, Cytospora |          |            | Foliar treatment – spraying | 51–97     | 3 14 | – – | 1.2 kg a.i./ha | 14 | BBCH 51–79 & 91–97 |
| Pecans                | FR                      | Alternaria, Anthracnose, Bacteria, Cytospora |          |            | Foliar treatment – spraying | 51–97     | 3 14 | – – | 1.2 kg a.i./ha | 14 | BBCH 51–79 & 91–97 |
| Pine nut kernels      | FR                      |                                    |          |            | Foliar treatment – spraying | 3–55      | 3 14 | – – | 2 kg a.i./ha | n.a. | Pre–flowering       |
| Pistachios            | EL, IT                  | Alternaria, Anthracnose, Bacteria, Cytospora | ST       | 19% (w/w) | Foliar treatment – spraying | 51–97     | 3 14 | – – | 0.75 kg a.i./ha | 14 | BBCH 51–79 & 91–97 |
| Walnuts               | FR                      | Alternaria, Anthracnose, Bacteria, Cytospora |          |            | Foliar treatment – spraying | 51–97     | 3 14 | – – | 1.2 kg a.i./ha | 14 | BBCH 51–79 & 91–97 |
| Apples                | FR, PT                  | Venturia inaequalis, Erwinia, Pseudomonas, other bacteriosis |          |            | Foliar treatment – spraying | 59–89     | 3 14 | – – | 0.8 kg a.i./ha | 21 | –                   |
| Pears                 | FR, PT                  | Venturia inaequalis, Erwinia, Pseudomonas, other bacteriosis |          |            | Foliar treatment – spraying | 59–89     | 3 14 | – – | 0.8 kg a.i./ha | 21 | –                   |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | Remarks |
|-----------------------|-------------------------|-----------------------------------|-------------|------------|-------------------------------|---------|
|                       |                         |                                   | Type(b), Conc. a.s., Method kind | Range of growth stages & season(c) | Number min-max | Interval between application(min) | g a.s./ha/L min-max | Water L/ha min-max | Rate & Unit | PHI (days)(d) | |
| Quinces               | FR, PT                  | Venturia inaequalis, Erwinia, Pseudomonas, other bacteriosis | – – | Foliar spray | 59 -89 | 3 | 14 | – – | 0.8 kg a.i./ha | 21 | – |
| Medlars               | FR, PT                  | Venturia inaequalis, Erwinia, Pseudomonas, other bacteriosis | – – | Foliar spray | 59 -89 | 3 | 14 | – – | 0.8 kg a.i./ha | 21 | – |
| Loquats               | FR, PT                  | Venturia inaequalis, Erwinia, Pseudomonas, other bacteriosis | – – | Foliar spray | 59 -89 | 3 | 14 | – – | 0.8 kg a.i./ha | 21 | – |
| Apricots              | IT, EL                  | Taphrina, Monilia, Coryneum, Pseudomonas, Stigmina carpophila, Blumeriella, Bacteria, Leucostoma | ST 19% (w/w) | Foliar spray | 73 -85 | 3 to 5 | 14 | – – | 0.5 kg a.i./ha | 21 | – |
| Cherries              | FR                      | Bacteria                          | – – | Foliar spray | 73 -85 | 3 | 14 | – – | 0.8 kg a.i./ha | 21 | – |
| Peaches               | FR                      | Bacteria                          | – – | Foliar spray | 73 -85 | 5 | 14 | – – | 0.8 kg a.i./ha | 21 | – |
## Crop and/or situation

| Crop and/or situation | NEU, SEU, MS or country | F or G or T(3) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) PH(d) | Remarks |
|-----------------------|------------------------|----------------|----------------------------------|-------------|-------------|-------------------------------|----------------|---------|
|                       |                        |                |                                  | Type(8)     | Conc. a.s.  | Method kind                   | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL | Water L/ha | Rate & Unit |                       |                     |
| Plums                 | FR                     | F              | Bacteria                         | –           | –          | Foliar treatment – spraying   | 73-85                      | 3              | 14                   | –         | –         | 0.8 kg a.i./ha | 21                  |                     |
| Table grapes          | FR                     | F              | Bacteria, Plasmopara viticola, Elsinoe ampelina, Anthracnose | –           | –          | Foliar treatment – spraying   | 15-91                      | 4              | 7                    | –         | –         | 2 kg a.i./ha | 21 BBCH 15-81 & 91 |                     |
| Wine grapes           | FR                     | F              | Bacteria, Plasmopara viticola, Elsinoe ampelina, Anthracnose | –           | –          | Foliar treatment – spraying   | 15-91                      | 4              | 7                    | –         | –         | 2 kg a.i./ha | 21 BBCH 15-81 & 91 |                     |
| Strawberries          | FR, PT                 | F              | Mycosphaerella, Bacteria, Colletotrichum | –           | –          | Foliar treatment – spraying   | 13-85                      | 4              | 7                    | –         | –         | 0.8 kg a.i./ha | 3                   |                     |
| Blueberries           | PT                     | F              | Colletotrichum gloeosporioides   | –           | –          | Foliar treatment – spraying   | 3                         | 7              | –                    | –         | –         | 5 kg a.i./ha | 7                   |                     |
| Figs                  | ES, EL                 | F              | Monilia, Bacteria, Clasterosporium, Venturia sp. | SC          | 520 g/L    | Foliar treatment – spraying   | 3                         | 10             | –                    | –         | –         | 1.56 kg a.i./ha | 15                  |                     |
| Table olives          | ES                     | F              | Cycloconium oleaginum Gloeosporium olivarum | WP          | 300 g/kg   | Foliar treatment – spraying   | 31-85                      | 2              | –                    | –         | –         | 2.25 kg a.i./ha | 15 First in spring since beginning of flowering (BBCH 31-64) Second after summer (BBCH 74-85) |                     |
| Crop and/or situation | NEU, SEU, MS or country | F G or 1(a) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|-------------|-----------------------------------|-------------|------------|--------------------------------|------------|---------|
|                        |                         |             |                                   | Type(b) Conc. a.s. Method kind | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hl min- max | Water L/ha min-max | Rate & Unit | |
| Jambuls                | FR                      | F           | Bacteria                          | – – Foliar treatment – spraying | 73-85      | 3               | 14                  | – – 0.8 kg a.i./ha | –         | 21        | –         |
| Kiwi fruits            | FR, EL                  | F           | Bacterial, *Pseudomonas syringae pv. Actiniae* | – – Foliar treatment – spraying | –          | 10              | 10                  | – – 0.5 kg a.i./ha | –         | 15        | BBCH: Autumn – winter leaf fall |
| Passionfruits          | PT                      | F           | *Colletotrichum gloeosporioides* | – – Foliar treatment – spraying | –          | 3               | 7                   | – – 5 kg a.i./ha | –         | 7         | –         |
| Mangoes                | PT                      | F           | *Colletotrichum gloeosporioides* | – – Foliar treatment – spraying | –          | 3               | 7                   | – – 5 kg a.i./ha | –         | 7         | –         |
| Cherimoyas             | PT                      | F           | *Colletotrichum gloeosporioides* | – – Foliar treatment – spraying | 3          | 7               |                     | – – 5 kg a.i./ha | –         | 7         | –         |
| Potatoes               | PT, FR                  | F           | *Bacteriosis, Phytophthora infestans, Alternaria, Colletotrichum* | – – Foliar treatment – spraying | 15-85      | 5               | 7                   | – – 1 kg a.i./ha | –         | 14        | –         |
| Cassava roots          | FR                      | F           | *Bacteriosis, Phytophthora infestans, Alternaria, Colletotrichum* | – – Foliar treatment – spraying | 15-85      | 5               | 7                   | – – 1 kg a.i./ha | –         | 14        | –         |
| Sweet potatoes         | FR                      | F           | *Bacteriosis, Phytophthora infestans, Alternaria, Colletotrichum* | – – Foliar treatment – spraying | 15-85      | 5               | 7                   | – – 1 kg a.i./ha | –         | 14        | –         |
| Crop and/or situation | NEU, SEU, MS or country | FG or F* | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|-------------------------|----------|-----------------------------------|-------------|------------|--------------------------------|
|                       |                         |          |                                   | Type(b) Conc. a.s. Method kind Range of growth stages & season(c) Number min-max Interval between application (min) g a.s./hl min-max Water L/ha min-max Rate & Unit (days) (d) Remarks |
| Yams                  | FR F                    | – –      | Foliar treatment – spraying       | 15-85 5 7   | – –        | 1 kg a.i./ha 14 – |
| Arrowroots            | FR F                    | – –      | Foliar treatment – spraying       | 15-85 5 7   | – –        | 1 kg a.i./ha 14 – |
| Beetroot              | FR F                    | – –      | Foliar treatment – spraying       | 15-47 4 7   | – –        | 1.2 kg a.i./ha 14 – |
| Carrots               | FR, PT F                | – –      | Foliar treatment – spraying       | 15-47 4 7   | – –        | 1.2 kg a.i./ha 14 – |
| Celeriacs             | FR F                    | – –      | Foliar treatment – spraying       | 15-47 4 7   | – –        | 1.2 kg a.i./ha 14 – |
| Horseradishes         | FR F                    | – –      | Foliar treatment – spraying       | 15-47 4 7   | – –        | 1.2 kg a.i./ha 14 – |
| Jerusalem artichokes  | FR F                    | – –      | Foliar treatment – spraying       | 15-47 4 7   | – –        | 1.2 kg a.i./ha 14 – |
| Crop and/or situation | NEU, SEU, MS or country | F or G or T(1) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|---------------|-----------------------------------|-------------|-------------|-------------------------------|------------|--------|
|                       |                         |               |                                   | Type(b) Conc. a.s. Method kind | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hl L/ha min-max | Rate & Unit | |
| Parsnips              | FR, PT                  | F             | Alternaria, Cercospora, bacterial diseases | – – Foliar treatment – spraying | 15-47 | 4 | 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Parsley roots         | FR, PT                  | F             | Alternaria, Cercospora, bacterial diseases | – – Foliar treatment – spraying | 15-47 | 4 | 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Radishes              | FR, PT                  | F             | Alternaria, Cercospora, bacterial diseases | – – Foliar treatment – spraying | 15-47 | 4 | 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Salsifies             | FR                      | F             | Alternaria, Cercospora, bacterial diseases | – – Foliar treatment – spraying | 15-47 | 4 | 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Swedes                | FR                      | F             | Alternaria, Cercospora, bacterial diseases | – – Foliar treatment – spraying | 15-47 | 4 | 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Turnips               | FR, PT                  | F             | Alternaria, Cercospora, bacterial diseases | – – Foliar treatment – spraying | 15-47 | 4 | 7 | – – | 1.2 kg a.i./ha | 14 | – |
| Garlic                | FR, PT                  | F             | Alternaria, Anthracnose, Bacteria, Peronospora destructor, Stemphyllum | – – Foliar treatment – spraying | 14-47 | 4 | 7 | – – | 0.8 kg a.i./ha | 3 | – |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|--------------------------|------------------------------------|-------------|------------|--------------------------------|
|                       |                          |                                    | Type(a)     | Conc. a.s. | Method kind | Range of growth stages & season(c) | Number min–max | Interval between application (min) | g a.s./hl min–max | Water L/ha min–max | Rate & Unit | PHI (days)(d) | Remarks |
| Onions                | FR, PT                   | Alternaria, Anthracnose, Bacteria, Peronospora destructor, Stemphylium | –           | –          | Foliar treatment – spraying | 14–47         | 4          | 7          | –          | 0.8 kg a.i./ha | 3         | –          |
| Shallots              | FR                       | Alternaria, Anthracnose, Bacteria, Peronospora destructor, Stemphylium | –           | –          | Foliar treatment – spraying | 14–47         | 4          | 7          | –          | 0.8 kg a.i./ha | 3         | –          |
| Spring onions        | FR                       | Bremia sp., Ascochyta, bacterial diseases | –           | –          | Foliar treatment – spraying | 17–85         | 5          | 7          | –          | 0.8 kg a.i./ha | 3         | –          |
| Tomatoes              | FR                       | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | –           | –          | Foliar treatment – spraying | 15–89         | 6          | 7          | –          | 1.25 kg a.i./ha | 3         | –          |
| Sweet peppers        | FR, PT                   | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | –           | –          | Foliar treatment – spraying | 15–89         | 4          | 7          | –          | 0.8 kg a.i./ha | 3         | –          |
| Aubergines            | FR                       | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | –           | –          | Foliar treatment – spraying | 15–89         | 6          | 7          | –          | 1.25 kg a.i./ha | 3         | –          |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|------------------------|-------------------------|-----------------------------------|-------------|------------|--------------------------------|
|                        |                         |                                   | Type(a)     | Conc. a.s. | Method                         | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hl min-max | Water L/ha min-max | Rate & Unit | PHI (days) | Remarks |
| Cucumbers              | FR, PT                  | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89          | 5   | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Gherkins               | FR                      | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89          | 5   | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Courgettes             | FR, PT                  | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89          | 5   | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Melons                 | FR, PT                  | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89          | 4   | 7 | – | – | 0.9 kg a.i./ha | 7 | – |
| Pumpkins               | FR, PT                  | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89          | 4   | 7 | – | – | 0.9 kg a.i./ha | 7 | – |
| Watermelons            | FR, PT                  | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | –           | –         | Foliar treatment – spraying | 15-89          | 4   | 7 | – | – | 0.9 kg a.i./ha | 7 | – |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|--------------------------|-----------------------------------|-------------|-------------|-------------------------------|-----------|---------|
|                       |                          |                                   | Type(b)     | Conc. a.s.  | Method (c)                    |           |         |
|                       |                          |                                   | Method kind  |             | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL | Water | Rate & Unit |           |         |
| Broccoli              | FR, PT                   | Phytophthora brassicae, Bacteria  | --          | --          | Foliar treatment – spraying   | 41–59     | 4       | 7       | --     | 0.8 kg a.i./ha | 14 | --     |
| Cauliflowers          | FR, PT                   | Phytophthora brassicae, Bacteria  | --          | --          | Foliar treatment – spraying   | 41–59     | 4       | 7       | --     | 0.8 kg a.i./ha | 14 | --     |
| Lamb’s lettuces       | FR, PT                   | Bremia, Alternaria, bacterial diseases | --          | --          | Foliar treatment – spraying   | 12–49     | 4       | 7       | --     | 0.8 kg a.i./ha | 7  | --     |
| Lettuces              | FR, PT                   | Bremia, Alternaria, bacterial diseases | --          | --          | Foliar treatment – spraying   | 12–49     | 4       | 7       | --     | 0.8 kg a.i./ha | 7  | --     |
| Escaroles             | FR                       | Bremia, Alternaria, bacterial diseases | --          | --          | Foliar treatment – spraying   | 12–49     | 4       | 7       | --     | 0.8 kg a.i./ha | 7  | --     |
| Cresses               | FR                       | Bremia, Alternaria, bacterial diseases | --          | --          | Foliar treatment – spraying   | 12–49     | 4       | 7       | --     | 0.8 kg a.i./ha | 7  | --     |
| Land cresses          | FR                       | Bremia, Alternaria, bacterial diseases | --          | --          | Foliar treatment – spraying   | 12–49     | 4       | 7       | --     | 0.8 kg a.i./ha | 7  | --     |
| Roman rocket          | FR                       | Bremia, Alternaria, bacterial diseases | --          | --          | Foliar treatment – spraying   | 12–49     | 4       | 7       | --     | 0.8 kg a.i./ha | 7  | --     |
| Crop and/or situation | NEU, SEU, MS or country | F G or T<sup>(a)</sup> | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | Remarks |
|------------------------|--------------------------|-------------------------|-----------------------------------|-------------|-----------------------------|---------------------------------|---------|
|                        |                          |                         |                                   | Type<sup>(b)</sup> | Conc. a.s. | Method kind | Range of growth stages & season<sup>(c)</sup> | Number min-max | Interval between application (min) | g a.s./hL min-max | Water L/ha min-max | Rate & Unit | PHI (days)<sup>(d)</sup> | |
| Red mustards           | FR                       | F                       | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 – |
| Baby leaf crops        | FR, PT                   | F                       | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 – |
| Spinaches              | FR, PT                   | F                       | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 – |
| Purslanes              | FR                       | F                       | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 – |
| Chards                 | FR                       | F                       | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 – |
| Watercresses           | PT                       | F                       | Several diseases                  | – – | Foliar treatment – spraying | 2    | 7 | – – | 1 kg a.i./ha | 7 – |
| Chervil                | FR                       | F                       | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 – |
| Chives                 | FR, PT                   | F                       | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12–49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 – |
| Crop and/or situation | NEU, SEU, MS or country | FG or G(1) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|------------|-----------------------------------|-------------|------------|-----------------------------|-----------|---------|
|                       |                         |            |                                   | Type(b) Conc. a.s. Method kind | Range of growth stages & season(c) | Number min – max | Interval between application (min) | g a.s./hL min – max | Water L/ha min – max | Rate & Unit | |
| Celery leaves         | FR, PT, IT             | F          | Bremia, Alternaria, bacterial diseases | – –          | Foliar treatment – spraying       | 12-49         | 4                        | 7          | – –                  | 0.8 kg a.i./ha | 7 –         |
| Parsley               | FR, PT, IT             | F          | Bremia, Alternaria, bacterial diseases | – –          | Foliar treatment – spraying       | 12-49         | 4                        | 7          | – –                  | 0.8 kg a.i./ha | 7 –         |
| Sage                  | FR, PT                 | F          | Bremia, Alternaria, bacterial diseases | – –          | Foliar treatment – spraying       | 12-49         | 4                        | 7          | – –                  | 0.8 kg a.i./ha | 7 –         |
| Rosemary              | FR, PT                 | F          | Bremia, Alternaria, bacterial diseases | – –          | Foliar treatment – spraying       | 12-49         | 4                        | 7          | – –                  | 0.8 kg a.i./ha | 7 –         |
| Thyme                 | FR, PT                 | F          | Bremia, Alternaria, bacterial diseases | – –          | Foliar treatment – spraying       | 12-49         | 4                        | 7          | – –                  | 0.8 kg a.i./ha | 7 –         |
| Basil                 | FR, PT                 | F          | Bremia, Alternaria, bacterial diseases | – –          | Foliar treatment – spraying       | 12-49         | 4                        | 7          | – –                  | 0.8 kg a.i./ha | 7 –         |
| Laurel                | FR, PT                 | F          | Bremia, Alternaria, bacterial diseases | – –          | Foliar treatment – spraying       | 12-49         | 4                        | 7          | – –                  | 0.8 kg a.i./ha | 7 –         |
| Crop and/or situation | NEU, SEU, MS or country | F G or 1(a) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|--------------------------|-------------|-----------------------------------|-------------|----------------|--------------------------------|------------|--------|
|                       |                          | F           | Bremia, Alternaria, bacterial diseases | –           | –              | Foliar treatment – spraying   | –          | –      |
| Tarragon              | FR, PT                   | F           | Colletotrichum, Peronospora, Septoria, Marsonina, bacterial diseases | –           | –              | Foliar treatment – spraying   | 61–78      | 4 7    |
| Beans (with pods)     | FR, PT                   | F           | Colletotrichum; Peronospora; Septoria; Marsonina; bacterial diseases | WG 75 g/kg | Foliar treatment – spraying | 11–69 3–5 7 | –          | 0.8 kg a.i./ha 3 |
| Beans (without pods)  | EL                       | F           | Colletotrichum; Peronospora; Septoria; Marsonina; bacterial diseases | –           | –              | Foliar treatment – spraying   | 61–78      | 4 7    |
| Peas (with pods)      | FR, PT                   | F           | Colletotrichum, Peronospora, Septoria, Marsonina, bacterial diseases | –           | –              | Foliar treatment – spraying   | 61–78      | 4 7    |
| Peas (without pods)   | FR, PT                   | F           | Colletotrichum, Peronospora, Septoria, Marsonina, bacterial diseases | –           | –              | Foliar treatment – spraying   | 61–78      | 4 7    |
| Crop and/or situation | NEU, SEU, MS or country | Pest(s) or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) |
|-----------------------|--------------------------|--------------------------------------|-------------|-------------|--------------------------------|------------|
|                       |                          |                                      | Type(b)     | Concentration (a.s.) | Method kind | Range of growth stages & season(c) | Number min-max | Interval between application (min) | Rate & Unit | Remarks |
| Lentils (fresh)        | EL                       | Colletotrichum; Peronospora; Septoria; Masconina; bacterial diseases | WG          | 75 g/kg | Foliar treatment – spraying | 11–69 | 3–5 | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Asparagus              | IT                       | Bremia sp.; Ascochyta; bacterial diseases | SC          | 190 g/L | Foliar treatment – spraying | 14–51 | 5 | 7 | – | – | 0.76 kg a.i./ha | 3 | – |
| Cardoons               | IT                       | Bremia sp.; Ascochyta; bacterial diseases | SC          | 190 g/L | Foliar treatment – spraying | 14–51 | 5 | 7 | – | – | 0.76 kg a.i./ha | 3 | – |
| Globe artichokes       | FR, PT, IT               | Bremia sp., Ascochyta, bacterial diseases | SC          | 190 g/L | Foliar treatment – spraying | 17–55 | 5 | 7 | – | – | 0.8 kg a.i./ha | 3 | – |
| Leeks                  | FR, PT, IT               | Bremia sp., Ascochyta, bacterial diseases | SC          | 190 g/L | Foliar treatment – spraying | 17–85 | 5 | 7 | – | – | 0.8 kg a.i./ha | 3 | – |
| Beans (dry)            | EL                       | Colletotrichum; Peronospora; Septoria; Masconina; bacterial diseases | WG          | 75 g/kg | Foliar treatment – spraying | 11–69 | 3–5 | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Crop and/or situation | NEU, SEU, MS or country | F or G or I | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment |
|-----------------------|-------------------------|-------------|------------------------------------|-------------|------------|--------------------------------|
|                       |                         |             |                                    | Type(b)     | Conc. a.s. | Method kind                       | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./ha | Water L/ha min-max | Rate & Unit | PHI (days) | Remarks |
| Lentils (dry)         | EL F                     | Colletotrichum: Peronospora; Septoria; Marsonina; bacterial diseases | WG 75 g/kg | Foliar treatment – spraying | 11-69 | 3-5 | 7 | – | – | 1 kg a.i./ha | 3 | – |
| Sunflower seeds       | IT F                     | Alternaria, Sclerotinia | WP 350 g/kg | Foliar treatment – spraying | – | 1 | – | – | – | 1.2 kg a.i./ha | 20 | – |
| Rapeseed             | IT F                     | Peronospora | WP 350 g/kg | Foliar treatment – spraying | 11-89 | 1 | – | – | – | 1.05 kg a.i./ha | 20 | – |
| Soyabeans             | IT F                     | Alternaria, Sclerotinia | WP 350 g/kg | Foliar treatment – spraying | – | 1 | – | – | – | 1.2 kg a.i./ha | 20 | – |
| Olives for oil       | ES F                     | Cycloconium oleaginum Gloeosporium olivarum | WP 300 g/kg | Foliar treatment – spraying | 31-85 | 2 | – | – | – | 2.25 kg a.i./ha | 15 | First in spring since beginning of flowering (BBCH 31–64) Second after summer (BBCH 74–85) |
| Sugar beets           | FR, IT F                 | Cercospora | – | Foliar treatment – spraying | 39-49 | 4 | 14 | – | – | 1.2 kg a.i./ha | 14 | – |

NEU: northern European Union; SEU: southern European Union; MS: Member State; MRL: maximum residue level; a.s.: active substance; a.i.: active ingredient; BBCH: growth stages of mono- and dicotyledonous plants; GAP: Good Agricultural Practice; ST: water-soluble tablet; SC: suspension concentrate; WP: wettable powder; WG: water-dispersible granule.
(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).
(b): CropLife International Technical Monograph no 2, 6th Edition. Revised May 2008. Catalogue of pesticide.
(c): Growth stage range from first to last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including, where relevant, information on season at time of application.
(d): PHI: minimum pre-harvest interval.
## A.3. Indoor authorised uses in EU

| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|-----------------------------------|-------------|-------------|-------------------------------|------------|---------|
| Strawberries          | FR, PT                  | Mycosphaerella, Bacteria, Colletotrichum | –           | Foliar treatment – spraying | 13–85 | 4 7 | – – | 0.8 kg a.i./ha | 3 | -- |
| Blackberries          | DE                      | Didymella applanata, Gloeosporium necator, Rhabdospora ruborum | SC          | Foliar treatment – spraying | n.a. to 59 | 3 5 | – – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Raspberries           | DE                      | Didymella applanata, Gloeosporium necator, Rhabdospora ruborum | SC          | Foliar treatment – spraying | n.a. to 59 | 3 5 | – – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Blueberries           | DE                      | Drepanopeziza ribis, Cronartium ribicola | SC          | Foliar treatment – spraying | n.a. to 59 | 3 5 | – – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Cranberries           | DE                      | Drepanopeziza ribis, Cronartium ribicola | SC          | Foliar treatment – spraying | n.a. to 59 | 3 5 | – – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Currants              | DE                      | Drepanopeziza ribis, Cronartium ribicola | SC          | Foliar treatment – spraying | n.a. to 59 | 3 5 | – – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Gooseberries          | DE                      | Drepanopeziza ribis, Cronartium ribicola | SC          | Foliar treatment – spraying | n.a. to 59 | 3 5 | – – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Crop and/or situation | NEU, SEU, MS or country | FG or I(a) | Pests or Group of pests controlled | Preparation | Conc. a.s. | Method kind | Application | Application rate per treatment | PHI (days) | Remarks |
|----------------------|------------------------|-----------|-----------------------------------|-------------|-----------|------------|-------------|-------------------------------|-----------|---------|
| Rose hips DE I | Drepanopeziza ribis, Cronartium ribicola | SC 383 g/L | Foliar treatment – spraying | n.a. to 59 | 3 | 5 | – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Mulberries DE I | Drepanopeziza ribis, Cronartium ribicola | SC 383 g/L | Foliar treatment – spraying | n.a. to 59 | 3 | 5 | – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Azaroles DE I | Drepanopeziza ribis, Cronartium ribicola | SC 383 g/L | Foliar treatment – spraying | n.a. to 59 | 3 | 5 | – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Elderberries DE I | Drepanopeziza ribis, Cronartium ribicola | SC 383 g/L | Foliar treatment – spraying | n.a. to 59 | 3 | 5 | – | 1 kg a.i./ha | n.a. | Application after harvest, before flowering |
| Tomatoes FR I | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | – | – | Foliar treatment – spraying | 15 to 89 | 6 | 7 | – | 1.25 kg a.i./ha | 3 | – |
| Sweet peppers FR, PT I | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | – | – | Foliar treatment – spraying | 15-89 | 4 | 7 | – | 0.8 kg a.i./ha | 3 | – |
| Aubergines FR I | Phytophthora spp., Alternaria, Colletotrichum, Pseudomonas, Xanthomonas | – | – | Foliar treatment – spraying | 15-89 | 6 | 7 | – | 1.25 kg a.i./ha | 3 | – |
| Cucumbers FR, PT I | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | – | – | Foliar treatment – spraying | 15-89 | 5 | 7 | – | 1 kg a.i./ha | 3 | – |
| Crop and/or situation | NEU, SEU, MS or country | Pests or Group of pests controlled | Preparation Type(b) | Conc. a.s. | Method kind | Application Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hl min-max | Water L/ha min-max | Rate & Unit | PHI (days) | Remarks |
|-----------------------|------------------------|-----------------------------------|---------------------|-----------|-------------|-----------------------------------------------|----------------|-----------------------------|----------------|----------------|-------------|----------|--------|
| Gherkins | FR | I | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | – – | Foliar treatment – spraying | 15-89 | 5 | 7 | – – | 1 kg a.i./ha | 3 | – |
| Courgettes | FR, PT | I | Peronospora cubensis, Alternaria, Colletotrichum, Bacteria | – – | Foliar treatment – spraying | 15-89 | 5 | 7 | – – | 1 kg a.i./ha | 3 | – |
| Melons | PT | I | Several deseases | – – | Foliar treatment – spraying | 4-7 | 4 | 7 | – – | 0.9 kg a.i./ha | 7 | – |
| Pumpkins | PT | I | Several deseases | – – | Foliar treatment – spraying | 4-7 | 4 | 7 | – – | 0.9 kg a.i./ha | 7 | – |
| Watermelons | PT | I | Several deseases | – – | Foliar treatment – spraying | 4-7 | 4 | 7 | – – | 0.9 kg a.i./ha | 7 | – |
| Lamb’s lettuces | FR, PT | I | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12-49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Lettuces | FR, PT | I | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12-49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Escaroles | FR | I | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12-49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Cresses | FR | I | Bremia, Alternaria, bacterial diseases | – – | Foliar treatment – spraying | 12-49 | 4 | 7 | – – | 0.8 kg a.i./ha | 7 | – |
| Crop and/or situation | NEU, SEU, MS or country | FG or I | Pests or Group of pests controlled | Type(b) | Conc. a.s. | Method kind | Preparation | Application | Application rate per treatment | Remarks |
|-----------------------|-------------------------|---------|-----------------------------------|---------|-----------|-------------|-------------|-----------|-------------------------------|---------|
| Land cresses          | FR I                    |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Roman rocket          | FR I                    |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Red mustards          | FR I                    |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Baby leaf crops       | FR, PT I                |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Spinaches             | FR, PT I                |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Purslanes             | FR I                    |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Chards                | FR I                    |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Chervil               | FR I                    |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Chives                | FR, PT I                |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Celery leaves         | FR, PT I                |         | Bremia, Alternaria, bacterial diseases |          | Foliar treatment | Spraying   |            |           | – – 0.8 kg a.i./ha | 7 –   |
| Crop and/or situation | NEU, SEU, MS or country | FG or I(a) | Pests or Group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days) | Remarks |
|-----------------------|-------------------------|-----------|-----------------------------------|-------------|------------|--------------------------------|------------|---------|
|                       |                         |           |                                   | Type(b)     | Conc. a.s. | Method kind                     | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hl min-max | Water L/ha min-max | Rate & Unit |             |
| Parsley | FR, PT | I | Bremia, Alternaria, bacterial diseases | -- | -- | Foliar treatment – spraying | 12–49 | 4 | 7 | -- | -- | 0.8 kg a.i./ha | 7 | -- |
| Sage | FR, PT | I | Bremia, Alternaria, bacterial diseases | -- | -- | Foliar treatment – spraying | 12–49 | 4 | 7 | -- | -- | 0.8 kg a.i./ha | 7 | -- |
| Rosemary | FR, PT | I | Bremia, Alternaria, bacterial diseases | -- | -- | Foliar treatment – spraying | 12–49 | 4 | 7 | -- | -- | 0.8 kg a.i./ha | 7 | -- |
| Thyme | FR, PT | I | Bremia, Alternaria, bacterial diseases | -- | -- | Foliar treatment – spraying | 12–49 | 4 | 7 | -- | -- | 0.8 kg a.i./ha | 7 | -- |
| Basil | FR, PT | I | Bremia, Alternaria, bacterial diseases | -- | -- | Foliar treatment – spraying | 12–49 | 4 | 7 | -- | -- | 0.8 kg a.i./ha | 7 | -- |
| Laurel | FR, PT | I | Bremia, Alternaria, bacterial diseases | -- | -- | Foliar treatment – spraying | 12–49 | 4 | 7 | -- | -- | 0.8 kg a.i./ha | 7 | -- |
| Tarragon | FR, PT | I | Bremia, Alternaria, bacterial diseases | -- | -- | Foliar treatment – spraying | 12–49 | 4 | 7 | -- | -- | 0.8 kg a.i./ha | 7 | -- |

NEU: northern European Union; SEU: southern European Union; MS: Member State; MRL: maximum residue level; a.s.: active substance; a.i.: active ingredient; SC: suspension concentrate.
(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).
(b): CropLife International Technical Monograph no 2, 6th Edition. Revised May 2008. Catalogue of pesticide.
(c): Growth stage range from first to last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including, where relevant, information on season at time of application.
(d): PHI: minimum pre-harvest interval.
Appendix B – List of end points

B.1. Residues in plants

B.1.1. Nature of residues and methods of analysis in plants

B.1.1.1. Metabolism studies, methods of analysis and residue definitions in plants

| Primary crops (available studies) | Crop groups | Crop(s) | Application(s) | Sampling (DAT) |
|----------------------------------|-------------|---------|----------------|---------------|
|                                  |             |         |                |               |
| Copper is a monoatomic element and inherently stable. Therefore, it is not expected to metabolise or to form degradation products (EFSA, 2008, 2018a). |

| Rotational crops (available studies) | Crop groups | Crop(s) | Application(s) | PBI (DAT) |
|-------------------------------------|-------------|---------|----------------|-----------|
|                                     |             |         |                |           |
| Copper is a monoatomic element and inherently stable. Therefore, it is not expected to metabolise or to form degradation products (EFSA, 2008, 2018a). |

| Processed commodities (hydrolysis study) | Conditions | Investigated? |
|------------------------------------------|------------|---------------|
| Pasteurisation (20 min, 90 °C, pH 4)      | No         |
| Baking, brewing and boiling (60 min, 100 °C, pH 5) | No         |
| Sterilisation (20 min, 120 °C, pH 6)      | No         |

Copper is a monoatomic element and inherently stable. Therefore, it is not expected to metabolise or to form degradation products (EFSA, 2008, 2018a).

DAT: days after treatment.

Can a general residue definition be proposed for primary crops? Yes

Rotational crop and primary crop metabolism similar? Yes

Residue pattern in processed commodities similar to residue pattern in raw commodities? Yes

Plant residue definition for monitoring (RD-Mo) Total copper

Plant residue definition for risk assessment (RD-RA) Total copper

Conversion factor (monitoring to risk assessment) not relevant

Methods of analysis for monitoring of residues (analytical technique, crop groups, LOQs) AAS – Atomic Absorption Spectrometry (France, 2007, 2016):
- High water content commodities, LOQ: 2 mg/kg
- High acid content commodities, LOQ: 5 mg/kg
- ILV not required since determination by AAS are recognised as standard methods of analysis for inorganic elements

LOQ: limit of quantification; ILV: independent laboratory validation.

B.1.1.2. Stability of residues in plants

| Plant products (available studies) | Category | Commodity | T (°C) | Stability (months) |
|-----------------------------------|----------|-----------|--------|-------------------|
|                                   |          |           |        | Since copper cannot degrade and since the analytical techniques measure total copper content, storage stability studies are not required (EFSA, 2008). |
### B.1.2. Magnitude of residues in plants

#### B.1.2.1. Summary of residues data from the supervised residue trials

| Crop | Region/Indoor | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg) | STMR (mg/kg) |
|------|---------------|-----------------------------------------------------------------------------------------------|---------------------------------------------|----------------------|-----------|-------------|
| Citrus fruits | SEU | Oranges: < 2.51; < 2.81; < 3.28; < 3.40; 3.78; < 5.77<br>Mandarins: < 2.50; < 4.08; 4.69; < 5.59; 5.97; < 7.59 | Combined dataset on oranges (6) and mandarins (6) compliant with GAP (France, 2016). Extrapolation to other citrus fruits is applicable<br>MRL\textsubscript{OECD} = 10.7 | 15 (tentative) | 7.59 | 3.93 |
| Almonds, Brazil nuts, Chestnuts, Hazelnuts/cobnuts, Macadamias, Pecans, Walnuts | NEU | Almonds: 7.29; 8.97\textsuperscript{(e)}; 10.80\textsuperscript{(e)}; 12.80; 15.20\textsuperscript{(e)}<br>Walnuts: 11.50; 11.90; 12.90 | Northern GAPs only authorised on almonds, chestnuts, hazelnuts and walnuts. No data available. | – | – | – |
| Cashew nuts, Pine nut kernels, Coconuts | SEU | Apples: < 1.5; < 1.5; < 1.5<br>Pears: < 1.5; < 1.5<br>Cherries: 0.79; 1.13 | Combined data set of trials performed on apples (3), pears (2), cherries (2) (France, 2016), applicable to support pre-flowering uses on cashew nuts, pine nuts and coconuts<br>MRL\textsubscript{OECD} = 2.48 | 3 (tentative) | 1.5 | 1.5 |
| Pistachios | SEU | Almonds: 7.29; 8.97\textsuperscript{(e)}; 10.80\textsuperscript{(e)}; 12.80; 15.20\textsuperscript{(e)}<br>Walnuts: 11.50; 11.90; 12.90 | Overdosed trials on almonds (5) and walnuts (3) used on tentative basis to support the post-flowering GAP on pistachios (France, 2016)<br>MRL\textsubscript{OECD} = 34.3 | 40 (tentative) | 15.2 | 11.7 |
| Apples, Pears, Quinces, Loquat, Medlar | NEU | – | Northern GAPs only authorised on apples, pears and quinces. No trials compliant with GAP. Trials reported by DE are performed with lower application rate (DE, 2016) | – | – | – |
| | SEU | 1.10; 1.11; 1.30; 1.35; 1.47\textsuperscript{(e)}; 1.68; 2.90; 3.37 | Trials on apples compliant with GAP (France, 2016); extrapolation to other pome fruits is applicable<br>MRL\textsubscript{OECD} = 5.36 | 6 | 3.37 | 1.41 |
| Crop            | Region/indoor<sup>(a)</sup> | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg)<sup>(b)</sup> | STMR (mg/kg)<sup>(c)</sup> |
|-----------------|-----------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------|-------------------------|--------------------------|
| Apricots        | NEU                         | Apples: < 1.5; < 1.5; < 1.5 <br>Pears: < 1.5; 1.52 <br>Cherries: 0.67 <br>Plums: 0.52 | Combined data set of trials performed on apples (3), pears (2), cherries (1) and plums (1) (France, 2016). Some trials performed on pome fruits are overdosed but show residues < LOQ <br>MRL<sub>OECD</sub> = 3.03 | 3 | 1.52 | 1.50 |
|                 | SEU                         | --                                                                                               | No data available. NB: extrapolation from peaches to apricots is not possible according to the guidance | -- | -- | -- |
| Cherries (sweet)| NEU                         | 2.08; 3.597; 4.64                                                                                 | Trials compliant with GAP (France, 2016). Three trials are not sufficient to derive a MRL for a major crop <br>MRL<sub>OECD</sub> = 10.32 | -- | -- | -- |
|                 | SEU                         | 1.23; 1.61; 3.76; 5.12                                                                            | Trials compliant with GAP (France, 2016) <br>MRL<sub>OECD</sub> = 10.3 | 10 | 5.12 | 2.69 |
| Peaches         | NEU                         | --                                                                                               | No data available                          | -- | -- | -- |
|                 | SEU                         | 1.30; 2.10; 2.18; 2.20; 2.50; 3.19; 3.29; 4.10                                                  | Trials compliant with GAP (France, 2016) <br>MRL<sub>OECD</sub> = 7.82 | 8 | 4.10 | 2.35 |
| Plums           | NEU                         | --                                                                                               | No data available. NB: trials with pre-flowering applications on other stone fruits are under dosed compared to this GAP | -- | -- | -- |
|                 | SEU                         | 0.74; 0.82<sup>(e)</sup>; 1.49; 1.69<sup>(e)</sup>                                               | Trials compliant with GAP (France, 2016) <br>MRL<sub>OECD</sub> = 3.56 | 4 <br>(tentative)<sup>(d)</sup> | 1.69 | 1.15 |
| Table and wine grapes | NEU                     | 4.00; 4.20; 4.30; 6.90; 8.70; 9.90; 12; 45; 56                                                   | Trials compliant with GAP for table and wine grapes (France, 2007, 2016) <br>MRL<sub>OECD</sub> = 94.8 | 100 | 56.0 | 8.70 |
|                 | SEU                         | 3.7; 6.1; 17                                                                                   | Trials compliant with GAP for table and wine grapes (France, 2016). 3 trials are not sufficient to derive a MRL for a major crop | -- | -- | -- |
| Crop                          | Region/indoor(a) | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg)(b) | STMR (mg/kg)(c) |
|------------------------------|------------------|------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------|---------------|-----------------|
| Strawberries                 | NEU              | 0.51; 0.72; 0.87; 0.98; 0.99(e); 1.06; 2.08; 3.44                                                | Trials compliant with GAP (France, 2016) MRL<sub>OECD</sub> = 5.21 | 6                     | 3.44          | 0.99            |
|                              | SEU              | 0.68(e); 1.10; 1.44(e); 1.77; 3.09; 3.31; 3.55                                                | Trials compliant with GAP (France, 2016) MRL<sub>OECD</sub> = 6.78 | 7                     | 3.55          | 1.77            |
|                              | EU               | 0.54; 1.39(e); 1.58; 1.63; 2.95; 3.81; 5.46; 6.12                                                | Trials compliant with GAP (France, 2016) MRL<sub>OECD</sub> = 11.1 | 15                    | 6.12          | 2.29            |
| Cane fruits (all) Other small fruits and berries (all) | NEU              | Raspberries: 0.95; 1.08 Currants: 0.77; 1.04                                                   | Trials on raspberries and currants compliant with GAP (France, 2016). Residues above the enforcement LOQ are not expected in cane fruits and other berries because copper is applied before flowering; this is confirmed by the 4 available trials MRL<sub>OECD</sub> = 2.88 | 5*                    | 1.08          | 1.00            |
|                              | SEU              | --                                                                                               | Southern GAP only authorised on blueberries. No data available | --                    | --            | --              |
|                              | EU               | --                                                                                               | Indoor GAPs authorised on all crops except dewberries. No trials are available but, based on the outdoor trials, it is expected that treatment before flowering or after commercial harvest will not results in residue above LOQ | 5*                    | --            | --              |
| Figs                         | SEU              | --                                                                                               | No data available                                            | --                    | --            | --              |
| Table olives & Olives for oil production | SEU              | 2.08; 4.20; 4.23; 5.45; < 7.0; < 7.1; < 8.0; 11                                                   | Trial performed on olives with 3 applications instead of 2 deemed acceptable since only the third application was performed after flowering, all other parameters are compliant with GAP (Spain, 2016) Extrapolation to olives for oil production is applicable MRL<sub>OECD</sub> = 17.2 | 20 (tentative)(f) | 11.0          | 6.23            |
| Crop                        | Region/ indoor(a) | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg)(b) | STMR (mg/kg)(c) |
|-----------------------------|-------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------|---------------|----------------|
| Jambuls/jambolans           | NEU               | 2.08; 3.597; 4.64                                                                            | Extrapolation of trials performed on cherries, compliant with GAP (France, 2016). Three trials are not sufficient to derive a MRL for a major crop. MRL_{OECD} = 10.3 | –                     | –             | –              |
|                             | SEU               | 1.23; 1.61; 3.76; 5.12                                                                       | Extrapolation of trials performed on cherries, compliant with GAP (France, 2016). MRL_{OECD} = 10.3 | 10                    | 5.12          | 2.69           |
| Kiwi fruits (green, red, yellow) | SEU             | 5.74; 7.02; 6.87; 11.65                                                                      | Trials compliant with GAP (France, 2016). MRL_{OECD} = 23.5 | 30 (tentative)(d)    | 11.7          | 6.94           |
| Passionfruits/maracujas     | SEU               | –                                                                                             | No trials available                         | –                     | –             | –              |
| Mangoes                     | SEU               | –                                                                                             | No trials available                         | –                     | –             | –              |
| Cherimoyas                  | SEU               | –                                                                                             | No trials available                         | –                     | –             | –              |
| Potatoes                    | NEU               | 1.1; 1.4; 1.8; 2.0; 2.4; 2.7; 3.6                                                             | Trials on potatoes performed with 6 applications instead 4 and application rate of 0.6 instead of 0.7 kg as/ha (Germany, 2016). MRL_{OECD} = 6.43 | 7                     | 3.60          | 2.00           |
|                             | SEU               | < 0.70; 1; 1.10; 1.20; 1.30; 1.60; 1.80; 2.80                                               | Trials on potatoes compliant with GAP (France, 2016). Extrapolation to cassava roots, sweet potatoes, yams and arrowroots is applicable. MRL_{OECD} = 3.95 | 4                     | 2.80          | 1.30           |
| Cassava roots/manioc        | SEU               | < 0.70 ;1; 1.10; 1.20; 1.30; 1.60; 1.80; 2.80                                                 | Trials on potatoes compliant with GAP (France, 2016). Extrapolation to cassava roots, sweet potatoes, yams and arrowroots is applicable. MRL_{OECD} = 3.95 | 4                     | 2.80          | 1.30           |

(a) Indoor
(b) HR
(c) STMR
(d) Tentative
### Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg)

| Crop                                    | Region/indoor | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg) | STMR (mg/kg) |
|------------------------------------------|---------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------|------------|--------------|
| Carrots                                  | NEU           | 0.49; 0.56; 0.92; 1.33                                                                      | Trials on carrots compliant with GAP (France, 2016). Tentative extrapolation (because only 4 trials) to other root and tuber vegetables is proposed. MRL\textsubscript{OECD} = 2.48 | 3 (tentative)        | 1.33       | 0.74         |
| Beetroots                                | SEU           | 2.23                                                                                         | Trials on carrots compliant with GAP (France, 2016) | --                    | --         | --           |
| Celeriacs                                |               |                                                                                              |                                               |                       |            |              |
| Horseradishes                            |               |                                                                                              |                                               |                       |            |              |
| Jerusalem artichokes                     |               |                                                                                              |                                               |                       |            |              |
| Parsnips                                 |               |                                                                                              |                                               |                       |            |              |
| Parsley roots                            |               |                                                                                              |                                               |                       |            |              |
| Radishes                                 |               |                                                                                              |                                               |                       |            |              |
| Salsifies                                 |               |                                                                                              |                                               |                       |            |              |
| Swedes/rutabagas                         |               |                                                                                              |                                               |                       |            |              |
| Turnips roots                            |               |                                                                                              |                                               |                       |            |              |
| Onions                                   | NEU           | 0.46; 0.48; 0.54; 0.57\textsuperscript{m}; 0.62\textsuperscript{m}; 0.63; 0.64\textsuperscript{m}; 0.75 | Trials on onions compliant with GAP (France, 2016). Extrapolation to shallots and garlic is applicable. MRL\textsubscript{OECD} = 1.76 | 2\textsuperscript{a} | 0.75       | 0.60         |
| Garlic                                   | SEU           | 0.39; 0.49\textsuperscript{m}; 0.66; 0.83                                                                 | Trials on onions compliant with GAP (France, 2016). Tentative extrapolation (only 4 trials) to shallots and garlic is proposed. MRL\textsubscript{OECD} = 1.78 | 2\textsuperscript{a} (tentative) | 0.83       | 0.58         |
| Shallots                                 |               |                                                                                              |                                               |                       |            |              |
| Spring onions                            | SEU           | 4.77; 14.20; 15.0\textsuperscript{m}; 35.90                                                | Trials on leeks compliant with GAP (France, 2016). Extrapolation to spring onion is applicable. MRL\textsubscript{OECD} = 70.0 | 70                    | 35.9       | 14.6         |
| Tomatoes                                 | NEU           | 0.70; 1.50; 1.60; 1.70; 1.70; 2.20; 4.30; 6.60                                              | Trials compliant with GAP (France, 2016). Extrapolation to aubergines is applicable. MRL\textsubscript{OECD} = 9.81 | 10                    | 6.60       | 1.70         |
| Aubergines/eggplants                     | SEU           | 1.70; 2.30; 2.50; 2.90; 3.70                                                             | Trials compliant with GAP (France, 2007). Extrapolation to aubergines is applicable. MRL\textsubscript{OECD} = 7.86 | 8 (tentative)         | 3.70       | 2.50         |
| EU                                       |               | 1; 1; 2; 2                                                                                | Trials compliant with GAP (France, 2007). Extrapolation to aubergines is applicable. Only 4 trials are available; considering that the indoor GAP is similar to the outdoor GAPs, it was not deemed appropriate to derive MRL from this GAP | --                    | --         | --           |
| Crop                  | Region/indoor(a) | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg)(b) | STMR (mg/kg)(c) |
|-----------------------|------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------|--------------|-----------------|
| Sweet peppers/bell peppers | NEU              | 1.38; 1.64(e); 2.34; 3.32                                                                        | Trials compliant with GAP (France, 2016) MRL\textsubscript{OECD} = 6.51                          | 7 (tentative)(d)     | 3.32         | 1.99            |
|                       | SEU              | 1.92; 2.70; 3.13; 3.32; 3.57(e); 4.13; 4.79; 13.4(e)                                             | Trials compliant with GAP (France, 2016). The highest residue level comes from a trial on chilli peppers MRL\textsubscript{OECD} = 19.2 | 20                   | 13.4         | 3.45            |
|                       | EU               | 1.08; 1.38; 1.52; 2.04; 2.94; 3.79; 3.91; 3.92(e)                                                | Trials compliant with GAP (France, 2016) MRL\textsubscript{OECD} = 7.37                          | 8                    | 3.92         | 2.04            |
| Courgettes/Cucumbers/Gherkins | NEU              | –                                                                                               | No data available                                                                             | –                    | –            | –               |
|                       | SEU              | 0.81; 0.85; 0.98; 1.20; 1.20; 1.30; 1.40; 1.70                                                 | Trials on courgettes compliant with GAP (France, 2016). Extrapolation to cucurbits with edible peel is applicable MRL\textsubscript{OECD} = 3.54 | 4                    | 1.70         | 1.20            |
|                       | EU               | Courgettes: 0.70; 0.78; 1.10; 1.70; 2.20; 2.50; 2.60; 3.30                                      | Combined dataset on courgettes (8) and cucumbers (4) compliant with GAP (France, 2016). Extrapolation to cucurbits with edible peel is applicable MRL\textsubscript{OECD} = 4.94 | 5                    | 3.30         | 2.00            |
| Melons/Pumpkins/Watermelons | NEU              | –                                                                                               | No data available                                                                             | –                    | –            | –               |
|                       | SEU              | < 5; < 5; < 10; < 10; < 10                                                                       | Trials compliant with GAP (6 app instead 4 but 2 first app performed at early stage) (France, 2016). Tentative MRL is based on the LOQ value of 10 mg/kg. Extrapolation to cucurbits with inedible peel is applicable MRL\textsubscript{OECD} = not applicable | 10 (tentative)(d)    | 10.0         | 10.0            |
|                       | EU               | < 1.97; 2 < 2.0; 2 < 2.1; 5.0                                                                   | Trials compliant with GAP (6 app instead 4 but 2 first app performed at early stage) (France, 2017). Extrapolation to cucurbits with inedible peel is applicable MRL\textsubscript{OECD} = 7.38 | 8 (tentative)(d)     | 5.0          | 2.05            |
| Broccoli & Cauliflower | SEU              | Broccoli: 1.20; 1.30(e); 1.45(e); 2.01                                                           | Combined dataset on broccoli (4) and cauliflower (4) compliant with GAP (France, 2016) MRL\textsubscript{OECD} = 4.72 | 5                    | 2.80         | 1.25            |
| Crop                              | Region/ indoor(a) | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg)(b) | STMR (mg/kg)(c) |
|-----------------------------------|-------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------|--------------|----------------|
| Head cabbages                     | NEU               | < 5; < 5                                                                                       | Trials performed on savoy cabbage performed with 6 applications instead of 4 (Germany, 2016); not sufficient to derive an MRL | --                    | --           | --            |
| Lettuces                          | NEU               | --                                                                                              | No data available                          | --                    | --           | --            |
| Lamb's lettuces                   | SEU               | 2.03; 3.22; 9.08; 11.7                                                                         | Trials compliant with GAP (France, 2016). Tentative extrapolation to other salad plants is proposed (missing data on open leaf lettuce) MRL_{OECD} = 122 | 150 (tentative)(d)   | 66.0         | 11.7          |
| Escaroles/broad-leaved endives    |                  |                                                                                                 |                                             |                       |              |                |
| Cresses and other sprouts and     |                  |                                                                                                 |                                             |                       |              |                |
| shoots                            |                   |                                                                                                 |                                             |                       |              |                |
| Land cresses                      |                   |                                                                                                 |                                             |                       |              |                |
| Roman rocket/rucola               |                   |                                                                                                 |                                             |                       |              |                |
| Red mustards                      |                   |                                                                                                 |                                             |                       |              |                |
| Baby leaf crops (including brassica species) |                   |                                                                                                 |                                             |                       |              |                |
| Spinaches                         |                   |                                                                                                 |                                             |                       |              |                |
| Purslanes                         |                   |                                                                                                 |                                             |                       |              |                |
| Chards/beet leaves                |                   |                                                                                                 |                                             |                       |              |                |
| Fresh herbs                       |                   |                                                                                                 |                                             |                       |              |                |
| Watercresses                      | SEU               | 2.03; 3.22; 9.08; 11.7                                                                         | Tentative extrapolation of trials performed on lettuce with 4 × 0.8 kg as/ha; PHI 7 days instead of 2 × 1 kg as/ha; PHI 7 days (France, 2016); the 3 latter trials were performed on open leaf varieties (missing data on open leaf lettuce) MRL_{OECD} = 122 | 150 (tentative)(d)   | 66.0         | 11.7          |
| Crop                        | Region/indoor<sup>(a)</sup> | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations)                                                                 | MRL proposals (mg/kg) | HR (mg/kg)<sup>(b)</sup> | STMR (mg/kg)<sup>(c)</sup> |
|---------------------------|-----------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------|--------------------------|
| Beans & Peas (with pods)  | NEU                         | 2.26; 2.63<sup>(e)</sup>; 3.22<sup>(e)</sup>; 3.27; 3.48<sup>(e)</sup>; 3.66                | Trials on beans with pods compliant with GAP (France, 2016). Extrapolation to peas with pods is applicable         | 10 (tentative)<sup>(d)</sup> | 3.66                     | 3.25                     |
|                           | SEU                         | 1.73; 1.82; 2.83; 3.14; 4.33<sup>(e)</sup>; 4.62<sup>(e)</sup>                                | Trials on beans with pods compliant with GAP (France, 2016). Extrapolation to peas with pods is applicable         | 10 (tentative)<sup>(d)</sup> | 4.62                     | 2.99                     |
| Beans (without pods)      | SEU                         | –                                                                                             | No data available                                                                                               | –                     | –                        | –                        |
| Peas (without pods)       | NEU                         | 1.60; 1.86<sup>(e)</sup>; 2.09; 2.69<sup>(e)</sup>; 2.70; 3.10<sup>(e)</sup>             | Trials on peas without pods compliant with GAP (France, 2016). MRL<sub>OECD</sub> = 7.02                    | 7 (tentative)<sup>(d)</sup> | 3.10                     | 2.39                     |
|                           | SEU                         | 1.69; 2.28<sup>(e)</sup>; 2.60                                                              | Trials on peas without pods compliant with GAP (France, 2016). Three trials are not sufficient to derive a MRL for a major crop | –                     | –                        | –                        |
| Lentils (fresh)           | SEU                         | –                                                                                             | No data available                                                                                               | –                     | –                        | –                        |
| Asparagus                 | SEU                         | –                                                                                             | No data available                                                                                               | –                     | –                        | –                        |
| Cardoons                  | SEU                         | –                                                                                             | No data available                                                                                               | –                     | –                        | –                        |
| Globe artichokes          | SEU                         | 4.10; 5.37; 9.51; 15.30                                                                      | Trials compliant with GAP (France, 2016). MRL<sub>OECD</sub> = 28.8                                               | 30                    | 15.3                     | 7.44                     |
| Leeks                     | SEU                         | 4.77; 14.20; 15.0<sup>(e)</sup>; 35.90                                                      | Trials on leeks compliant with GAP (France, 2016). MRL<sub>OECD</sub> = 70.0                                     | 70                    | 35.9                     | 14.6                     |
| Beans (dry) & Lentils (dry)| SEU                         | –                                                                                             | No data available                                                                                               | –                     | –                        | –                        |
| Sunflower seeds           | SEU                         | –                                                                                             | No data available                                                                                               | –                     | –                        | –                        |
| Rapeseeds/canola seeds    | SEU                         | –                                                                                             | No data available                                                                                               | –                     | –                        | –                        |
| Crop         | Region/indoor (a) | Residue levels observed in the supervised residue trials relevant to the supported GAPs (mg/kg) | Recommendations/comments (OECD calculations) | MRL proposals (mg/kg) | HR (mg/kg) (b) | STMR (mg/kg) (c) |
|-------------|------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------|----------------|----------------|
| Soyabeans   | SEU              | --                                                                                               | No data available                          |                      |                |                |
| Hops        | NEU              | 77.5(e); 160; 220; 245(e); 430(e); 581(e); 620; 629                                               | Overdosed trials compared to GAP (6-7 applications instead of 5 at rates ranging from 2.5-9.5 kg as/ha; PHI 7 days) (Germany, 2016). Residues directly measured in dry cones MRL\textsubscript{OECD} = 1259 | 1500 (tentative)(d),(f) | 629            | 338            |
| Sugar beet roots | NEU      | 0.82; 2.12                                                                                      | Trials compliant with GAP (France, 2016). Two trials are not sufficient to derive a MRL |                      |                |                |
|              | SEU              | 1.19; 1.29                                                                                      | Trials compliant with GAP (France, 2016). Two trials are not sufficient to derive a MRL |                      |                |                |
| Sugar beet tops | NEU      | 39.2; 111                                                                                       | Trials compliant with GAP (France, 2016). Two trials are not sufficient to derive a MRL |                      |                |                |
|              | SEU              | 40.7                                                                                             | Trial compliant with GAP (France, 2016). One trial is not sufficient to derive a MRL |                      |                |                |
| Turnip tops | NEU              | --                                                                                                | No data available for turnip tops           |                      |                |                |
|              | SEU              | --                                                                                                | No data available for turnip tops           |                      |                |                |

GAP: Good Agricultural Practice; OECD: Organisation for Economic Co-operation and Development; MRL: maximum residue level; LOQ: limit of quantification; PHI: preharvest interval.

*: Indicates that the MRL is proposed at the limit of quantification.
(a): NEU: Outdoor trials conducted in northern Europe, SEU: Outdoor trials conducted in southern Europe, Indoor: indoor EU trials or Country code: if non-EU trials.
(b): Highest residue.
(c): Supervised trials median residue.
(d): MRL is derived on tentative basis because the number of trials supporting the GAPs is not compliant with the data requirement.
(e): Higher residue level observed at a longer PHI compared to GAP.
(f): MRL is tentative in the absence of validated analytical method for enforcement in high oil content commodities, dry commodities and hops.
B.1.2.2. Residues in succeeding crops

| Study Type                      | Description                                                                 | Available and Required |
|---------------------------------|-----------------------------------------------------------------------------|------------------------|
| Confined rotational crop study  | No study available and not required                                         |                        |
| Field rotational crop study     | No study available and not required                                         |                        |

As copper is an essential micronutrient for plants and it is assumed that copper uptake in succeeding crop is auto regulated by the crops. Therefore, the survey on the endogenous copper levels in all plant commodities (France, 2016) was considered as a surrogate to rotational crops studies. These data could allow deriving MRLs and risk assessment values for all plant commodities (see Appendix F.1).

B.1.2.3. Processing factors

| Processed commodity       | Number of studies(a) | Individual values                                      | Median PF |
|---------------------------|----------------------|--------------------------------------------------------|-----------|
|                           |                      | (processing factor)                                    |           |
|                           |                      | Median PF                                              |           |
|                           |                      | (sufficiently supported by data)                        |           |
| Oranges, peeled           | 11                   | 0.19; 0.20; 0.20; 0.25; 0.26; 0.31; 0.33; 0.36; 0.38; 0.41; 0.45 (France, 2016) | 0.31      |
| Mandarins, peeled         | 12                   | 0.15; 0.17; 0.22; 0.24; 0.24; 0.29; 0.30; 0.31; 0.35; 0.36; 0.38; 0.41 (France, 2016) | 0.30      |
| Oranges, juice            | 5                    | 0.81; 0.89; 0.94; 1.17; 1.49 (France, 2016)             | 0.94      |
| Oranges, marmalade        | 5                    | 0.44; 0.52; 0.53; 0.56; 0.69 (FR, 2016)                | 0.53      |
| Apples, juice             | 8                    | 0.32; 0.40; 0.42; 0.51; 0.51; 0.54; 0.60; 0.74 (France, 2016) | 0.51      |
| Cherries, canned          | 8(b)                 | 0.21; 0.24; 0.30; 0.36; 0.36; 0.47; 0.48; 0.51 (France, 2016) | 0.36      |
| Peaches, canned           | 8(b)                 | 0.16; 0.16; 0.18; 0.20; 0.24; 0.25; 0.36 (France, 2016) | 0.19      |
| Plums, dried (prunes)     | 8                    | 2.89; 2.93; 3.0; 3.47; 3.76; 4.33; 5.43; 6.42 (France, 2016) | 3.62      |
| Table grapes, dried (raisins) | 3                    | 2.6; 2.6; 2.9 (France, 2007)                           | 2.60      |
| Wine grapes, juice        | 9                    | 0.10; < 0.15; 0.17; < 0.21; < 0.39; 0.42; 0.54; 0.65; 0.70 (France, 2007) | 0.39      |
| Wine grapes, wet pomace    | 6                    | 0.8; 1.0; 1.2; 1.2; 6.1; 6.8 (France, 2007)            | 1.20      |
| Wines grapes, must        | 14                   | 0.4; 0.6; 0.6; 0.7; 0.7; < 0.8; 0.8; 0.9; 1.5; 1.8; 1.9; 2.5; 2.9; 4.7 (France, 2007) | 0.85      |
| Wine grapes, red wine      | 20(c)                | < 0.01; < 0.01; < 0.01; < 0.01; < 0.01; 0.02; 0.03; 0.03; 0.03; < 0.04; < 0.04; < 0.07; < 0.07; < 0.08; 0.20; < 0.33; < 0.46; < 0.55; 0.76; 0.78 (France, 2007) | 0.04      |
| Wine grapes, white wine    |                      |                                                        |           |
| Strawberries, jam          | 8                    | 0.60; 0.64; 0.74; 0.78; 0.89; 0.93; 0.94; 1.14; 1.32 (France, 2016) | 0.85      |
| Kiwi fruits, peeled        | 5                    | 0.15; 0.15; 0.44; 0.44; 0.53 (France, 2016)            | 0.44      |
| Melons, peeled             | 5                    | 0.14; 0.28; 0.42; 0.46; 0.92 (France, 2016)            | 0.42      |
| Peas (without pods), cooked| 8                    | 0.71; 0.78; 0.89; 0.93; 0.98; 1.03; 1.15; 1.28 (France, 2016) | 0.96      |
| Peas (without pods), canned| 8                    | 0.46; 0.48; 0.60; 0.60; 0.71; 0.75; 0.81; 0.89 (France, 2016) | 0.66      |
| Processed commodity                                                                 | Number of studies<sup>(a)</sup> | Individual values                                                                 | Median PF                      |
|------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------|-------------------------------|
| Olives for oil production, virgin oil after cold press                              | 10                               | <0.10; <0.10; <0.10; <0.10; <0.10; <0.10; <0.10; <0.10; <0.10 (France, 2016) | <0.10<sup>(d)</sup>           |
| Olives for oil production, press cake                                               | 10                               | 0.22; 0.28; 0.37; 0.51; 0.58; 0.84; 0.86; 0.87; 0.88; 0.93 (France, 2016)   | 0.71                          |
| Hops, beer                                                                         | 8                                | <0.10; <0.10; <0.10; <0.10; <0.10; <0.10; <0.10; <0.10 (France, 2016)       | <0.10<sup>(d)</sup>           |

**Indicative processing factors (limited dataset)**

| Processed commodity                                                                 | Individual values                                                                 | Median PF |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------|
| Oranges, wet pomace                                                                | 1  2.12 (France, 2016)                                                          | 2.12      |
| Oranges, dry pomace                                                                | 1  8.61 (France, 2016)                                                          | 8.61      |
| Apples, wet pomace                                                                 | 2  0.68; 0.78 (France, 2016)                                                    | 0.73      |
| Olives for oil production, refined oil after warm press                             | 1  <0.10 (France, 2016)                                                          | <0.10<sup>(d)</sup>           |

<sup>(a)</sup>: Studies with residues in the RAC at or close to the LOQ were disregarded (unless concentration may occur).

<sup>(b)</sup>: Processing factor calculated for canned unstoned cherry/peach (=pulp).

<sup>(c)</sup>: PF for wine is derived from a combined dataset of red and white wine studies.

<sup>(d)</sup>: Residues < LOQ in all processed samples of virgin, refined oil and beer.

### Residues in livestock

| Relevant groups | Dietary burden expressed in mg/kg bw per day | Most critical diet<sup>(a)</sup> | Most critical commodity<sup>(a)</sup> | Trigger exceeded (Y/N) |
|-----------------|---------------------------------------------|----------------------------------|--------------------------------------|------------------------|
| Cattle (all diets) | 4.13  4.39  139.8<sup>(b)</sup>  147.6<sup>(b)</sup> | Cattle (dairy) | Potatoes (process waste) | Y |
| Cattle (dairy only) | 4.13  4.39  107.3  114.1 | Cattle (dairy) | Potatoes (process waste) | Y |
| Sheep (all diets) | 4.62  4.80  138.5  143.9 | Sheep (ram/ewe) | Potatoes (process waste) | Y |
| Sheep (ewe only) | 4.62  4.80  138.5  143.9 | Sheep (ram/ewe) | Potatoes (process waste) | Y |
| Swine (all diets) | 1.73  1.88  74.8  81.4 | Swine (breeding) | Potatoes (process waste) | Y |
| Poultry (all diets) | 1.53  1.58  21.7  22.5 | Poultry (broiler) | Potatoes (dried pulp) | Y |
| Poultry (layer only) | 1.20  1.31  17.6  19.1 | Poultry (layer) | Potatoes (dried pulp) | Y |

bw: body weight; DM: dry matter.

<sup>(a)</sup>: Calculated for the maximum dietary burden.

<sup>(b)</sup>: The highest dietary burdens expressed in mg/kg DM results from beef cattle.

### B.2.1. Nature of residues and methods of analysis in livestock

#### B.2.1.1. Metabolism studies, methods of analysis and residue definitions in livestock

| Livestock (available studies) | Animal | Dose (mg/kg bw per day) | Duration (days) | N rate/comment |
|-------------------------------|--------|-------------------------|-----------------|----------------|
|                               |        |                         |                 |                |

Copper is a monoatomic element and inherently stable. Therefore, it is not expected to metabolise or to form degradation products (EFSA, 2008).
Time needed to reach a plateau concentration in milk and eggs (days) | Inconclusive
---|---
Metabolism in rat and ruminant similar (Yes/No) | Yes
Animal residue definition for monitoring (RD-Mo) | total copper
Animal residue definition for risk assessment (RD-RA) | total copper
Conversion factor (monitoring to risk assessment) | not relevant
Fat soluble residues (Yes/No) | No
Methods of analysis for monitoring of residues (analytical technique, crop groups, LOQs) | AAS – Atomic Absorption Spectrometry (EFSA, 2014):
- All animal matrices, LOQ: 0.5–1 mg/kg
- Performance characteristic to be validated

LOQ: limit of quantification.

**B.2.1.2. Stability of residues in livestock**

| Animal products (available studies) | Animal | Commodity | T (°C) | Stability (Months/years) |
|---|---|---|---|---|
| | | | Since copper cannot degrade and since the analytical techniques measure total copper content, storage stability studies are not required (EFSA, 2008) |

**B.2.2. Magnitude of residues in livestock**

**B.2.2.1. Summary of the residue data from livestock feeding studies**

Not relevant as feeding studies are not required.

MRLs for livestock commodities are derived from the background levels (France, 2016) and/or monitoring data (2009–2015); See Appendix F.2.

**B.3. Consumer risk assessment**

**ADI**

0.15 mg/kg bw per day (EFSA, 2018a)

**Highest IEDI, according to EFSA PRIMo**

**Scenario 1 (without risk mitigation measures):**

109% ADI (WHO Cluster Diet B)

**Scenario 2 (with risk mitigation measures):**

93.4 % ADI (WHO Cluster Diet B)

**Assumptions made for the calculations**

**Scenario 1 (without risk mitigation measures):**

The calculation takes into account residues arising from authorised uses as well as from any other sources (background concentrations, uptake from soil, etc.). Therefore, the contribution of commodities where no GAP was reported in the framework of this review was also included in the calculation.

For those commodities where MRLs were derived from:

- the authorised GAPs, input values are based on the median values of the supporting residue trials;
- the monitoring data, input values are based on mean values of the monitoring results;
- the background levels data, input values are based on median values of the background levels.

For citrus fruits, cucurbits with inedible peel, the relevant peeling factors were applied. For wine grapes, the processing factor of wine juice was applied. For rapeseed and olives for oil production, the processing factor for oil production was applied.

For those commodities where data were insufficient to derive an MRL, EFSA considered the existing EU MRL for an indicative calculation.
Scenario 2 (with risk mitigation measures):
Same approach as in scenario 1 was applied, including the following assumptions:

- Northern GAP on potatoes will be withdrawn; a fall-back option is identified with the southern GAP (MRL of 4 mg/kg);
- The critical GAPs authorised on wine grapes will be withdrawn (no fall-back GAP identified); exposure assessed with the background levels;
- The critical GAPs authorised on tomatoes will be withdrawn (no fall-back GAP identified); exposure assessed with the background levels;
- The critical GAPs authorised on lettuce will be withdrawn (no fall-back GAP identified); exposure assessed with the background levels.

Consumer exposure through drinking water or from ‘water and water-based beverages’:

| ADI | 0.15 mg/kg bw per day (EFSA, 2018a) |
| --- | ----------------------------------- |
| Intake of copper (%ADI) | Calculation 1: |
| | Calculation 1a: 0.62 – 2.80% ADI |
| | Calculation 1b: 3.36 – 15.1% ADI |
| | Calculation 1c: 9.64 – 43.4% ADI |
| Calculation 2: | 0.20 – 5.4% ADI |

Assumptions made for the calculations

**Calculation 1:**
This calculation is based on the standard consumption data considered in the EC guidance on the assessment of metabolites in groundwater (European Commission, 2003) and on copper occurrence data in tap water, taken from a French database (France, 2016):

- Calculation 1a: based on the median value
- Calculation 1b: based on the average value
- Calculation 1c: based on 95th percentile

**Calculation 2:**
This calculation was performed in the framework of the scientific opinion on dietary reference values for copper (EFSA NDA Panel, 2015) and considers the contribution of the group of “water and water-based beverages”, therefore including tap water, natural mineral water, bottled drinking water, soft drinks, flavoured waters, etc.

| ARfD | Not needed (EFSA, 2018a) |
| --- | ------------------------- |
| Highest IESTI, according to EFSA PRIMo | -- |
| Assumptions made for the calculations | -- |

ADi: acceptable daily intake; IEDI: international estimated daily intake; PRIMo: (EFSA) Pesticide Residues Intake Model; bw: body weight; WHO: World Health Organization; GAP: Good Agricultural Practice; MRL: maximum residue level; ARfD: acute reference dose; IESTI: international estimated short-term intake.
### B.4. Proposed MRLs

| Code number | Commodity                  | Existing EU MRL (mg/kg) | Outcome of the review | Comment       |
|-------------|----------------------------|-------------------------|-----------------------|---------------|
| 110010      | Grapefruits                | 20                      |                      | Further consideration needed \(^{(a)}\) |
| 110020      | Oranges                    | 20                      |                      | Further consideration needed \(^{(a)}\) |
| 110030      | Lemons                     | 20                      |                      | Further consideration needed \(^{(a)}\) |
| 110040      | Limes                      | 20                      |                      | Further consideration needed \(^{(a)}\) |
| 110050      | Mandarins                  | 20                      |                      | Further consideration needed \(^{(a)}\) |
| 120010      | Almonds                    | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 120020      | Brazil nuts                | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 120030      | Cashew nuts                | 30                      |                      | Further consideration needed \(^{(b)}\) |
| 120040      | Chestnuts                  | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 120050      | Coconuts                   | 30                      |                      | Further consideration needed \(^{(b)}\) |
| 120060      | Hazelnuts/cobnuts          | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 120070      | Macadamias                 | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 120080      | Pecans                     | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 120090      | Pine nut kernels           | 30                      |                      | Further consideration needed \(^{(b)}\) |
| 120100      | Pistachios                 | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 120110      | Walnuts                    | 30                      |                      | Further consideration needed \(^{(a)}\) |
| 130010      | Apples                     | 5                       |                      | Recommended \(^{(c)}\) |
| 130020      | Pears                      | 5                       |                      | Recommended \(^{(c)}\) |
| 130030      | Quinces                    | 5                       |                      | Recommended \(^{(c)}\) |
| 130040      | Medlars                    | 5                       |                      | Recommended \(^{(c)}\) |
| 130050      | Loquats/Japanese medlars   | 5                       |                      | Recommended \(^{(c)}\) |
| 140010      | Apricots                   | 5                       |                      | Recommended \(^{(c)}\) |
| 140020      | Cherries (sweet)           | 5                       |                      | Recommended \(^{(c)}\) |
| 140030      | Peaches                    | 5                       |                      | Recommended \(^{(c)}\) |
| 140040      | Plums                      | 5                       |                      | Further consideration needed \(^{(a)}\) |
| 151010      | Table grapes               | 50                      |                      | Recommended \(^{(c)}\) |
| 151020      | Wine grapes                | 50                      |                      | Further consideration needed \(^{(d)}\) |
| 152000      | Strawberries               | 5                       |                      | Recommended \(^{(c)}\) |
| 153010      | Blackberries               | 5                       |                      | Recommended \(^{(c)}\) |
| 153020      | Dewberries                 | 5                       |                      | Recommended \(^{(c)}\) |
| 153030      | Raspberries (red and yellow)| 5                      |                      | Recommended \(^{(c)}\) |
| 154010      | Blueberries                | 5                       |                      | Recommended \(^{(c)}\) |
| 154020      | Cranberries                | 5                       |                      | Recommended \(^{(c)}\) |
| 154030      | Currants (black, red and white) | 5                   |                      | Recommended \(^{(c)}\) |
| 154040      | Gooseberries (green, red and yellow) | 5          |                      | Recommended \(^{(c)}\) |
| 154050      | Rose hips                  | 5                       |                      | Recommended \(^{(c)}\) |
| 154060      | Mulberries (black and white) | 5                  |                      | Recommended \(^{(c)}\) |
| 154070      | Azaroles/Mediterranean medlars | 5                  |                      | Recommended \(^{(c)}\) |
| 154080      | Elderberries               | 5                       |                      | Recommended \(^{(c)}\) |
| 161010      | Dates                      | 20                      |                      | Further consideration needed \(^{(e)}\) |
| 161020      | Figs                       | 20                      |                      | Further consideration needed \(^{(f)}\) |
| 161030      | Table olives               | 30                      |                      | Further consideration needed \(^{(a)}\) |

**Enforcement residue definition (existing):** copper compounds (copper)  
**Enforcement residue definition (proposed):** total copper
| Code number | Commodity                              | Existing EU MRL (mg/kg) | Outcome of the review (MRL (mg/kg)) | Comment                                      |
|------------|----------------------------------------|-------------------------|------------------------------------|----------------------------------------------|
| 161040     | Kumquats                               | 20                      | 2*                                 | Further consideration needed*(e)             |
| 161050     | Carambolas                              | 20                      | 2*                                 | Further consideration needed*(e)             |
| 161060     | Kaki/Japanese persimmons               | 20                      | 2*                                 | Further consideration needed*(e)             |
| 161070     | Jambuils/jambolans                      | 20                      | 10                                 | Recommended*(c)                              |
| 162010     | Kiwi fruits (green, red, yellow)        | 20                      | 30                                 | Further consideration needed*(a)             |
| 162020     | Litchis/lychees                         | 20                      | 2*                                 | Further consideration needed*(e)             |
| 162030     | Passionfruits/maracujas                 | 20                      | 4                                  | Further consideration needed*(f)             |
| 162040     | Prickly pears/cactus fruits             | 20                      | 2*                                 | Further consideration needed*(e)             |
| 162050     | Star apples/caimitos                    | 20                      | 2*                                 | Further consideration needed*(e)             |
| 162060     | American persimmons/Virginia kaki       | 20                      | 2*                                 | Further consideration needed*(e)             |
| 163010     | Avocados                                | 20                      | 6                                  | Further consideration needed*(e)             |
| 163020     | Bananas                                 | 20                      | 6                                  | Further consideration needed*(e)             |
| 163030     | Mangoes                                 | 20                      | 6                                  | Further consideration needed*(f)             |
| 163040     | Papayas                                 | 20                      | 6                                  | Further consideration needed*(e)             |
| 163050     | Granate apples/pomegranates             | 20                      | 6                                  | Further consideration needed*(e)             |
| 163060     | Cherimoyas                              | 20                      | 6                                  | Further consideration needed*(f)             |
| 163070     | Guavas                                  | 20                      | 6                                  | Further consideration needed*(e)             |
| 163080     | Pineapples                              | 20                      | 6                                  | Further consideration needed*(e)             |
| 163090     | Breadfruits                             | 20                      | 6                                  | Further consideration needed*(e)             |
| 163100     | Durians                                 | 20                      | 6                                  | Further consideration needed*(e)             |
| 163110     | Soursops/guanabanas                     | 20                      | 6                                  | Further consideration needed*(e)             |
| 211000     | Potatoes                                | 5                       | 7/4                                | Further consideration needed*(d)             |
| 212010     | Cassava roots/manioc                    | 5                       | 4                                  | Recommended*(c)                              |
| 212020     | Sweet potatoes                          | 5                       | 4                                  | Recommended*(c)                              |
| 212030     | Yams                                    | 5                       | 4                                  | Recommended*(c)                              |
| 212040     | Arrowroots                              | 5                       | 4                                  | Recommended*(c)                              |
| 213010     | Beetroots                               | 5                       | 3                                  | Further consideration needed*(a)             |
| 213020     | Carrots                                 | 5                       | 3                                  | Further consideration needed*(a)             |
| 213030     | Celeriacs/turnip rooted celeries        | 5                       | 3                                  | Further consideration needed*(a)             |
| 213040     | Horseradishes                           | 5                       | 3                                  | Further consideration needed*(a)             |
| 213050     | Jerusalem artichokes                    | 5                       | 3                                  | Further consideration needed*(a)             |
| 213060     | Parsnips                                | 5                       | 3                                  | Further consideration needed*(a)             |
| 213070     | Parsley roots/Hamburg roots parsley     | 5                       | 3                                  | Further consideration needed*(a)             |
| 213080     | Radishes                                | 5                       | 3                                  | Further consideration needed*(a)             |
| 213090     | Salsifies                               | 5                       | 3                                  | Further consideration needed*(a)             |
| 213100     | Swedes/rutabagas                        | 5                       | 3                                  | Further consideration needed*(a)             |
| 213110     | Turnips                                 | 5                       | 3                                  | Further consideration needed*(a)             |
| 220010     | Garlic                                  | 5                       | 4                                  | Further consideration needed*(b)             |
| 220020     | Onions                                  | 5                       | 2*                                 | Recommended*(c)                              |
| 220030     | Shallots                                | 5                       | 2*                                 | Recommended*(c)                              |
| 220040     | Spring onions/green onions and Welsh onions | 5                      | 70                                 | Recommended*(c)                              |
| 231010     | Tomatoes                                | 5                       | 10/2                               | Further consideration needed*(d)             |
| 231020     | Sweet peppers/bell peppers              | 5                       | 20                                 | Recommended*(c)                              |
| Code number | Commodity                              | Existing EU MRL (mg/kg) | Outcome of the review |
|-------------|----------------------------------------|-------------------------|-----------------------|
| 231030      | Aubergines/eggplants                   | 5                       | 10                    | Recommended<sup>(c)</sup> |
| 231040      | Okra/lady's fingers                    | 5                       | 2*                    | Further consideration needed<sup>(e)</sup> |
| 232010      | Cucumbers                              | 5                       | 5                     | Recommended<sup>(c)</sup> |
| 232020      | Gherkins                               | 5                       | 5                     | Recommended<sup>(c)</sup> |
| 232030      | Courgettes                             | 5                       | 5                     | Recommended<sup>(c)</sup> |
| 233010      | Melons                                 | 5                       | 10                    | Further consideration needed<sup>(a)</sup> |
| 233020      | Pumpkins                               | 5                       | 10                    | Further consideration needed<sup>(a)</sup> |
| 233030      | Watermelons                            | 5                       | 10                    | Further consideration needed<sup>(a)</sup> |
| 234000      | Sweet corn                             | 10                      | 2*                    | Further consideration needed<sup>(e)</sup> |
| 241010      | Broccoli                               | 20                      | 5                     | Recommended<sup>(c)</sup> |
| 241020      | Cauliflowers                            | 20                      | 5                     | Recommended<sup>(c)</sup> |
| 242010      | Brussels sprouts                       | 20                      | 2*                    | Further consideration needed<sup>(e)</sup> |
| 242020      | Head cabbages                          | 20                      | 2*                    | Further consideration needed<sup>(f)</sup> |
| 243010      | Chinese cabbages/pe-tsai               | 20                      | 3                     | Further consideration needed<sup>(e)</sup> |
| 243020      | Kales                                  | 20                      | 3                     | Further consideration needed<sup>(e)</sup> |
| 244000      | Kohlrabies                              | 20                      | 3                     | Further consideration needed<sup>(e)</sup> |
| 251010      | Lamb's lettuces/corn salads            | 100                     | 150                   | Recommended<sup>(c)</sup> |
| 251020      | Lettuces                               | 100                     | 150/4                 | Further consideration needed<sup>(d)</sup> |
| 251030      | Escaroles/broad-leaved endives         | 100                     | 150                   | Recommended<sup>(c)</sup> |
| 251040      | Cresses and other sprouts and shoots   | 100                     | 150                   | Recommended<sup>(c)</sup> |
| 251050      | Land cresses                           | 100                     | 150                   | Recommended<sup>(c)</sup> |
| 251060      | Roman rocket/rucola                    | 100                     | 150                   | Recommended<sup>(c)</sup> |
| 251070      | Red mustards                           | 100                     | 150                   | Recommended<sup>(c)</sup> |
| 251080      | Baby leaf crops (including brassica species) | 100                     | 150                   | Recommended<sup>(c)</sup> |
| 252010      | Spinaches                              | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 252020      | Purslanes                              | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 252030      | Chards/beet leaves                     | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 253000      | Grape leaves and similar species       | 20                      | 5                     | Further consideration needed<sup>(e)</sup> |
| 254000      | Watercresses                           | 20                      | 150                   | Further consideration needed<sup>(a)</sup> |
| 255000      | Witloofs/Belgian endives               | 20                      | 2*                    | Further consideration needed<sup>(e)</sup> |
| 256010      | Chervil                                | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256020      | Chives                                 | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256030      | Celery leaves                          | 50                      | 150                   | Recommended<sup>(c)</sup> |
| 256040      | Parsley                                | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256050      | Sage                                   | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256060      | Rosemary                               | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256070      | Thyme                                  | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256080      | Basil and edible flowers               | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256090      | Laurel/bay leaf                        | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 256100      | Tarragon                               | 20                      | 150                   | Recommended<sup>(c)</sup> |
| 260010      | Beans (with pods)                      | 20                      | 10                    | Further consideration needed<sup>(a)</sup> |
| 260020      | Beans (without pods)                   | 20                      | 4                     | Further consideration needed<sup>(f)</sup> |
| 260030      | Peas (with pods)                       | 20                      | 10                    | Further consideration needed<sup>(a)</sup> |
| 260040      | Peas (without pods)                    | 20                      | 7                     | Further consideration needed<sup>(a)</sup> |
| 260050      | Lentils (fresh)                        | 20                      | 4                     | Further consideration needed<sup>(f)</sup> |
| Code number | Commodity                  | Existing EU MRL (mg/kg) | Outcome of the review | MRL (mg/kg) | Comment                     |
|------------|----------------------------|-------------------------|-----------------------|-------------|-----------------------------|
| 270010     | Asparagus                  | 5                       | 7                     | Further consideration needed (f) |
| 270020     | Cardoons                   | 20                      | 7                     | Further consideration needed (f) |
| 270030     | Celeries                   | 20                      | 7                     | Further consideration needed (e) |
| 270040     | Florence fennels           | 20                      | 7                     | Further consideration needed (e) |
| 270050     | Globe artichokes           | 20                      | 30                    | Recommended (c) |
| 270060     | Leeks                      | 20                      | 70                    | Recommended (c) |
| 270070     | Rhubarbs                   | 20                      | 7                     | Further consideration needed (e) |
| 270080     | Bamboo shoots              | 20                      | 7                     | Further consideration needed (e) |
| 270090     | Palm hearts                | 20                      | 7                     | Further consideration needed (e) |
| 280010     | Cultivated fungi           | 20                      | 6                     | Further consideration needed (e) |
| 280020     | Wild fungi                 | 20                      | 6                     | Further consideration needed (e) |
| 290000     | Algae and prokaryotes      | 20                      | 3                     | Further consideration needed (e) |
| 300010     | Beans (dry)                | 20                      | 15                    | Further consideration needed (f) |
| 300020     | Lentils (dry)              | 20                      | 15                    | Further consideration needed (f) |
| 300030     | Peas (dry)                 | 20                      | 15                    | Further consideration needed (e) |
| 300040     | Lupins/lupini beans (dry)  | 20                      | 15                    | Further consideration needed (e) |
| 401010     | Linseeds                   | 30                      | 30                    | Further consideration needed (e) |
| 401020     | Peanuts/groundnuts         | 30                      | 30                    | Further consideration needed (e) |
| 401030     | Poppy seeds                | 30                      | 30                    | Further consideration needed (e) |
| 401040     | Sesame seeds               | 30                      | 30                    | Further consideration needed (e) |
| 401050     | Sunflower seeds            | 40                      | 30                    | Further consideration needed (f) |
| 401060     | Rapseeds/canola seeds      | 30                      | 30                    | Further consideration needed (f) |
| 401070     | Soyabeans                  | 40                      | 30                    | Further consideration needed (g) |
| 401080     | Mustard seeds              | 30                      | 30                    | Further consideration needed (e) |
| 401090     | Cotton seeds               | 30                      | 30                    | Further consideration needed (e) |
| 401100     | Pumpkin seeds              | 30                      | 30                    | Further consideration needed (e) |
| 401110     | Safflower seeds            | 30                      | 30                    | Further consideration needed (e) |
| 401120     | Borage seeds               | 30                      | 30                    | Further consideration needed (e) |
| 401130     | Gold of pleasure seeds     | 30                      | 30                    | Further consideration needed (e) |
| 401140     | Hemp seeds                 | 30                      | 30                    | Further consideration needed (e) |
| 401150     | Castor beans               | 30                      | 30                    | Further consideration needed (e) |
| 402010     | Olives for oil production  | 30                      | 20                    | Further consideration needed (a) |
| 402020     | Oil palms kernels          | 30                      | 30                    | Further consideration needed (h) |
| 402030     | Oil palms fruits           | 30                      | 30                    | Further consideration needed (h) |
| 402040     | Kapok                      | 30                      | 30                    | Further consideration needed (h) |
| 500010     | Barley grains              | 10                      | 10                    | Further consideration needed (e) |
| 500020     | Buckwheat and other        | 10                      | 15                    | Further consideration needed (e) |
| 500030     | Maize/corn grains          | 10                      | 10                    | Further consideration needed (i) |
| 500040     | Common millet/proso millet grains | 10 | 10 | Further consideration needed (e) |
| 500050     | Oat grains                 | 10                      | 10                    | Further consideration needed (e) |
| 500060     | Rice grains                | 10                      | 10                    | Further consideration needed (e) |
| 500070     | Rye grains                 | 10                      | 10                    | Further consideration needed (e) |
| 500080     | Sorghum grains             | 10                      | 10                    | Further consideration needed (e) |
| 500090     | Wheat grains               | 10                      | 10                    | Further consideration needed (i) |
| 610000     | Teas                       | 40                      | 30                    | Further consideration needed (e) |
| Code number | Commodity                        | Existing EU MRL (mg/kg) | Outcome of the review | Comment       |
|-------------|----------------------------------|-------------------------|-----------------------|---------------|
| 620000      | Coffee beans                      | 50                      | 20                    | Further consideration needed (e) |
| 631000      | Herbal infusions from flowers     | 100                     | 5*                    | Further consideration needed (e) |
| 632000      | Herbal infusions from leaves and herbs | 100                    | 5*                    | Further consideration needed (e) |
| 633000      | Herbal infusions from roots       | 100                     | 5*                    | Further consideration needed (e) |
| 640000      | Cocoa beans                       | 50                      | 5*                    | Further consideration needed (e) |
| 650000      | Carobs/Saint John's breads        | 20                      | 6                     | Further consideration needed (e) |
| 700000      | Hops                              | 1,000                   | 1,500                 | Further consideration needed (a) |
| 810000      | Seed spices                       | 40                      | 15                    | Further consideration needed (e) |
| 820000      | Fruit spices                      | 40                      | 15                    | Further consideration needed (e) |
| 830000      | Bark spices                       | 40                      | 5*                    | Further consideration needed (e) |
| 840000      | Root and rhizome spices           | 40                      | 5*                    | Further consideration needed (e) |
| 850000      | Bud spices                        | 40                      | 5*                    | Further consideration needed (e) |
| 860000      | Flower pistil spices              | 40                      | 5*                    | Further consideration needed (e) |
| 870000      | Aril spices                       | 40                      | 30                    | Further consideration needed (e) |
| 900010      | Sugar beet roots                  | 5                       | 2*                    | Further consideration needed (f) |
| 900020      | Sugar canes                       | 5                       | 2*                    | Further consideration needed (e) |
| 900030      | Chicory roots                     | 5                       | 2*                    | Further consideration needed (e) |
| 1011010     | Swine muscle                      | 5                       | 7                     | Further consideration needed (j) |
| 1011020     | Swine fat tissue                  | 5                       | 2                     | Further consideration needed (j) |
| 1011030     | Swine liver                       | 30                      | 90                    | Further consideration needed (j) |
| 1011040     | Swine kidney                      | 30                      | 10                    | Further consideration needed (j) |
| 1012010     | Bovine muscle                     | 5                       | 3                     | Further consideration needed (j) |
| 1012020     | Bovine fat tissue                 | 5                       | 0.6*                  | Further consideration needed (j) |
| 1012030     | Bovine liver                      | 30                      | 400                   | Further consideration needed (j) |
| 1012040     | Bovine kidney                     | 30                      | 10                    | Further consideration needed (j) |
| 1013010     | Sheep muscle                      | 5                       | 3                     | Further consideration needed (j) |
| 1013020     | Sheep fat tissue                  | 5                       | 0.6*                  | Further consideration needed (j) |
| 1013030     | Sheep liver                       | 30                      | 150                   | Further consideration needed (j) |
| 1013040     | Sheep kidney                      | 30                      | 6                     | Further consideration needed (j) |
| 1014010     | Goat muscle                       | 5                       | 3                     | Further consideration needed (j) |
| 1014020     | Goat fat tissue                   | 5                       | 0.6*                  | Further consideration needed (j) |
| 1014030     | Goat liver                        | 30                      | 150                   | Further consideration needed (j) |
| 1014040     | Goat kidney                       | 30                      | 6                     | Further consideration needed (j) |
| 1015010     | Equine muscle                     | 5                       | 3                     | Further consideration needed (j) |
| 1015020     | Equine fat tissue                 | 5                       | 0.6*                  | Further consideration needed (j) |
| 1015030     | Equine liver                      | 30                      | 400                   | Further consideration needed (j) |
| 1015040     | Equine kidney                     | 30                      | 10                    | Further consideration needed (j) |
| 1016010     | Poultry muscle                    | 5                       | 7                     | Further consideration needed (j) |
| 1016020     | Poultry fat tissue                | 5                       | 1*                    | Further consideration needed (j) |
| 1016030     | Poultry liver                     | 30                      | 80                    | Further consideration needed (j) |
| 1020010     | Cattle milk                       | 2                       | 1*                    | Further consideration needed (j) |
| 1020020     | Sheep milk                        | 2                       | 1*                    | Further consideration needed (j) |
| 1020030     | Goat milk                         | 2                       | 1*                    | Further consideration needed (j) |
| 1020040     | Horse milk                        | 2                       | 1*                    | Further consideration needed (j) |
| Code number | Commodity                        | Existing EU MRL (mg/kg) | Outcome of the review | MRL (mg/kg) | Comment                                      |
|-------------|----------------------------------|-------------------------|-----------------------|-------------|----------------------------------------------|
| 1030000     | Birds eggs                       | 2                       |                       | 1*          | Further consideration needed (j)             |
| 1070000     | Other terrestrial animal products| 0.01*                   |                       | 3           | Further consideration needed (j)             |

MRL: maximum residue level.
*: Indicates that the MRL is set at the limit of quantification.
(a): Tentative MRL is derived from a GAP evaluated at EU level, which is not fully supported by data but for which no risk to consumers was identified; no CXL is available (case A2 in the decision tree reported in Appendix E.1).
(b): Tentative MRL is derived from monitoring data and/or background levels; GAP evaluated as EU level is expected to lead to lower residues compared to endogenous levels; no risk to consumers was identified; no CXL is available (case B in the decision tree reported in Appendix E.1).
(c): MRL is derived from a GAP evaluated at EU level, which is fully supported by data and for which no risk to consumers is identified; no CXL is available (case A1 in the decision tree reported in Appendix E.1).
(d): GAP evaluated at EU level is fully supported by data but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available. A lower MRL derived from a fall-back GAP or from the background levels may be considered (equivalent to cases A1/A2 or D1 in the decision tree reported in Appendix E.1).
(e): There are no relevant authorisations or import tolerances reported at EU level but tentative MRL is derived from background levels, for which no risk to consumers is identified; no CXL is available (cases D1 and D2 in the decision tree reported in Appendix E.1).
(f): Tentative MRL is derived from monitoring data and/or background levels; GAP evaluated at EU level is not supported by data; no risk to consumers was identified; no CXL is available (case C in the decision tree reported in Appendix E.1).
(g): GAP evaluated at EU level is not supported by data; a tentative MRL can derived from monitoring data and/or background levels but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available (equivalent to case C in the decision tree reported in Appendix E.1).
(h): There are no relevant authorisations or import tolerances reported at EU level but no risk to consumers was identified for the existing EU MRL; no CXL is available (case E in the decision tree reported in Appendix E.1).
(i): There are no relevant authorisations or import tolerances reported at EU level; tentative MRL can be derived from background levels but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available (equivalent to cases D1/D2 in the decision tree reported in Appendix E.1).
(j): Tentative MRL is derived from monitoring data and/or background levels for all food commodities of animal origin; no risk to consumers was identified for this commodity; no CXL is available (case F in the decision tree reported in Appendix E.2).
(k): Tentative MRL can be derived from monitoring data and/or background levels for all food commodities of animal origin but this commodity is identified as one of the main contributors to the chronic exposure while a chronic risk to consumers cannot be excluded; no CXL is available (equivalent to case F in the decision tree reported in Appendix E.2).
Appendix C – Pesticide Residue Intake Model (PRIMO)

**PRIMO(EU1)**

### Copper

| Status of the active substance | Code no. |
|--------------------------------|----------|
| LOQ (mg/kg bw) | Proposed LOQ |

| Toxicological endpoints |
|--------------------------------|
| ADI (mg/kg bw per day) | Proposed ADI (mg/kg bw) |
| Source of ADI | EFSA 2018 Year of evaluation |

| ARfD (mg/kg bw) | Year of evaluation | Source of ARfD |
|----------------|------------------|----------------|
| n.n. | | |

| Source of ADI | EFSA 2018 Year of evaluation |
|----------------|------------------|
| | |

| No of diets exceeding ADI | 1 |
|---------------------------|---|
| TMDI values in % of ADI | 14 – 109 |

| Highest calculated TMDI values in % of ADI | MS Diet |
|--------------------------------------------|---------|
| 106.9 WHO Cluster diet B | 21.6 Wheat |

| Commodity / group of commodities |
|----------------------------------|
| 2.1 Spinach |
| 3.3 Lettuce |

| ARfD (mg/kg bw) | Year of evaluation | Source of ARfD |
|----------------|------------------|----------------|
| n.n. | | |

| Source of ADI | EFSA 2018 Year of evaluation |
|----------------|------------------|
| | |

### Conclusion:

The estimated Theoretical Maximum Daily Intakes based on MS and WHO diets and pTMRLs were in the range of 14.1% – 109% of the ADI.

For 1 diet, the ADI is exceeded. Further refinements of the dietary intake estimates have not been performed. A public health risk can not be excluded at the moment.
Acute risk assessment is not necessary.

For each commodity, the calculation is based on the highest reported MS consumption per kg bw and the corresponding unit weight from the MS with the critical consumption. If no data on the unit weight was available from that MS, an average European unit weight was used for the IESTI calculation.

In the IESTI 1 calculation, the variability factors were 10, 7 or 5 (according to JMPR manual 2002); for lettuce, a variability factor of 5 was used. In the IESTI 2 calculations, the variability factors of 10 and 7 were replaced by 5. For lettuce, the calculation was performed with a variability factor of 3.

Threshold MRL is the calculated residue level which would lead to an exposure equivalent to 100% of the ARfD.

| Unprocessed commodities | IESTI 1 | --- | IESTI 2 | --- | IESTI 1 | --- | IESTI 2 | --- | IESTI 1 | --- | IESTI 2 | --- |
|-------------------------|---------|---|---------|---|---------|---|---------|---|---------|---|---------|---|
| No of commodities for which ARfD/ADI is exceeded (IESTI 1): | --- | --- | No of commodities for which ARfD/ADI is exceeded (IESTI 2): | --- | No of commodities for which ARfD/ADI is exceeded (IESTI 1): | --- | No of commodities for which ARfD/ADI is exceeded (IESTI 2): | --- |
| No of critical MRLs (IESTI 1): | --- | --- | No of critical MRLs (IESTI 2): | --- | --- | --- | --- |
| Highest % of ARfD/ADI commodities | pTMRL/ threshold MRL (mg/kg) | | Highest % of ARfD/ADI commodities | pTMRL/ threshold MRL (mg/kg) | | Highest % of ARfD/ADI commodities | pTMRL/ threshold MRL (mg/kg) | | Highest % of ARfD/ADI commodities | pTMRL/ threshold MRL (mg/kg) |

Processed commodities

| No of commodities for which ARfD/ADI is exceeded: | --- | --- |
| No of critical MRLs (IESTI 1): | --- | --- | No of critical MRLs (IESTI 2): | --- | --- |
| Highest % of ARfD/ADI commodities | pTMRL/ threshold MRL (mg/kg) | | Highest % of ARfD/ADI commodities | pTMRL/ threshold MRL (mg/kg) |

*) The results of the IESTI calculations are reported for at least 5 commodities. If the ARfD is exceeded for more than 5 commodities, all IESTI values > 90% of ARfD are reported.

**) pTMRL: provisional temporary MRL.

***) pTMRL: provisional temporary MRL for unprocessed commodity.

Conclusion:
As no ARfD was considered necessary, it is concluded that the short-term intake of copper residues is unlikely to present a public health concern.
**PRIMo(EU2)**

| Status of the active substance | Code no. |
|--------------------------------|----------|
| LOQ (mg/kg bw) | Proposed LOQ |
| 9.15 | --- |
| ADI (mg/kg bw per day) | Source of ADI: |
| 0.15 | EFSA |
| ARfD (mg/kg bw) | Year of evaluation |
| n.n. | 2019 |
| Source of ARfD: | Year of evaluation |
| | 2019 |

| No of diets exceeding ADI | --- |
| MS Diet | --- |
| Commodity/ group of commodities | --- |
| 2nd contributor to MS diet (in % of ADI) | --- |
| Commodity/ group of commodities | --- |
| 3rd contributor to MS diet (in % of ADI) | --- |
| Commodity/ group of commodities | --- |

| Toxicological end points | Cu (mg/kg bw per day) | R.A. |
|--------------------------|-----------------------|-----|
| Source of ADI: | EFSA |
| Year of evaluation | 2018 |

**Copper**

**Conclusion:**

The estimated Theoretical Maximum Daily Intakes (TMDI), based on pTMRLs were below the ADI.

A long-term intake of residues of copper is unlikely to present a public health concern.
Acute risk assessment is not necessary.

For each commodity, the calculation is based on the highest reported MS consumption per kg bw and the corresponding unit weight from the MS with the critical consumption. If no data on the unit weight was available from that MS, an average European unit weight was used for the IESTI calculation.

In the IESTI 1 calculation, the variability factors were 10, 7 or 5 (according to JMPR manual 2002); for lettuce, a variability factor of 5 was used.

In the IESTI 2 calculations, the variability factors of 10 and 7 were replaced by 5. For lettuce, the calculation was performed with a variability factor of 3.

Threshold MRL is the calculated residue level which would lead to an exposure equivalent to 100% of the ARfD.

### Acute risk assessment/children – refined calculations

| No of commodities for which ARfD/ADI is exceeded (IESTI 1): | IESTI 1 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |
| --- | --- | --- | --- | --- | --- |
| No of commodities for which ARfD/ADI is exceeded (IESTI 2): | IESTI 2 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |

### Acute risk assessment/adults/general population – refined calculations

| No of commodities for which ARfD/ADI is exceeded (IESTI 1): | IESTI 1 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |
| --- | --- | --- | --- | --- | --- |
| No of commodities for which ARfD/ADI is exceeded (IESTI 2): | IESTI 2 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |

| No of commodities for which ARfD/ADI is exceeded (IESTI 1): | IESTI 1 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |
| --- | --- | --- | --- | --- | --- |
| No of commodities for which ARfD/ADI is exceeded (IESTI 2): | IESTI 2 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |

| No of commodities for which ARfD/ADI is exceeded: | IESTI 1 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |
| --- | --- | --- | --- | --- | --- |
| No of commodities for which ARfD/ADI is exceeded: | IESTI 2 | (*) | High % of ARfD/ADI Commodities | pTMRL | threshold MRL (mg/kg) |

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**(*)** The results of the IESTI calculations are reported for at least 5 commodities. If the ARfD is exceeded for more than 5 commodities, all IESTI values > 90% of ARfD are reported.

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**pTMRL:** provisional temporary MRL.

**pTMRL:** provisional temporary MRL for unprocessed commodity.

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**Conclusion:**

As no ARfD was considered necessary, it is concluded that the short-term intake of copper residues is unlikely to present a public health concern.
## Appendix D – Input values for the exposure calculations

### D.1. Livestock dietary burden calculations

| Feed commodity                  | Median dietary burden | Maximum dietary burden |
|---------------------------------|-----------------------|------------------------|
| **Input value (mg/kg)**         | **Comment**           | **Input value (mg/kg)**| **Comment**               |
| Grapefruits, dried pulp        | 33.8 STMR × PF        | 33.8 STMR × PF         |
| Oranges, dried pulp            | 33.8 STMR × PF        | 33.8 STMR × PF         |
| Lemons, dried pulp             | 33.8 STMR × PF        | 33.8 STMR × PF         |
| Limes, dried pulp              | 33.8 STMR × PF        | 33.8 STMR × PF         |
| Mandarin, dried pulp           | 33.8 STMR × PF        | 33.8 STMR × PF         |
| Coconut, meal                   | 6.75 Median background(b) × 1.5(a) | 6.75 Median background(b) × 1.5(a) |
| Apple, pomace, wet              | 1.03 STMR × PF        | 1.03 STMR × PF         |
| Potato, culls                   | 2.00 STMR             | 3.60 HR                |
| Potato, process waste           | 40 STMR × 20(a)       | 40 STMR × 20(a)        |
| Potato, dried pulp              | 76 STMR × 38(a)       | 76 STMR × 38(a)        |
| Cassava/tapioca, roots          | 1.30 STMR             | 2.80 HR                |
| Carrot, culls                   | 0.74 STMR             | 1.33 HR                |
| Swede, roots                    | 0.74 STMR             | 1.33 HR                |
| Turnip, roots                   | 0.74 STMR             | 1.33 HR                |
| Cabbage, heads, leaves          | 0.26 Mean monitoring(c) | 0.65 Max monitoring(c) |
| Alfalfa, forage (green)         | 1.46 Median background(b) | 1.46 Highest background(b) |
| Alfalfa, hay (fodder)           | 3.65 Median background(b) × 2.5(a) | 3.65 Median background(b) × 2.5(a) |
| Alfalfa, meal                   | 3.65 Median background(b) × 2.5(a) | 3.65 Highest background(b) × 2.5(a) |
| Alfalfa, silage                 | 1.61 Median background(b) × 1.1(a) | 1.61 Highest background(b) × 1.1(a) |
| Barley, straw                   | 4.30 Median background(b) | 6.02 Highest background(b) |
| Fodder beets, tops              | 1.75 Median background(b) | 4.42 Highest background(b) |
| Sugar beets, tops               | 1.75 Median background(b) | 4.42 Highest background(b) |
| Clover, forage                  | 1.46 Median background(b) | 1.46 Highest background(b) |
| Clover, hay                     | 4.38 Median background(b) × 3(a) | 4.38 Highest background(b) × 3(a) |
| Clover, silage                  | 1.46 Median background(b) × 1(a) | 1.46 Highest background(b) × 1(a) |
| Corn, field, forage/silage      | 1.52 Median background(b) | 1.52 Highest background(b) |
| Grass, forage (fresh)           | 1.80 Median background(b) | 1.80 Highest background(b) |
| Grass, hay                      | 6.30 Median background(b) × 3.5(a) | 6.30 Highest background(b) × 3.5(a) |
| Grass, silage                   | 2.88 Median background(b) × 1.6(a) | 2.88 Highest background(b) × 1.6(a) |
| Kale, leaves (forage)           | 0.56 Median background(b) | 2.90 Highest background(b) |
| Millet, straw (fodder, dry)     | 4.30 Median background(b) | 6.02 Highest background(b) |
| Oat, straw                      | 4.30 Median background(b) | 6.02 Highest background(b) |

**Risk assessment residue definition:** total copper
| Feed commodity                   | Median dietary burden | Maximum dietary burden |
|----------------------------------|-----------------------|------------------------|
|                                  | Input value (mg/kg)   | Comment                | Input value (mg/kg)   | Comment                |
| Rape, forage                     | 1.26                  | Median background(b)   | 1.26                  | Highest background(b)  |
| Rice, straw                      | 4.30                  | Median background(b)   | 6.02                  | Highest background(b)  |
| Rye, straw                       | 4.30                  | Median background(b)   | 6.02                  | Highest background(b)  |
| Triticale, straw                 | 4.30                  | Median background(b)   | 6.02                  | Highest background(b)  |
| Wheat, straw                     | 4.30                  | Median background(b)   | 6.02                  | Highest background(b)  |
| Barley, grain                    | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Bean, seed (dry)                 | 7.21                  | Mean monitoring(c)     | 7.21                  | Mean monitoring(c)     |
| Corn, field, grain               | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Corn, pop, grain                 | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Cotton, undelinted seed          | 12.02                 | Median background(b)   | 12.02                 | Median background(b)   |
| Cowpea, seed                     | 7.21                  | Median background(b)   | 7.21                  | Median background(b)   |
| Lupin, seed                      | 7.30                  | Median background(b)   | 7.30                  | Median background(b)   |
| Millet, grain                    | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Oat, grain                       | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Field pea, seed (dry)            | 7.30                  | Median background(b)   | 7.30                  | Median background(b)   |
| Rye, grain                       | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Sorghum, grain                   | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Soybean, seed                    | 12.02                 | Median background(b)   | 12.02                 | Median background(b)   |
| Triticale, grain                 | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Wheat, grain                     | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Sugar beets, dried pulp          | 22.5                  | Median background(b)   | 22.5                  | Median background(b)   |
| Sugar beets, ensiled pulp        | 3.75                  | Median background(b)   | 3.75                  | Median background(b)   |
| Sugar beets, molasses            | 35                    | Median background(b)   | 35                    | Median background(b)   |
| Brewer’s grain, dried            | 13.70                 | Median background(b)   | 13.70                 | Median background(b)   |
| Canola, meal                     | 24.04                 | Median background(b)   | 24.04                 | Median background(b)   |
| Corn, field, milled by-pdts      | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Corn, field, hominy meal         | 24.90                 | Median background(b)   | 24.90                 | Median background(b)   |
| Corn, field, gluten feed         | 10.38                 | Median background(b)   | 10.38                 | Median background(b)   |
| Corn, field, gluten, meal        | 4.15                  | Median background(b)   | 4.15                  | Median background(b)   |
| Cotton, meal                     | 15.63                 | Median background(b)   | 15.63                 | Median background(b)   |
| Distiller’s grain, dried         | 13.70                 | Median background(b)   | 13.70                 | Median background(b)   |
| Flaxseed/Linseed, meal           | 24.04                 | Median background(b)   | 24.04                 | Median background(b)   |
| Lupin seed, meal                 | 8.03                  | Median background(b)   | 8.03                  | Median background(b)   |
| Palm (hearts), kernel meal        | 1.30                  | Median background(b)   | 1.30                  | Median background(b)   |
| Peanut, meal                     | 24.04                 | Median background(b)   | 24.04                 | Median background(b)   |
| Rape seed, meal                  | 24.04                 | Median background(b)   | 24.04                 | Median background(b)   |

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### Feed commodity

| Feed commodity          | Input value (mg/kg) | Comment         | Input value (mg/kg) | Comment         |
|-------------------------|--------------------|-----------------|--------------------|-----------------|
| Rice, bran/pollard      | 41.50              | Median background\(^{(b)}\) \(\times\) 10\(^{(a)}\) | 41.50              | Median background\(^{(b)}\) \(\times\) 10\(^{(a)}\) |
| Safflower, meal         | 24.04              | Median background\(^{(b)}\) \(\times\) 2\(^{(a)}\) | 24.04              | Median background\(^{(b)}\) \(\times\) 2\(^{(a)}\) |
| Soybean, meal           | 15.63              | Median background\(^{(b)}\) \(\times\) 1.3\(^{(a)}\) | 15.63              | Median background\(^{(b)}\) \(\times\) 1.3\(^{(a)}\) |
| Soybean, hulls          | 156.26             | Median background\(^{(b)}\) \(\times\) 13\(^{(a)}\) | 156.26             | Median background\(^{(b)}\) \(\times\) 13\(^{(a)}\) |
| Sugarcane, molasses     | 22.08              | Median background\(^{(b)}\) \(\times\) 32\(^{(a)}\) | 22.08              | Median background\(^{(b)}\) \(\times\) 32\(^{(a)}\) |
| Sunflower, meal         | 36.82              | Mean monitoring\(^{(c)}\) \(\times\) 2\(^{(a)}\)  | 36.82              | Mean monitoring\(^{(c)}\) \(\times\) 2\(^{(a)}\) |
| Wheat gluten, meal      | 7.47               | Median background\(^{(b)}\) \(\times\) 1.8\(^{(a)}\) | 7.47               | Median background\(^{(b)}\) \(\times\) 1.8\(^{(a)}\) |
| Wheat, milled by-pdts   | 29.05              | Median background\(^{(b)}\) \(\times\) 7\(^{(a)}\)  | 29.05              | Median background\(^{(b)}\) \(\times\) 7\(^{(a)}\) |

**STMR:** supervised trials median residue; **HR:** highest residue; **PF:** processing factor.

\(\text{(a)}\): For all processed feed items where no data were available to support a PF, default PFs were included in the calculation to consider the potential concentration of residues in these commodities.

\(\text{(b)}\): Median background level estimated from the survey of the RMS (France, 2016), see Annex A for details.

\(\text{(c)}\): Mean value estimated from the monitoring data (2009–2015); see Annex B for details.

### Consumer risk assessment

#### Chronic risk assessment

| Commodity          | Input value (mg/kg) | Comment         |
|--------------------|--------------------|-----------------|
| Grapefruits        | 1.22               | STMR (tentative) \(\times\) PF (peeling) |
| Oranges            | 1.22               | STMR (tentative) \(\times\) PF (peeling) |
| Lemons             | 1.18               | STMR (tentative) \(\times\) PF (peeling) |
| Limes              | 1.18               | STMR (tentative) \(\times\) PF (peeling) |
| Mandarins          | 1.18               | STMR (tentative) \(\times\) PF (peeling) |
| Almonds            | 11.7               | STMR (tentative) |
| Brazil nuts        | 11.7               | STMR (tentative) |
| Cashew nuts        | 13.3               | Median background levels |
| Chestnuts          | 11.7               | STMR (tentative) |
| Coconuts           | 4.50               | Median background levels |
| Hazelnuts/cobnuts   | 11.7               | STMR (tentative) |
| Macadamias         | 11.7               | STMR (tentative) |
| Pecans             | 11.7               | STMR (tentative) |
| Pine nut kernels   | 16.0               | Mean monitoring data |
| Pistachios         | 11.7               | STMR (tentative) |
| Walnuts            | 11.7               | STMR (tentative) |
| Apples             | 1.41               | STMR               |
| Pears              | 1.41               | STMR               |
| Quinces            | 1.41               | STMR               |
| Medlars            | 1.41               | STMR               |
| Loquats/Japanese medlars | 1.41           | STMR               |
| Apricots           | 1.50               | STMR               |
| Cherries (sweet)   | 2.69               | STMR               |
| Peaches            | 2.35               | STMR               |
| Plums              | 1.15               | STMR (tentative)   |

**Risk assessment residue definition:** total copper
| Consumer risk assessment Commodity | Input value (mg/kg) | Chronic risk assessment |
|----------------------------------|-------------------|------------------------|
| Table grapes                     | 8.70              | STMR                   |
| Wine grapes                      | 2.55              | **Scenario 1**: STMR × 0.75 (yield factor for juice) × PF (juice) |
|                                 |                   | **Scenario 2**: Median background levels × 0.75 (yield factor for juice) × PF (juice) |
| Strawberries                     | 2.29              | STMR                   |
| Blackberries                     | 1.00              | STMR                   |
| Dewberries                       | 1.00              | STMR                   |
| Raspberries (red and yellow)     | 1.00              | STMR                   |
| Blueberries                      | 1.00              | STMR                   |
| Cranberries                      | 1.00              | STMR                   |
| Currants (black, red and white)  | 1.00              | STMR                   |
| Gooseberries (green, red and yellow) | 1.00          | STMR                   |
| Rose hips                        | 1.00              | STMR                   |
| Mulberries (black and white)     | 1.00              | STMR                   |
| Azaroles/Mediterranean medlars   | 1.00              | STMR                   |
| Elderberries                     | 1.00              | STMR                   |
| Dates                            | 0.86              | Median background levels |
| Figs                             | 7.85              | Mean monitoring data   |
| Table olives                     | 6.23              | STMR (tentative)       |
| Kumquats                         | 0.86              | Median background levels |
| Carambolas                       | 0.86              | Median background levels |
| Kaki/Japanese persimmons         | 0.86              | Median background levels |
| Jambuls/jambolans                | 2.69              | STMR                   |
| Kiwi fruits (green, red, yellow) | 6.94              | STMR (tentative)       |
| Litchis/lychees                  | 1.48              | Median background levels |
| Passionfruits/maracujas          | 3.55              | Mean monitoring data   |
| Prickly pears/cactus fruits      | 1.48              | Median background levels |
| Star apples/cainitos             | 1.48              | Median background levels |
| American persimmons/Virginia kaki| 1.48              | Median background levels |
| Avocados                         | 0.96              | Median background levels |
| Bananas                          | 0.96              | Median background levels |
| Mangoes                          | 0.96              | Median background levels |
| Papayas                          | 0.96              | Median background levels |
| Granate apples/pomegranates      | 0.96              | Median background levels |
| Cherimoyas                       | 0.96              | Median background levels |
| Guavas                           | 0.96              | Median background levels |
| Pineapples                       | 0.96              | Median background levels |
| Breadfruits                      | 0.96              | Median background levels |
| Durians                          | 0.96              | Median background levels |
| Soursops/guanabanas              | 0.96              | Median background levels |
| Potatoes                         | 2.00              | **Scenario 1**: STMR   |
|                                 |                   | **Scenario 2**: STMR (fall-back southern GAP) |
| Cassava roots/manioc             | 1.30              | STMR                   |
| Sweet potatoes                   | 1.30              | STMR                   |
| Yams                             | 1.30              | STMR                   |
### Consumer risk assessment

| Commodity                                | Input value (mg/kg) | Comment                |
|------------------------------------------|---------------------|------------------------|
| Arrowroots                               | 1.30                | STMR                   |
| Beetroots                                | 0.74                | STMR (tentative)       |
| Carrots                                  | 0.74                | STMR (tentative)       |
| Celeriacs/turnip rooted celeries         | 0.74                | STMR (tentative)       |
| Horseradishes                            | 0.74                | STMR (tentative)       |
| Jerusalem artichokes                     | 0.74                | STMR (tentative)       |
| Parsnips                                 | 0.74                | STMR (tentative)       |
| Parsley roots/Hamburg roots parsley      | 0.74                | STMR (tentative)       |
| Radishes                                 | 0.74                | STMR (tentative)       |
| Salsifies                                | 0.74                | STMR (tentative)       |
| Swedes/rutabagas                         | 0.74                | STMR (tentative)       |
| Turnips                                  | 0.74                | STMR (tentative)       |
| Garlic                                   | 1.93                | Mean monitoring data   |
| Onions                                   | 0.60                | STMR                   |
| Shallots                                 | 0.60                | STMR                   |
| Spring onions/green onions and Welsh onions | 14.6            | STMR                   |
| Tomatoes                                 | 2.50                | **Scenario 1**: STMR   |
|                                         | 0.75                | **Scenario 2**: STMR (median background levels) |
| Sweet peppers/bell peppers               | 3.45                | STMR                   |
| Aubergines/eggplants                     | 2.50                | STMR                   |
| Okra/lady’s fingers                      | 0.94                | Median background levels|
| Cucumbers                                | 2.00                | STMR                   |
| Gherkins                                 | 2.00                | STMR                   |
| Courgettes                               | 2.00                | STMR                   |
| Melons                                   | 4.20                | STMR (tentative)       |
| Pumpkins                                 | 4.20                | STMR (tentative)       |
| Watermelons                              | 4.20                | STMR (tentative)       |
| Sweet corn                               | 0.48                | Median background levels|
| Broccoli                                 | 1.25                | STMR                   |
| Cauliflower                              | 1.25                | STMR                   |
| Brussels sprouts                         | 0.41                | Median background levels|
| Head cabbages                            | 0.26                | Mean monitoring data   |
| Chinese cabbages/pe-tsai                 | 0.56                | Median background levels|
| Kales                                    | 0.56                | Median background levels|
| Kohlrabies                               | 0.56                | Median background levels|
| Lamb’s lettuces/corn salads              | 34.6                | STMR                   |
| Lettuces                                 | 34.6                | **Scenario 1**: STMR   |
|                                         | 0.83                | **Scenario 2**: Median background levels |
| Escaroles/broad-leaved endives           | 34.6                | STMR                   |
| Cresses and other sprouts and shoots     | 34.6                | STMR                   |
| Land cresses                             | 34.6                | STMR                   |
| Roman rocket/rucola                      | 34.6                | STMR                   |
| Red mustards                             | 34.6                | STMR                   |
| Baby leaf crops (including brassica species) | 34.6          | STMR                   |
### Consumer risk assessment

#### Commodity

| Commodity                          | Input value (mg/kg) | Comment          |
|------------------------------------|--------------------|------------------|
| Spinaches                          | 34.6               | STMR             |
| Purslanes                          | 34.6               | STMR             |
| Chards/beet leaves                 | 34.6               | STMR             |
| Grape leaves and similar species   | 4.15               | Median background levels |
| Watercresses                       | 11.7               | STMR (tentative) |
| Witloofs/Belgian endives           | 0.51               | Median background levels |
| Chervil                            | 34.6               | STMR             |
| Chives                             | 34.6               | STMR             |
| Celery leaves                      | 34.6               | STMR             |
| Parsley                            | 34.6               | STMR             |
| Sage                               | 34.6               | STMR             |
| Rosemary                           | 34.6               | STMR             |
| Thyme                              | 34.6               | STMR             |
| Basil and edible flowers           | 34.6               | STMR             |
| Laurel/bay leave                   | 34.6               | STMR             |
| Tarragon                           | 34.6               | STMR             |
| Beans (with pods)                  | 3.25               | STMR (tentative) |
| Beans (without pods)               | 3.18               | Median background levels |
| Peas (with pods)                   | 3.25               | STMR (tentative) |
| Peas (without pods)                | 2.39               | STMR (tentative) |
| Lentils (fresh)                    | 3.18               | Median background levels |
| Asparagus                          | 0.65               | Median background levels |
| Cardoons                           | 0.65               | Median background levels |
| Celeries                           | 0.65               | Median background levels |
| Florence fennels                   | 0.65               | Median background levels |
| Globe artichokes                   | 7.44               | STMR             |
| Leeks                              | 14.6               | STMR             |
| Rhubarbs                           | 0.65               | Median background levels |
| Bamboo shoots                      | 0.65               | Median background levels |
| Palm hearts                        | 0.65               | Median background levels |
| Cultivated fungi                   | 2.86               | Median background levels |
| Wild fungi                         | 2.86               | Median background levels |
| Algae and prokaryotes organisms    | 0.44               | Median background levels |
| Beans (dry)                        | 7.21               | Mean monitoring data |
| Lentils (dry)                      | 9.19               | Mean monitoring data |
| Peas (dry)                         | 7.30               | Median background levels |
| Lupins/lupini beans (dry)          | 7.30               | Median background levels |
| Linseeds                           | 12.0               | Median background levels |
| Peanuts/groundnuts                 | 12.0               | Median background levels |
| Poppy seeds                        | 12.0               | Median background levels |
| Sesame seeds                       | 12.0               | Median background levels |
| Sunflower seeds                    | 18.4               | Mean monitoring data |
| Rapeseeds/canola seeds             | 1.20               | Median background levels x PF (oil) |
| Soya beans                         | 12.0               | Median background levels |
| Mustard seeds                      | 12.0               | Median background levels |
| Cotton seeds                       | 12.0               | Median background levels |
| Pumpkin seeds                      | 12.0               | Median background levels |

#### Chronic risk assessment

| Commodity                          | Input value (mg/kg) | Comment |
|------------------------------------|--------------------|---------|
| Spinaches                          | 34.6               | STMR    |
| Purslanes                          | 34.6               | STMR    |
| Chards/beet leaves                 | 34.6               | STMR    |
| Grape leaves and similar species   | 4.15               | Median background levels |
| Watercresses                       | 11.7               | STMR (tentative) |
| Witloofs/Belgian endives           | 0.51               | Median background levels |
| Chervil                            | 34.6               | STMR    |
| Chives                             | 34.6               | STMR    |
| Celery leaves                      | 34.6               | STMR    |
| Parsley                            | 34.6               | STMR    |
| Sage                               | 34.6               | STMR    |
| Rosemary                           | 34.6               | STMR    |
| Thyme                              | 34.6               | STMR    |
| Basil and edible flowers           | 34.6               | STMR    |
| Laurel/bay leave                   | 34.6               | STMR    |
| Tarragon                           | 34.6               | STMR    |
| Beans (with pods)                  | 3.25               | STMR (tentative) |
| Beans (without pods)               | 3.18               | Median background levels |
| Peas (with pods)                   | 3.25               | STMR (tentative) |
| Peas (without pods)                | 2.39               | STMR (tentative) |
| Lentils (fresh)                    | 3.18               | Median background levels |
| Asparagus                          | 0.65               | Median background levels |
| Cardoons                           | 0.65               | Median background levels |
| Celeries                           | 0.65               | Median background levels |
| Florence fennels                   | 0.65               | Median background levels |
| Globe artichokes                   | 7.44               | STMR    |
| Leeks                              | 14.6               | STMR    |
| Rhubarbs                           | 0.65               | Median background levels |
| Bamboo shoots                      | 0.65               | Median background levels |
| Palm hearts                        | 0.65               | Median background levels |
| Cultivated fungi                   | 2.86               | Median background levels |
| Wild fungi                         | 2.86               | Median background levels |
| Algae and prokaryotes organisms    | 0.44               | Median background levels |
| Beans (dry)                        | 7.21               | Mean monitoring data |
| Lentils (dry)                      | 9.19               | Mean monitoring data |
| Peas (dry)                         | 7.30               | Median background levels |
| Lupins/lupini beans (dry)          | 7.30               | Median background levels |
| Linseeds                           | 12.0               | Median background levels |
| Peanuts/groundnuts                 | 12.0               | Median background levels |
| Poppy seeds                        | 12.0               | Median background levels |
| Sesame seeds                       | 12.0               | Median background levels |
| Sunflower seeds                    | 18.4               | Mean monitoring data |
| Rapeseeds/canola seeds             | 1.20               | Median background levels x PF (oil) |
| Soya beans                         | 12.0               | Median background levels |
| Mustard seeds                      | 12.0               | Median background levels |
| Cotton seeds                       | 12.0               | Median background levels |
| Pumpkin seeds                      | 12.0               | Median background levels |
| Consumer risk assessment Commodity | Input value (mg/kg) | Chronic risk assessment |
|-----------------------------------|---------------------|------------------------|
| Safflower seeds                   | 12.0                | Median background levels |
| Borage seeds                      | 12.0                | Median background levels |
| Gold of pleasure seeds            | 12.0                | Median background levels |
| Hemp seeds                        | 12.0                | Median background levels |
| Castor beans                      | 12.0                | Median background levels |
| Olives for oil production         | 0.62                | STMR (tentative) × PF (oil) |
| Oil palms kernels                 | 30                  | EU MRL                 |
| Oil palms fruits                  | 30                  | EU MRL                 |
| Kapok                             | 30                  | EU MRL                 |
| Barley grains                     | 4.15                | Median background levels |
| Buckwheat and other pseudo-cereal grains | 8.42          | Median background levels |
| Maize/corn grains                 | 4.15                | Median background levels |
| Common millet/proso millet grains | 4.15                | Median background levels |
| Oat grains                        | 4.15                | Median background levels |
| Rice grains                       | 4.15                | Median background levels |
| Rye grains                        | 4.15                | Median background levels |
| Sorghum grains                    | 4.15                | Median background levels |
| Wheat grains                      | 4.15                | Median background levels |
| Teas                              | 25.0                | Median background levels |
| Coffee beans                      | 16.3                | Median background levels |
| Herbal infusions from flowers     | 0.30                | Median background levels |
| Herbal infusions from leaves and herbs | 0.30            | Median background levels |
| Herbal infusions from roots       | 0.95                | Median background levels |
| Cocoa beans                       | 1.50                | Median background levels |
| Carobs/Saint John’s breads       | 5.71                | Median background levels |
| Hops                              | 337.5               | STMR (tentative)       |
| Seed spices                       | 9.75                | Median background levels |
| Fruit spices                      | 11.3                | Median background levels |
| Bark spices                       | 3.39                | Median background levels |
| Root and rhizome spices           | 2.13                | Median background levels |
| Bud spices                        | 3.61                | Median background levels |
| Flower pistil spices              | 3.28                | Median background levels |
| Aril spices                       | 24.7                | Median background levels |
| Sugar beet roots                  | 1.25                | Median background levels |
| Sugar canes                       | 0.69                | Median background levels |
| Chicory roots                     | 1.09                | Median background levels |
| Swine muscle                      | 0.88                | Median background levels |
| Swine fat tissue                  | 0.41                | Median background levels |
| Swine liver                       | 11.6                | Median background levels |
| Swine kidney                      | 7.28                | Median background levels |
| Bovine muscle                     | 0.90                | Median background levels |
| Bovine fat tissue                 | 0.39                | Median background levels |
| Bovine liver                      | 86.7                | Mean monitoring data   |
| Bovine kidney                     | 4.61                | Median background levels |
| Sheep muscle                      | 1.25                | Median background levels |
| Sheep fat tissue                  | 0.30                | Median background levels |
| Consumer risk assessment Commodity | Chronic risk assessment |
|-----------------------------------|------------------------|
|                                   | Input value (mg/kg)    |
| Sheep liver                       | 90                     |
| Sheep kidney                      | 3.85                   |
| Goat muscle                       | 1.25                   |
| Goat fat tissue                   | 0.30                   |
| Goat liver                        | 90                     |
| Goat kidney                       | 3.85                   |
| Equine muscle                     | 0.90                   |
| Equine fat tissue                 | 0.39                   |
| Equine liver                      | 64.3                   |
| Equine kidney                     | 4.61                   |
| Poultry muscle                    | 3.47                   |
| Poultry fat tissue                | 0.00                   |
| Poultry liver                     | 6.90                   |
| Cattle milk                       | 0.24                   |
| Sheep milk                        | 0.24                   |
| Goat milk                         | 0.24                   |
| Horse milk                        | 0.24                   |
| Birds eggs                        | 0.58                   |
| Wild terrestrial animal vertebrate| 1.72                   |
| Comment                           | Median background levels|
| Comment                           | Mean monitoring data   |
Appendix E – Decision trees

E.1. Decision tree for deriving MRLs in plant commodities (ad-hoc methodology proposed for copper)

GAP is authorised in the EU

Yes

MRL derived from the available residue trials?

Yes

Derive MRL from monitoring data (if possible).

(A1/A2): MRL derived from GAP and residue trials (RA values: STMR/HR)

No

MRL covers both background levels and monitoring data?

Yes

Derive MRL from monitoring data (if possible).

(B): MRL derived from monitoring data > MAX (background levels)

No

MRL derived from background levels (RA values: Med/Max of background levels)

(C): MRL derived from background levels but additional trials are still required (RA values: Med/Max of background levels)

No

Background data available?

Yes

Derive MRL from background data.

(D1): MRL derived from background levels (RA values: Med/Max of background levels)

No

MRL derived from background levels (RA values: Med/Max of background levels) but monitoring data indicate potential misuses

(D2)

No

Maintain current EU MRL?

(E)

No GAP authorised in the EU

Is a GAP authorised? (reported in this review)

No

MRL derived from monitoring data > MAX (background levels)?

Yes

Derive MRL from monitoring data (if possible).

(B): MRL derived from monitoring data > MAX (monitoring levels)

No

MRL derived from background data.

(D1)

MRL derived from background data.

(D2)

MRL derived from background data.

(D3)
**E.2. Decision tree for deriving MRLs in livestock commodities (ad-hoc methodology proposed for copper)**

- **MRLs for livestock commodities**

  - **Are monitoring data available?**
    - **YES**
      - **Derive MRL from monitoring data.**
    - **NO**
      - **Are monitoring data > MAX (background levels)?**
        - **YES**
          - **MRL derived from monitoring data (RA values: Mean/max of monitoring data)**
        - **NO**
          - **MRL derived from background levels (RA values: Med/Max of background levels)**
### Appendix F – Comparison of MRL derived from GAPs with other sources of residues

#### F.1. Plant commodities

| Code   | Commodity     | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(c) | P95 (UCI)(d) (mg/kg) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal |
|--------|---------------|--------------------|---------------------------------|-------------------------|--------------|----------------------|---------------------------------------|-------------------------|--------------------------|
| 110010 | Grapefruits   | Y                  | 15                              | 3.55                    | n.r.         | 1.29                 | 15                                    | MRL derived from GAP and trials |
| 110020 | Oranges       | Y                  | 15                              | 0.59                    | n.r.         | 1.29                 | 15                                    | MRL derived from GAP and trials |
| 110030 | Lemons        | Y                  | 15                              | 0.55                    | n.r.         | 1.29                 | 15                                    | MRL derived from GAP and trials |
| 110040 | Limes         | Y                  | 15                              | –                       | –            | 1.29                 | 15                                    | MRL derived from GAP and trials |
| 110050 | Mandarins     | Y                  | 15                              | 0.63                    | n.r.         | 1.29                 | 15                                    | MRL derived from GAP and trials |
| 120010 | Almonds       | Y                  | 40                              | –                       | –            | 17.9                 | 40                                    | MRL derived from GAP and trials |
| 120020 | Brazil nuts   | Y                  | 40                              | 22.2                    | n.r.         | 17.9                 | 40                                    | MRL derived from GAP and trials |
| 120030 | Cashew nuts   | Y                  | 3                               | –                       | –            | 37                   | 40                                    | MRL derived from background data, no monitoring data available (trials supporting the authorised GAP may not reflect the background levels as they were extrapolated from other orchards) |
| 120040 | Chestnuts     | Y                  | 40                              | –                       | –            | 17.9                 | 40                                    | MRL derived from GAP and trials |
| 120050 | Coconuts      | Y                  | 3                               | –                       | –            | 4.5                  | 5                                     | MRL derived from background data, no monitoring data available, available (trials supporting the authorised GAP may not reflect the background levels as they were extrapolated from other orchards) |
| 120060 | Hazelnuts     | Y                  | 40                              | 18.3                    | n.r.         | 17.9                 | 40                                    | MRL derived from GAP and trials |
| 120070 | Macadamias    | Y                  | 40                              | –                       | –            | 17.9                 | 40                                    | MRL derived from GAP and trials |
| 120080 | Pecans        | Y                  | 40                              | –                       | –            | 17.9                 | 40                                    | MRL derived from GAP and trials |
| 120090 | Pine nut kernels | Y              | 3                               | 35.0                   | 33.6 (34)    | 37                   | 40                                    | MRL derived from monitoring data, using the 'spices approach'(g), available (trials supporting the authorised GAP may not reflect the background levels as they were extrapolated from other orchards) |
| 120100 | Pistachios    | Y                  | 40                              | –                       | –            | 37                   | 40                                    | MRL derived from GAP and trials |
| 120110 | Walnuts       | Y                  | 40                              | 20.4                    | n.r.         | 17.9                 | 40                                    | MRL derived from GAP and trials |
| 130010 | Apples        | Y                  | 6                               | 1.50                    | n.r.         | 1.30                 | 6                                     | MRL derived from GAP and trials |
| 130020 | Pears         | Y                  | 6                               | 4.43                    | n.r.         | 1.30                 | 6                                     | MRL derived from GAP and trials |
| Code   | Commodity       | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data | MAX value(c) | P95 (UCI)(d) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal |
|--------|-----------------|--------------------|---------------------------------|-----------------|--------------|-------------|--------------------------------------|------------------------|-------------------------|
| 130030 | Quinces         | Y                  | 6                               | < 2             | n.r.         | 1.30        | 6 MRL derived from GAP and trials    |                        |                         |
| 130040 | Medlars         | Y                  | 6                               | –               | –            | 1.30        | 6 MRL derived from GAP and trials    |                        |                         |
| 130050 | Loquats         | Y                  | 6                               | –               | –            | 1.30        | 6 MRL derived from GAP and trials    |                        |                         |
| 140010 | Apricots        | Y                  | 3                               | 1.60            | n.r.         | 1.34        | 3 MRL derived from GAP and trials    |                        |                         |
| 140020 | Cherries        | Y                  | 10                              | 1.18            | n.r.         | 1.34        | 10 MRL derived from GAP and trials   |                        |                         |
| 140030 | Peaches         | Y                  | 8                               | 1.45            | n.r.         | 1.34        | 8 MRL derived from GAP and trials    |                        |                         |
| 140040 | Plums           | Y                  | 4                               | 0.96            | n.r.         | 1.34        | 4 MRL derived from GAP and trials    |                        |                         |
| 151010 | Table grapes    | Y                  | 100                             | 9.60            | n.r.         | 1.5         | 100/2 MRL derived from GAP and trials |                        |                         |
| 151020 | Wine grapes     | Y                  | 100                             | 1.20            | n.r.         | 1.5         | MRL of 100 mg/kg derived from GAP and trials | A fall-back MRL of 2 mg/kg can be derived based on background data |                         |
| 152000 | Strawberries    | Y                  | 15                              | 1.20            | n.r.         | 0.48        | 15 MRL derived from GAP and trials   |                        |                         |
| 153010 | Blackberries    | Y                  | 5                               | 1.40            | n.r.         | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 153020 | Dewberries      | Y                  | 5                               | 0.79            | n.r.         | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 153030 | Raspberries     | Y                  | 5                               | 1.19            | n.r.         | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154010 | Blueberries     | Y                  | 5                               | 0.97            | n.r.         | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154020 | Cranberries     | Y                  | 5                               | 0               | n.r.         | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154030 | Currants        | Y                  | 5                               | 1.10            | n.r.         | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154040 | Gooseberries    | Y                  | 5                               | 0.82            | n.r.         | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154050 | Rose hips       | Y                  | 5                               | –               | –            | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154060 | Mulberries      | Y                  | 5                               | –               | –            | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154070 | Azaroles        | Y                  | 5                               | –               | –            | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 154080 | Elderberries    | Y                  | 5                               | –               | –            | 2.2         | 5* MRL derived from GAP and trials   |                        |                         |
| 161010 | Dates           | N                  | –                               | 1.73            | n.r.         | 1.37        | 2* MRL derived from background data, also covering monitoring data |                        |                         |
| 161020 | Figs            | Y                  | –                               | 23.8            | n.r.         | 1.37        | 30 MRL derived from monitoring data, tentative approach based on the highest value, authorised GAP may not be covered by the proposed MRL |                        |                         |
| 161030 | Table olives    | Y                  | 20                              | 3.68            | n.r.         | 2.7         | 20 MRL derived from GAP and trials   |                        |                         |
| Code   | Commodity   | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(c) | P95 (UCI)(d) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal |
|--------|-------------|-------------------|---------------------------------|-------------------------|-------------|-------------|-------------------------------------|------------------------|------------------------|
| 161040 | Kumquats    | N                 | –                               | < 2                     | n.r.        | 1.37        | 2*                                  | MRL derived from background data, also covering monitoring data |
| 161050 | Carambolas  | N                 | –                               | –                       | –           | 1.37        | 2*                                  | MRL derived from background data, no monitoring data available |
| 161060 | Kaki        | N                 | –                               | 0.32                    | n.r.        | 1.37        | 2*                                  | MRL derived from background data, also covering monitoring data |
| 161070 | Jambuls     | Y                 | 10                              | –                       | –           | 1.37        | 10                                  | MRL derived from GAP and trials |
| 162010 | Kiwi fruits | Y                 | 30                              | 2.15                    | n.r.        | 2           | 30                                  | MRL derived from GAP and trials |
| 162020 | Litchis     | N                 | –                               | 3.17                    | n.r.        | 2           | 2*                                  | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation |
| 162030 | Passion fruits | Y                | –                               | 3.55                    | n.r.        | 2           | 4                                   | MRL derived from monitoring data, tentative approach based on the highest value, authorised GAP may not be covered by the proposed MRL |
| 162040 | Prickly pears | N                 | –                               | –                       | –           | 2           | 2*                                  | MRL derived from background data, no monitoring data available |
| 162050 | Star apples | N                 | –                               | –                       | –           | 2           | 2*                                  | MRL derived from background data, no monitoring data available |
| 162060 | American persimmons | N               | –                               | –                       | –           | 2           | 2*                                  | MRL derived from background data, no monitoring data available |
| 163010 | Avocados    | N                 | –                               | 3.22                    | n.r.        | 5.3         | 6                                   | MRL derived from background data, also covering monitoring data |
| 163020 | Bananas     | N                 | –                               | 1.63                    | n.r.        | 5.3         | 6                                   | MRL derived from background data, also covering monitoring data |
| 163030 | Mangoes     | Y                 | –                               | 1.10                    | n.r.        | 5.3         | 6                                   | MRL derived from background data, also covering monitoring data, authorised GAP may not be covered by the proposed MRL |
| 163040 | Papayas     | N                 | –                               | 0.48                    | n.r.        | 5.3         | 6                                   | MRL derived from background data, also covering monitoring data |
| 163050 | Granate apples | N                | –                               | 1.69                    | n.r.        | 5.3         | 6                                   | MRL derived from background data, also covering monitoring data |
| Code   | Commodity      | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(c) | P95 (UCI)(d) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal |
|--------|----------------|--------------------|---------------------------------|-------------------------|--------------|-------------|-------------------------------------|------------------------|--------------------------|
| 163060 | Cherimoyas     | Y                  | –                               | –                       | –            | –           | 5.3                                 | 6                      | MRL derived from background data, no monitoring data available, authorised GAP may not be covered by the proposed MRL |
| 163070 | Guavas         | N                  | –                               | 0.78                    | n.r.         | 5.3         | 6                                   | 6                      | MRL derived from background data, also covering monitoring data |
| 163080 | Pineapples     | N                  | –                               | 1.30                    | n.r.         | 5.3         | 6                                   | 6                      | MRL derived from background data, also covering monitoring data |
| 163090 | Breadfruits    | N                  | –                               | –                       | –            | –           | 5.3                                 | 6                      | MRL derived from background data, no monitoring data available |
| 163100 | Durians        | N                  | –                               | –                       | –            | –           | 5.3                                 | 6                      | MRL derived from background data, no monitoring data available |
| 163110 | Soursops       | N                  | –                               | –                       | –            | –           | 5.3                                 | 6                      | MRL derived from background data, no monitoring data available |
| 211000 | Potatoes       | Y                  | 7                               | 6.32                    | n.r.         | 1.34        | 7/4                                 | 4                      | MRL of 7 mg/kg derived from the most critical GAP (NEU) and trials. A fall-back MRL of 4 mg/kg can be derived based on a fall-back GAP (SEU). |
| 212010 | Cassava roots  | Y                  | 4                               | 0.68                    | n.r.         | 1.78        | 4                                   | 4                      | MRL derived from GAP and trials |
| 212020 | Sweet potatoes | Y                  | 4                               | 1.13                    | n.r.         | 3           | 3                                   | 3                      | MRL derived from GAP and trials |
| 212030 | Yams           | Y                  | 4                               | 0.82                    | n.r.         | 3           | 3                                   | 3                      | MRL derived from GAP and trials |
| 212040 | Arrowroots     | Y                  | 4                               | 2.31                    | n.r.         | 3           | 3                                   | 3                      | MRL derived from GAP and trials |
| 213010 | Beetroots      | Y                  | 3                               | 1.38                    | n.r.         | 3           | 3                                   | 3                      | MRL derived from GAP and trials |
| 213020 | Carrots        | Y                  | 3                               | 1.46                    | n.r.         | 3           | 3                                   | 3                      | MRL derived from GAP and trials |
| 213030 | Celeriacs      | Y                  | 3                               | 0.67                    | n.r.         | 3           | 3                                   | 3                      | MRL derived from GAP and trials |
## Review of the existing MRLs for copper compounds

| Code  | Commodity     | GAP authorised(a) | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(c) | P95 (UCI)(d) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal |
|-------|---------------|-------------------|---------------------------------|-------------------------|--------------|--------------|-------------------------------------|------------------------|------------------------|
| 213090| Salsifies     | Y                 | 3                               | 1.90                    | n.r.         | 3            | 3                                   | 3                      | MRL derived from GAP and trials |
| 213100| Swedes        | Y                 | 3                               | 0                       | n.r.         | 3            | 3                                   | 3                      | MRL derived from GAP and trials |
| 213110| Turnips       | Y                 | 3                               | –                       | –            | 3            | 3                                   | 3                      | MRL derived from GAP and trials |
| 220010| Garlic        | Y                 | 2                               | 3.79                    | n.r.         | 2.99         | 4                                   |                        | MRL derived from monitoring data, tentative approach based on the highest value available (trials supporting the authorised GAP may not reflect the background levels as they were extrapolated from onions). |
| 220020| Onions        | Y                 | 2                               | 0.93                    | n.r.         | 1.3          | 2*                                  |                        | MRL derived from GAP and trials |
| 220030| Shallots      | Y                 | 2                               | 0                       | n.r.         | 0.88         | 2*                                  |                        | MRL derived from GAP and trials |
| 220040| Spring onions | Y                 | 70                              | 0.52                    | n.r.         | 0.83         | 70                                  |                        | MRL derived from GAP and trials |
| 231010| Tomatoes      | Y                 | 10                              | 2.17                    | n.r.         | 1.74         | 10/2                                |                        | MRL of 10 mg/kg derived from GAP and trials. A fall-back MRL of 2 mg/kg can be derived based on background data |
| 231020| Sweet peppers | Y                 | 20                              | 1.20                    | n.r.         | 1.74         | 20                                  |                        | MRL derived from GAP and trials |
| 231030| Aubergines    | Y                 | 10                              | 0.87                    | n.r.         | 1.74         | 10                                  |                        | MRL derived from GAP and trials |
| 231040| Okra          | N                 | –                               | –                       | –            | 1.09         | 2*                                  |                        | MRL derived from background data, no monitoring data available |
| 232010| Cucumbers     | Y                 | 5                               | 1.06                    | n.r.         | 1.5          | 5                                   |                        | MRL derived from GAP and trials |
| 232020| Gherkins      | Y                 | 5                               | –                       | –            | 1.5          | 5                                   |                        | MRL derived from GAP and trials |
| 232030| Courgettes    | Y                 | 5                               | 2.00                    | n.r.         | 1.5          | 5                                   |                        | MRL derived from GAP and trials |
| 233010| Melons        | Y                 | 10                              | 0.35                    | n.r.         | 1.27         | 10                                  |                        | MRL derived from GAP and trials |
| 233020| Pumpkins      | Y                 | 10                              | 0.71                    | n.r.         | 1.27         | 10                                  |                        | MRL derived from GAP and trials |
| 233030| Watermelons   | Y                 | 10                              | 2.09                    | n.r.         | 1.27         | 10                                  |                        | MRL derived from GAP and trials |
| 234000| Sweet corn    | N                 | –                               | 2.01                    | n.r.         | 0.54         | 2*                                  |                        | MRL derived from background data, also covering monitoring data |
| 241010| Broccoli      | Y                 | 5                               | 0.78                    | n.r.         | 0.7          | 5                                   |                        | MRL derived from GAP and trials |
| 241020| Cauliflowers  | Y                 | 5                               | 0.98                    | n.r.         | 0.7          | 5                                   |                        | MRL derived from GAP and trials |
| 242010| Brussels sprouts | N               | –                               | 0.72                    | n.r.         | 0.7          | 2*                                  |                        | MRL derived from background data, also covering monitoring data |
| Code   | Commodity       | GAP authorised? | MRL derived from GAP (mg/kg) | Monitoring data (mg/kg) | MAX value | P95 (UCI) | MRL proposal (mg/kg) | Comment on MRL proposal                                           |
|--------|-----------------|----------------|-----------------------------|-------------------------|-----------|-----------|----------------------|------------------------------------------------------------------|
| 242020 | Head cabbages   | Y              | --                          | 0.65                    | n.r.      | 0.7       | 2*                   | MRL derived from monitoring data, based on the highest value, authorised GAP may not be covered by the proposed MRL |
| 243010 | Chinese cabbages| N              | --                          | 0.64                    | n.r.      | 2.9       | 3                    | MRL derived from background data, also covering monitoring data   |
| 243020 | Kales           | N              | --                          | 62.0                    | n.r.      | 2.9       | 3                    | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation |
| 244000 | Kohlrabies      | N              | --                          | 1.32                    | n.r.      | 2.9       | 3                    | MRL derived from background data, also covering monitoring data   |
| 251010 | Lamb’s lettuces | Y              | 150                         | 1.30                    | n.r.      | 4         | 150                  | MRL derived from GAP and trials                                  |
| 251020 | Lettuces        | Y              | 150                         | 101                     | n.r.      | 4         | 150/4                | MRL derived from GAP and trials. A fall-back MRL of 4 mg/kg can be derived based on background data |
| 251030 | Escaroles       | Y              | 150                         | 0.63                    | n.r.      | 4         | 150                  | MRL derived from GAP and trials                                  |
| 251040 | Cresses         | Y              | 150                         | –                       | –         | 4         | 150                  | MRL derived from GAP and trials                                  |
| 251050 | Land cresses    | Y              | 150                         | –                       | –         | 4         | 150                  | MRL derived from GAP and trials                                  |
| 251060 | Roman rocket    | Y              | 150                         | 14.2                    | n.r.      | 4         | 150                  | MRL derived from GAP and trials                                  |
| 251070 | Red mustards    | Y              | 150                         | –                       | –         | 4         | 150                  | MRL derived from GAP and trials                                  |
| 251080 | Baby leaf crops | Y              | 150                         | –                       | –         | 2.9       | 150                  | MRL derived from GAP and trials                                  |
| 252010 | Spinaches       | Y              | 150                         | 10.6                    | n.r.      | 4         | 150                  | MRL derived from GAP and trials                                  |
| 252020 | Purslanes       | Y              | 150                         | –                       | –         | 4         | 150                  | MRL derived from GAP and trials                                  |
| 252030 | Chards          | Y              | 150                         | < 2                     | n.r.      | 4         | 150                  | MRL derived from GAP and trials                                  |
| 253000 | Grape leaves    | N              | --                          | 64.0                    | n.r.      | 4.15      | 5                    | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation |
| 254000 | Watercresses    | Y              | 150                         | 1.25                    | n.r.      | 1.4       | 150                  | MRL derived from GAP and trials                                  |
| 255000 | Witloofs        | N              | --                          | 0.64                    | n.r.      | 0.51      | 2*                   | MRL derived from background data, also covering monitoring data   |
## Review of the existing MRLs for copper compounds

| Code   | Commodity    | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(e) | P95 (UCI)(d) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal |
|--------|--------------|-------------------|---------------------------------|-------------------------|--------------|-------------|--------------------------------------|--------------------------|-------------------------|
| 256010 | Chervil      | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256020 | Chives       | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256030 | Celery leaves | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256040 | Parsley      | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256050 | Sage         | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256060 | Rosemary     | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256070 | Thyme        | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256080 | Basil        | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256090 | Laurel       | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 256100 | Tarragon     | Y                 | 150                              | 42.1                    | n.r.         | 6.77        | 150                                  | MRL derived from GAP and trials |
| 260010 | Beans (with pods) | Y | 10                              | 1.52                    | n.r.         | 4.4         | 10                                  | MRL derived from GAP and trials |
| 260020 | Beans (without pods) | Y | –                                | –                       | –            | 3.18        | 4                                   | MRL derived from background data, no monitoring data available, authorised GAP may not be covered by the proposed MRL |
| 260030 | Peas (with pods) | Y | 10                              | 1.32                    | n.r.         | 6.56        | 10                                  | MRL derived from GAP and trials |
| 260040 | Peas (without pods) | Y | 7                               | 1.42                    | n.r.         | 1.76        | 7                                   | MRL derived from GAP and trials |
| 260050 | Lentils (fresh) | Y | –                                | –                       | –            | 3.18        | 4                                   | MRL derived from background data, no monitoring data available, authorised GAP may not be covered by the proposed MRL |
| 270010 | Asparagus    | Y                 | –                                | 1.87                    | n.r.         | 6.44        | 7                                   | MRL derived from background data, also covering monitoring data, authorised GAP may not be covered by the proposed MRL |
| 270020 | Cardoons     | Y                 | –                                | –                       | –            | 6.44        | 7                                   | MRL derived from background data, no monitoring data available, authorised GAP may not be covered by the proposed MRL |
| 270030 | Celeries     | N                 | 0.24                             | –                       | n.r.         | 6.44        | 7                                   | MRL derived from background data, also covering monitoring data |
| Code   | Commodity         | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(c) (UCI)(d) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal                                      |
|--------|-------------------|--------------------|---------------------------------|-------------------------|-----------------------|--------------------------------------|-------------------------|-------------------------------------------------------------|
| 270040 | Florence fennels   | N                  | –                               | 0.70 n.r.               | 6.44                  | 7                                    |                         | MRL derived from background data, also covering monitoring data |
| 270050 | Globe artichokes   | Y                  | 30                              | –                       | 6.44                  | 30                                   |                         | MRL derived from GAP and trials                              |
| 270060 | Leeks              | Y                  | 70                              | 0.77 n.r.               | 6.44                  | 70                                   |                         | MRL derived from GAP and trials                              |
| 270070 | Rhubarbs           | N                  | –                               | 0.50 n.r.               | 6.44                  | 7                                    |                         | MRL derived from background data, also covering monitoring data |
| 270080 | Bamboo shoots      | N                  | –                               | –                       | 6.44                  | 7                                    |                         | MRL derived from background data, no monitoring data available |
| 270090 | Palm hearts        | N                  | –                               | –                       | 6.44                  | 7                                    |                         | MRL derived from background data, no monitoring data available |
| 280010 | Cultivated fungi   | N                  | –                               | 4.64 n.r.               | 5.4                   | 6                                    |                         | MRL derived from background data, also covering monitoring data |
| 280020 | Wild fungi         | N                  | –                               | 34.7 n.r.               | 5.4                   | 6                                    |                         | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation |
| 290000 | Algae              | N                  | –                               | –                       | 2.64                  | 3                                    |                         | MRL derived from background data, no monitoring data available |
| 300010 | Beans (dry)        | Y                  | –                               | 17.1                   | 10.8 (13.4)           | 13.03                               | 15                      | MRL derived from monitoring data, using the ‘spices approach’(g), authorised GAP may not be covered by the proposed MRL |
| 300020 | Lentils (dry)      | Y                  | –                               | 15.0                   | 12.2 (13.1)           | 13.03                               | 15                      | MRL derived from monitoring data, using the ‘spices approach’(g), authorised GAP may not be covered by the proposed MRL |
| 300030 | Peas (dry)         | N                  | –                               | 10.9                   | n.r.                  | 13.03                               | 15                      | MRL derived from background data, also covering monitoring data |
| 300040 | Lupins (dry)       | N                  | –                               | –                      | 13.03                 | 15                                   |                         | MRL derived from background data, no monitoring data available |
| 401010 | Linseeds           | N                  | –                               | 18.3                   | n.r.                  | 21.5                                | 30                      | MRL derived from background data, also covering monitoring data |
| 401020 | Peanuts            | N                  | –                               | –                      | 21.5                  | 30                                   |                         | MRL derived from background data, no monitoring data available |
| Code   | Commodity     | GAP authorised? | MRL derived from GAP (mg/kg) | Monitoring data (mg/kg) | MAX value | P95 (UCI) | MRL proposal (mg/kg) | Comment on MRL proposal |
|--------|---------------|-----------------|-----------------------------|------------------------|-----------|-----------|---------------------|-------------------------|
| 401030 | Poppy seeds   | N               | 41.0                        | n.r.                   | 21.5      | 30        |                     | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation |
| 401040 | Sesame seeds  | N               | 21.3                        | n.r.                   | 21.5      | 30        |                     | MRL derived from background data, also covering monitoring data |
| 401050 | Sunflower seeds | Y              | 24.6 21.9 (24)              |                        | 21.5      | 30        |                     | MRL derived from monitoring data, using the 'spices approach' (g), authorised GAP may not be covered by the proposed MRL |
| 401060 | Rapeseeds     | Y               | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available, authorised GAP may not be covered by the proposed MRL |
| 401070 | Soyabeans     | Y               | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available, authorised GAP may not be covered by the proposed MRL |
| 401080 | Mustard seeds | N               | 18.4                        | n.r.                   | 21.5      | 30        |                     | MRL derived from background data, also covering monitoring data |
| 401090 | Cotton seeds  | N               | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available |
| 401100 | Pumpkin seeds | N               | 12.3                        | n.r.                   | 21.5      | 30        |                     | MRL derived from background data, also covering monitoring data |
| 401110 | Safflower seeds | N             | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available |
| 401120 | Borage seeds  | N               | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available |
| 401130 | Gold of pleasure seeds | N         | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available |
| 401140 | Hemp seeds    | N               | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available |
| 401150 | Castor beans  | N               | 21.5                        | 30                     |           |           |                     | MRL derived from background data, no monitoring data available |
| Code   | Commodity                        | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(c) | P95 (UCI)(d) | MAX value background data(e) (mg/kg) | MRL proposal(f) (mg/kg) | Comment on MRL proposal                                                                 |
|--------|----------------------------------|--------------------|----------------------------------|-------------------------|--------------|--------------|--------------------------------------|-------------------------|----------------------------------------------------------------------------------------|
| 402010 | Olives for oil production        | Y                  | 20                               | –                       | –            | –            | 2.7                                  | 20                      | MRL derived from GAP and trials                                                        |
| 402020 | Oil palms kernels                | N                  | –                                | –                       | no data      | –            | –                                    | –                       | No MRL proposal possible (no GAP authorised, no background data and no monitoring data). |
| 402030 | Oil palms fruits                 | N                  | –                                | –                       | no data      | –            | –                                    | –                       | No MRL proposal possible (no GAP authorised, no background data and no monitoring data). |
| 402040 | Kapok                            | N                  | –                                | –                       | no data      | –            | –                                    | –                       | No MRL proposal possible (no GAP authorised, no background data and no monitoring data). |
| 500010 | Barley                           | N                  | –                                | 11.9                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation |
| 500020 | Buckwheat                        | N                  | –                                | 7.35                    | n.r.         | 11           | 15                                   | 15                      | MRL derived from background data, also covering monitoring data                          |
| 500030 | Maize                            | N                  | –                                | 5.64                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data, no monitoring data available                          |
| 500040 | Common millet                    | N                  | –                                | 6.73                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data, also covering monitoring data                          |
| 500050 | Oat                              | N                  | –                                | 5.64                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data, also covering monitoring data                          |
| 500060 | Rice                             | N                  | –                                | 12.2                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation |
| 500070 | Rye                              | N                  | –                                | 8.43                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data, also covering monitoring data                          |
| 500080 | Sorghum                          | N                  | –                                | 10.1                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data, also covering monitoring data                          |
| 500090 | Wheat                            | N                  | –                                | 10.1                    | n.r.         | 10           | 10                                   | 10                      | MRL derived from background data, also covering monitoring data                          |
| 610000 | Teas                             | N                  | –                                | 21.8                    | n.r.         | 25           | 30                                   | 30                      | MRL derived from background data, also covering monitoring data                          |
| Code   | Commodity                                      | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(c) | P95 (UCI)(d) | MRL proposal(f) (mg/kg) | Comment on MRL proposal                                                                                                                                 |
|--------|-----------------------------------------------|--------------------|---------------------------------|-------------------------|--------------|--------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 620000 | Coffee beans                                  | N                  | –                               | 23.4                    | n.r.         | 17           | 20                     | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation                           |
| 631000 | Herbal infusions from flowers                 | N                  | –                               | 0.63                    | n.r.         | 0.49         | 5*                    | MRL derived from background data, also covering monitoring data. A default LOQ of 5 mg/kg is considered for complex matrices                               |
| 632000 | Herbal infusions from leaves and herbs        | N                  | –                               | –                       | –            | 0.49         | 5*                    | MRL derived from background data, no monitoring data available. A default LOQ of 5 mg/kg is considered for complex matrices                               |
| 633000 | Herbal infusions from roots                   | N                  | –                               | –                       | –            | 3            | 5*                    | MRL derived from background data, no monitoring data available. A default LOQ of 5 mg/kg is considered for complex matrices                               |
| 640000 | Cocoa beans                                   | N                  | –                               | –                       | –            | 1.5          | 5*                    | MRL derived from background data, no monitoring data available. A default LOQ of 5 mg/kg is considered for complex matrices                               |
| 650000 | Carobs                                        | N                  | –                               | –                       | –            | 5.71         | 6                     | MRL derived from background data, no monitoring data available.                                                                                         |
| 700000 | Hops                                          | Y                  | 1500                            | 370                     | n.r.         | No data      | 1500                   | MRL derived from GAP and trials                                                                                                                          |
| 810000 | Seed spices                                   | N                  | –                               | –                       | –            | 13.7         | 15                    | MRL derived from background data, no monitoring data available                                                                                          |
| 820000 | Fruit spices                                  | N                  | –                               | –                       | –            | 11.3         | 15                    | MRL derived from background data, no monitoring data available                                                                                          |
| 830000 | Bark spices                                   | N                  | –                               | –                       | –            | 3.39         | 5*                    | MRL derived from background data, no monitoring data available. A default LOQ of 5 mg/kg is considered for complex matrices                               |
| 840000 | Root and rhizome spices                       | N                  | –                               | 10.32                   | n.r.         | 2.3          | 5*                    | MRL derived from background data. Monitoring data indicate potential higher residues, which cannot be used for MRL calculation. A default LOQ of 5 mg/kg is considered for complex matrices |
| 850000 | Bud spices                                    | N                  | –                               | –                       | –            | 3.74         | 5*                    | MRL derived from background data, no monitoring data available. A default LOQ of 5 mg/kg is considered for complex matrices                               |
### Review of the existing MRLs for copper compounds

| Code    | Commodity         | GAP authorised(a)? | MRL derived from GAP(b) (mg/kg) | Monitoring data (mg/kg) | MAX value(e) | P95 (UCI)(d) | MRL proposal(f) (mg/kg) | Comment on MRL proposal                                                                 |
|---------|-------------------|--------------------|---------------------------------|-------------------------|--------------|--------------|------------------------|----------------------------------------------------------------------------------------|
| 860000  | Flower pistil     | N                  | –                               | –                       | 3.28         | –            | 5*                     | MRL derived from background data, no monitoring data available. A default LOQ of 5 mg/kg is considered for complex matrices. |
| 870000  | Spices            | N                  | –                               | –                       | 24.67        | 30           | –                      | MRL derived from background data, no monitoring data available                           |
| 900010  | Sugar beets       | Y                  | –                               | –                       | 2            | 2*           | –                      | MRL derived from background data, no monitoring data available, authorised GAP may not be covered by the proposed MRL |
| 900020  | Sugar canes       | N                  | –                               | –                       | 1.7          | 2*           | –                      | MRL derived from background data, no monitoring data available                           |
| 900030  | Chicory roots     | N                  | –                               | –                       | 1.4          | 2*           | –                      | MRL derived from background data, no monitoring data available                           |

**GAP**: Good Agricultural Practice; **MRL**: maximum residue level; **UCI**: Upper Confidence Interval; **n.r.**: not relevant; **NEU**: northern European Union; **SEU**: southern European Union; **LOQ**: limit of quantification.

*: Indicates that the MRL is derived at the limit of quantification.

(a): Is there a GAP authorised in the EU? (see also Appendix A: Summary of authorised uses considered for the review of MRL).

(b): At least one relevant GAP reported during this review is supported by data for this commodity; an (tentative) MRL was derived based on residue trials (reference to Appendix B.1.2.1).

(c): Highest value found in the monitoring data from 2009 to 2015 (see Annex B).

(d): P95: Percentile 95th; when the MRL proposal derived from GAP and trials was lower than the max value of the monitoring data or when no MRL proposals could be derived from the reported GAP, the P95th (and its upper confidence interval) of the monitoring data were calculated (this indicator could only be calculated when more than 58 positive results were available); the UCI of the calculated P95th is reported between bracket.

(e): Highest value from the background levels reported by RMS, considering pooling similar commodities (France, 2016, see Annex A).

(f): Final MRL proposal derived in accordance with decision tree reported in Appendix D.1.

(g): ‘Spices approach’: MRL proposal is based on the upper confidence interval of the Percentile 95th; this approach is only applicable when more than 58 data are available.
### F.2. Animal commodities

| Code     | Commodity        | Monitoring data (mg/kg) | MAX value(a) | P95 (UCI)(b) | MAX value background data (mg/kg) | MRL proposal(d) (mg/kg) | Comment on MRL proposal                                                                 |
|----------|------------------|-------------------------|--------------|--------------|-----------------------------------|------------------------|----------------------------------------------------------------------------------------|
| 1011010  | Swine muscle     | 3.55                    | n.r.         |              | 6.85                              | 7                      | MRL derived from background levels, also covering monitoring data                          |
| 1011020  | Swine fat tissue | –                       | –            |              | 1.06                              | 2                      | MRL derived from background levels. No monitoring data available                           |
| 1011030  | Swine liver      | 19.2                    | n.r.         |              | 84.3                              | 90                     | MRL derived from background levels, also covering monitoring data                          |
| 1011040  | Swine kidney     | –                       | –            |              | 9.25                              | 10                     | MRL derived from background levels. No monitoring data available                           |
| 1012010  | Bovine muscle    | 2.02                    | n.r.         |              | 2.20                              | 3                      | MRL derived from background levels, also covering monitoring data                          |
| 1012020  | Bovine fat tissue| –                       | –            |              | 0.50                              | 0.6*                   | MRL derived from background levels. No monitoring data available                           |
| 1012030  | Bovine liver     | 374                     | 256 (326)    |              | 374                               | 400                    | MRL derived from monitoring data using the 'spices approach(e)' and covering background levels (the highest value observed in monitoring data and background levels was deemed as an outlier) |
| 1012040  | Bovine kidney    | 3.45                    | n.r.         |              | 10.0                              | 10                     | MRL derived from background levels, also covering monitoring data                          |
| 1013010  | Sheep muscle     | 2.95                    | 1.58 (1.96)  |              | 2.56                              | 3                      | MRL derived from background levels, also covering monitoring data                          |
| 1013020  | Sheep fat tissue | –                       | –            |              | 0.57                              | 0.6*                   | MRL derived from background levels. No monitoring data available                           |
| 1013030  | Sheep liver      | –                       | –            |              | 131                               | 150                    | MRL derived from background levels. No monitoring data available                           |
| 1013040  | Sheep kidney     | –                       | –            |              | 5.39                              | 6                      | MRL derived from background levels. No monitoring data available                           |
| 1014010  | Goat muscle      | –                       | –            |              | 2.56                              | 3                      | MRL derived from background levels. No monitoring data available                           |
| 1014020  | Goat fat tissue  | –                       | –            |              | 0.57                              | 0.6*                   | MRL derived from background levels. No monitoring data available                           |
| 1014030  | Goat liver       | –                       | –            |              | 131                               | 150                    | MRL derived from background levels. No monitoring data available                           |
| 1014040  | Goat kidney      | –                       | –            |              | 5.39                              | 6                      | MRL derived from background levels. No monitoring data available                           |
| 1015010  | Equine muscle    | –                       | –            |              | 2.20                              | 3                      | MRL derived from background levels. No monitoring data available                           |
| 1015020  | Equine fat tissue| –                       | –            |              | 0.50                              | 0.6*                   | MRL derived from background levels. No monitoring data available                           |
| 1015030  | Equine liver     | –                       | –            |              | 374                               | 400                    | MRL derived from background levels (the highest value observed in the data set was deemed as an outlier). No monitoring data available |
| 1015040  | Equine kidney    | –                       | –            |              | 10.0                              | 10                     | MRL derived from background levels. No monitoring data available                           |
| 1016010  | Poultry muscle   | 7.10                    | 5.94 (6.9)   |              | 5.94                              | 7                      | MRL derived from monitoring data using the 'spices approach(e)', also covering background levels |
| 1016020  | Poultry fat tissue| –                      | –            |              | 0.0                               | 1*                     | MRL derived from background levels. No monitoring data available                           |
| 1016030  | Poultry liver    | 3.20                    | n.r.         |              | 75.2                              | 80                     | MRL derived from background levels, also covering monitoring data                          |
| Code   | Commodity               | Monitoring data (mg/kg) | MAX value (a) | P95 (UCI) (b) | MAX value background data (mg/kg) | MRL proposal (d) (mg/kg) | Comment on MRL proposal |
|--------|-------------------------|-------------------------|---------------|---------------|----------------------------------|--------------------------|-------------------------|
| 1020010| Cattle milk             | 1.10                    | 0.66 (1)      | 0.65          | 1*                               | MRL derived from monitoring data using the ‘spices approach\(^{(e)}\), also covering background levels |
| 1020020| Sheep milk              | 1.10                    | 0.66 (1)      | 0.65          | 1*                               | MRL derived from monitoring data using the ‘spices approach\(^{(e)}\), also covering background levels |
| 1020030| Goat milk               | 1.10                    | 0.66 (1)      | 0.65          | 1*                               | MRL derived from monitoring data using the ‘spices approach\(^{(e)}\), also covering background levels |
| 1020040| Horse milk              | 1.10                    | 0.66 (1)      | 0.65          | 1*                               | MRL derived from monitoring data using the ‘spices approach\(^{(e)}\), also covering background levels |
| 1030000| Birds eggs              | 3.55                    | 0.67 (0.73)   | 1.10          | 1*                               | MRL derived from monitoring data using the ‘spices approach\(^{(e)}\), also covering background levels |
| 1070000| Wild terrestrial animal vertebrate | 3.9 | 2.51 (2.98) | – | 3 | A MRL of 4 mg/kg, based on the MAX value, was derived in a previous opinion (EFSA, 2014). However, considering the ‘spices approach\(^{(e)}\), a MRL of 3 mg/kg can be derived from monitoring data |

MRL: maximum residue level; GAP: Good Agricultural Practice; UCI: Upper Confidence Interval; n.r.: not relevant.

*: Indicates that the MRL is derived at the limit of quantification.
(a): Highest value found in the monitoring data from 2009 to 2015 (see Annex B).
(b): P95: Percentile 95th; when the MRL proposal derived from GAP and trials was lower than the max value of the monitoring data or when no MRL proposals could be derived from the reported GAP, the P95th (and its upper confidence interval) of the monitoring data were calculated (this indicator could only be calculated when more than 58 positive results were available); the upper confidence interval (UCI) of the calculated P95th is reported between bracket.
(c): Highest value from the background levels reported by RMS, considering pooling similar commodities (France, 2016, see Annex A).
(d): Final MRL proposal derived in accordance with decision tree reported in Appendix D.2.
(e): ‘Spices approach\(^{(e)}\): MRL proposal is based on the upper confidence interval of the Percentile 95th; this approach is only applicable when more than 58 data are available.
Annex A – Report of survey on background levels (plant and animal commodities)

From: France (2016)

| Code   | Commodity       | Individual values (mg/kg) | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)(a) | Mean for the group (mg/kg)(a) | Median for the group (mg/kg)(b) |
|--------|-----------------|----------------------------|--------------------------------|------------------------------------------|-----------------------------|-----------------------------|-------------------------------|
| 110010 | Grapefruits     | 0.32; 0.32; 0.32; 0.37; 0.42; 0.44; 0.47; 0.50; 0.56 | 0.56                           | Citrus fruits                           | 1.29                        | 0.49                        | 0.44                           |
| 110020 | Oranges         | 0.37; 0.39; 0.39; 0.40; 0.45; 0.53; 0.57; 0.70 | 0.7                             | Citrus fruits                           | 1.29                        | 0.49                        | 0.44                           |
| 110030 | Lemons          | 0.26; 0.34; 0.37; 0.53; 1.29                        | 1.29                           | Citrus fruits                           | 1.29                        | 0.49                        | 0.44                           |
| 110040 | Limes           | 0.65; 0.65; 0.65                                         | 0.65                           | Citrus fruits                           | 1.29                        | 0.49                        | 0.44                           |
| 110050 | Mandarin        | 0.36; 0.42; 0.55; 0.56                                         | 0.56                           | Citrus fruits                           | 1.29                        | 0.49                        | 0.44                           |
| 120010 | Almonds         | 7.80; 8.50; 10.7                                           | 10.7                           | Closed nuts                              | 17.9                        | 10.5                        | 10.7                           |
| 120020 | Brazil nuts     | 13.0; 17.5; 17.6; 17.9                                           | 17.9                           | Closed nuts                              | 17.9                        | 10.5                        | 10.7                           |
| 120030 | Cashew nuts     | 21.95; 37                                                    | 37                             | Open nuts                                | 37                          | 16.4                        | 13.3                           |
| 120040 | Chestnuts       | 2.30; 2.30; 3.63; 5.62                                          | 5.62                           | Closed nuts                              | 17.9                        | 10.5                        | 10.7                           |
| 120050 | Coconuts        | 3.20; 3.78; 4.35; 4.50                                          | 4.5                            | –                                         | 4.5                         | 3.96                        | 4.50                           |
| 120060 | Hazelnuts       | 13.0; 14.0; 15.7                                             | 15.7                           | Closed nuts                              | 17.9                        | 10.5                        | 10.7                           |
| 120070 | Macadamias      | 7.56; 7.56                                                  | 7.56                           | Closed nuts                              | 17.9                        | 10.5                        | 10.7                           |
| 120080 | Pecans          | 11.9                                                       | 11.9                           | Closed nuts                              | 17.9                        | 10.5                        | 10.7                           |
| 120090 | Pine nut kernels | 12                                                            | 12                             | Open nuts                                | 37                          | 16.4                        | 13.3                           |
| 120100 | Pistachios      | 11.0; 13.0; 13.0; 13.25; 13.25; 13.3                           | 13.3                           | Open nuts                                | 37                          | 16.4                        | 13.3                           |
| 120110 | Walnuts         | 8.80; 13.4                                                  | 13.4                           | Closed nuts                              | 17.9                        | 10.5                        | 10.7                           |
| 130010 | Apples          | 0.27; 0.28; 0.31; 0.40; 0.52                                     | 0.52                           | Pome fruits                              | 1.30                        | 0.67                        | 0.77                           |
| 130020 | Pears           | 0.50; 0.71; 0.72; 0.77; 0.82                                     | 0.82                           | Pome fruits                              | 1.30                        | 0.67                        | 0.77                           |
| 130030 | Quinces         | 1.01; 1.30; 1.30; 1.30                                        | 1.3                            | Pome fruits                              | 1.30                        | 0.67                        | 0.77                           |
| 130040 | Medlars         | –                                                            | –                              | Pome fruits                              | 1.30                        | 0.67                        | 0.77                           |
| 130050 | Loquats         | 0.40; 0.40; 0.40                                            | 0.4                            | Pome fruits                              | 1.30                        | 0.67                        | 0.77                           |
| 140010 | Apricots        | 0.66; 0.78; 0.78; 1.34                                         | 1.34                           | Stone fruits                             | 1.34                        | 0.81                        | 1.02                           |
| 140020 | Cherries        | 0.60; 0.70; 0.81; 0.99; 1.04                                      | 1.04                           | Stone fruits                             | 1.34                        | 0.81                        | 1.02                           |
| 140030 | Peaches         | 0.67; 0.68; 0.75; 1.30                                         | 1.3                            | Stone fruits                             | 1.34                        | 0.81                        | 1.02                           |
| 140040 | Plums           | 0.57; 0.63; 0.71; 0.80; 0.80                                      | 0.8                            | Stone fruits                             | 1.34                        | 0.81                        | 1.02                           |
| Code   | Commodity          | Individual values (mg/kg)                                                                 | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)(a) | Mean for the group (mg/kg)(a) | Median for the group (mg/kg)(a) |
|--------|--------------------|------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------|----------------------------|-----------------------------|-------------------------------|
| 151010 | Table grapes       | 0.40; 0.79; 0.94; 0.96; 0.97; 1.1; 1.15; 1.2; 1.2; 1.27; 1.5; 1.5; 1.5                   | 1.5                           | Grapes                                 | 1.5                        | 1.11                        | 1.20                          |
| 151020 | Wine grapes        | 0.40; 0.79; 0.83; 0.94; 0.96; 0.97; 1.1; 1.15; 1.2; 1.2; 1.27; 1.5; 1.5; 1.5         | 1.5                           | Grapes                                 | 1.5                        | 1.11                        | 1.20                          |
| 152000 | Strawberries       | 0.34; 0.39; 0.46; 0.48                                                                  | 0.48                          |                                       | 0.48                       | 0.42                        | 0.43                          |
| 153010 | Blackberries       | 1.08; 1.10; 1.20; 1.65; 2.20                                                            | 2.2                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 153020 | Dewberries         | 0.3                                                                                      | 0.3                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 153030 | Raspberries        | 0.90; 0.93; 0.97; 1.05; 1.10                                                            | 1.1                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154010 | Blueberries        | 0.30; 0.57; 0.69; 0.77; 1.7                                                             | 1.7                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154020 | Cranberries        | 0.61; 0.61; 0.96                                                                        | 0.96                          | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154030 | Currants           | 0.88; 0.99; 1.03; 1.07; 1.40; 1.40; 1.40                                                | 1.4                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154040 | Gooseberries       | 0.56; 0.63; 0.70; 1.63                                                                   | 1.63                          | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154050 | Rose hips          | 1.13; 1.80                                                                               | 1.8                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154060 | Mulberries         | 0.60; 0.60                                                                              | 0.6                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154070 | Azaroles           | 0.86                                                                                     | 0.86                          | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 154080 | Elderberries       | 0.61; 0.62; 0.9                                                                        | 0.9                           | Cane fruits and other small fruits and berries | 2.2                        | 0.99                        | 1.40                          |
| 161010 | Dates              | 0.62; 0.74; 0.83                                                                        | 0.83                          | Miscellaneous fruit with edible peel (except olives) | 1.37                      | 0.91                        | 0.86                          |
| 161020 | Figs               | 0.60; 0.70; 0.70; 0.81                                                                   | 0.81                          | Miscellaneous fruit with edible peel (except olives) | 1.37                      | 0.91                        | 0.86                          |
| 161030 | Table olives       | 1.20; 1.54; 2.10; 2.26; 2.30; 2.30; 2.51; 2.70                                         | 2.7                           | Olives                                 | 2.7                        | 2.11                        | 2.28                          |
| Code   | Commodity            | Individual values (mg/kg) | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)(a) | Mean for the group (mg/kg)(a) | Median for the group (mg/kg)(a) |
|--------|----------------------|---------------------------|-------------------------------|------------------------------------------|----------------------------|------------------------------|------------------------------|
| 161040 | Kumquats             | 0.95; 0.95                | 0.95                          | Miscellaneous fruit with edible peel (except olives) | 1.37                      | 0.91                         | 0.86                         |
| 161050 | Carambolas           | 1.37; 1.37; 1.37          | 1.37                          | Miscellaneous fruit with edible peel (except olives) | 1.37                      | 0.91                         | 0.86                         |
| 161060 | Kaki                 | 0.20; 1.13; 1.13; 1.13    | 1.13                          | Miscellaneous fruit with edible peel (except olives) | 1.37                      | 0.91                         | 0.86                         |
| 161070 | Jambuls              | 0.86                      | 0.86                          | Miscellaneous fruit with edible peel (except olives) | 1.37                      | 0.91                         | 0.86                         |
| 162010 | Kiwi fruits          | 0.95; 1.30; 1.47; 1.72    | 1.72                          | Miscellaneous fruit with inedible peel, small   | 2                         | 1.33                         | 1.48                         |
| 162020 | Litchis              | 1.48; 1.48; 1.48; 2.0     | 2                             | Miscellaneous fruit with inedible peel, small   | 2                         | 1.33                         | 1.48                         |
| 162030 | Passionfruits        | 0.86; 0.86; 1.60          | 1.6                           | Miscellaneous fruit with inedible peel, small   | 2                         | 1.33                         | 1.48                         |
| 162040 | Prickly pears        | 0.80                      | 0.8                            | Miscellaneous fruit with inedible peel, small   | 2                         | 1.33                         | 1.48                         |
| 162050 | Star apples          | --                        | --                            | Miscellaneous fruit with inedible peel, small   | 2                         | 1.33                         | 1.48                         |
| 162060 | American persimmons  | --                        | --                            | Miscellaneous fruit with inedible peel, small   | 2                         | 1.33                         | 1.48                         |
| 163010 | Avocados             | 1.70; 1.90; 1.90; 2.31; 3.11; 5.30 | 5.3                         | Miscellaneous fruit with inedible peel, large   | 5.3                      | 1.20                         | 0.96                         |
| 163020 | Bananas              | 0.78; 1.02; 1.10; 1.11    | 1.11                          | Miscellaneous fruit with inedible peel, large   | 5.3                      | 1.20                         | 0.96                         |
| 163030 | Mangoes              | 0.64; 1.10; 1.10; 1.20    | 1.2                           | Miscellaneous fruit with inedible peel, large   | 5.3                      | 1.20                         | 0.96                         |
| 163040 | Papayas              | 0.16; 0.16; 0.31; 0.32    | 0.32                          | Miscellaneous fruit with inedible peel, large   | 5.3                      | 1.20                         | 0.96                         |
| 163050 | Granate apples       | 0.70; 1.20; 1.40; 1.58    | 1.58                          | Miscellaneous fruit with inedible peel, large   | 5.3                      | 1.20                         | 0.96                         |
| 163060 | Cherimoyas           | 0.73; 0.87                | 0.87                          | Miscellaneous fruit with inedible peel, large   | 5.3                      | 1.20                         | 0.96                         |
Review of the existing MRLs for copper compounds

| Code    | Commodity     | Individual values (mg/kg) | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)(a) | Mean for the group (mg/kg)(a) | Median for the group (mg/kg)(a) |
|---------|---------------|---------------------------|------------------------------|------------------------------------------|-----------------------------|-----------------------------|-------------------------------|
| 163070  | Guavas        | 0.40; 0.40; 0.60; 2.3; 2.30 | 2.3                          | Miscellaneous fruit with inedible peel, large | 5.3                         | 1.20                        | 0.96                          |
| 163080  | Pineapples    | 0.61; 0.76; 0.81; 0.90; 1.10; 1.13 | 1.13                         | Miscellaneous fruit with inedible peel, large | 5.3                         | 1.20                        | 0.96                          |
| 163090  | Breadfruits   | 0.70; 0.84                 | 0.84                         | Miscellaneous fruit with inedible peel, large | 5.3                         | 1.20                        | 0.96                          |
| 163100  | Durians       | 2.07                       | 2.07                         | Miscellaneous fruit with inedible peel, large | 5.3                         | 1.20                        | 0.96                          |
| 163110  | Soursops      | 0.40; 0.86                 | 0.86                         | Miscellaneous fruit with inedible peel, large | 5.3                         | 1.20                        | 0.96                          |
| 211000  | Potatoes      | 0.52; 0.91; 1.03; 1.08; 1.16;1.34 | 1.34                         |                                      | 1.34                        | 1.01                        | 1.06                          |
| 212010  | Cassava roots | 1.0; 1.0; 1.60             | 1.6                          | Tropical roots and vegetables          | 1.78                        | 1.43                        | 1.51                          |
| 212020  | Sweet potatoes| 1.27; 1.33; 1.51; 1.51     | 1.51                         | Tropical roots and vegetables          | 1.78                        | 1.43                        | 1.51                          |
| 212030  | Yams          | 1.70; 1.78; 1.78           | 1.78                         | Tropical roots and vegetables          | 1.78                        | 1.43                        | 1.51                          |
| 212040  | Arrowroots    | 1.21                       | 1.21                         | Tropical roots and vegetables          | 1.78                        | 1.43                        | 1.51                          |
| 213010  | Beetroots     | 0.75; 0.84; 1.2            | 1.2                          | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213020  | Carrots       | 0.36; 0.39; 0.45; 0.50     | 0.5                          | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213030  | Celeriacs     | 0.70; 0.80; 0.15; 1.16     | 1.16                         | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213040  | Horseradishes | 1.44; 1.55; 2.0; 2.30      | 2.3                          | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213050  | Jerusalem artichokes | 1.20; 1.20; 1.40         | 1.4                          | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213060  | Parsnips      | 1.20; 1.32; 1.40           | 1.4                          | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213070  | Parsley roots | 2.30                       | 2.3                          | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213080  | Radishes      | 0.26; 0.40; 0.50; 1.0; 1.15; 1.15; 1.79 | 1.79                  | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
| 213090  | Salsifies     | 0.10; 0.89; 1.20; 3.0      | 3                            | Other roots and tuber vegetables except sugar beet | 3                           | 1.01                        | 0.95                          |
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|---------|-----------------|--------------------------|------------------------------|------------------------------------------|----------------------------|------------------------------|-------------------------------|
| 213100  | Swedes          | 0.30; 0.40; 0.80         | 0.8                          | Other roots and tuber vegetables except sugar beet | 3                          | 1.01                         | 0.95                          |
| 213110  | Turnips         | 0.23; 0.40; 0.56; 0.85   | 0.85                         | Other roots and tuber vegetables except sugar beet | 3                          | 1.01                         | 0.95                          |
| 220010  | Garlic          | 0.85; 1.49; 2.99; 2.99    | 2.99                         | –                                         | 2.99                       | 2.08                         | 2.24                          |
| 220020  | Onions          | 0.39; 0.44; 0.56; 0.61; 1.30 | 1.3                        | –                                         | 1.3                        | 0.66                         | 0.56                          |
| 220030  | Shallots        | 0.88; 0.88               | 0.88                         | –                                         | 0.88                       | 0.88                         | 0.88                          |
| 220040  | Spring onions   | 0.83; 0.83               | 0.83                         | –                                         | 0.83                       | 0.83                         | 0.83                          |
| 231010  | Tomatoes        | 0.33; 0.39; 0.39; 0.42; 0.50; 0.58; 0.59; 0.60; 0.62; 0.66; 0.85; 0.90; 0.90; 1; 1.01 | 1.01 | Solanacea                          | 1.74                       | 0.79                         | 0.75                          |
| 231020  | Sweet peppers   | 0.17; 0.45; 0.53; 0.66; 0.70; 0.80; 0.94; 1.07; 1.15; 1.29; 1.33; 1.74; 1.74 | 1.74 | Solanacea                          | 1.74                       | 0.79                         | 0.75                          |
| 231030  | Aubergines      | 0.80; 0.82; 0.90         | 0.9                          | Solanacea                                | 1.74                       | 0.79                         | 0.75                          |
| 231040  | Okra            | 0.14; 0.94; 1.09         | 1.09                         | –                                         | 1.09                       | 0.72                         | 0.94                          |
| 232010  | Cucumbers       | 0.21; 0.21; 0.25; 0.25; 0.26; 0.26; 0.26; 0.28; 0.28; 0.28; 0.29; 0.3; 0.3; 0.3; 0.3; 0.3; 0.31; 0.31; 0.31; 0.31; 0.33; 0.33; 0.33; 0.35; 0.35; 0.37; 0.37; 0.37; 0.37; 0.37; 0.39; 0.39; 0.4; 0.4; 0.41; 0.41; 0.43; 0.44; 0.45; 0.47; 0.48; 0.51; 0.58; 0.71 | 0.71 | Cucurbits with edible peel         | 1.5                        | 0.42                         | 0.37                          |
| 232020  | Gherkins        | 0.28; 0.57; 0.85; 1.05; 1.5 | 1.5                         | Cucurbits with edible peel                | 1.5                        | 0.42                         | 0.37                          |
| 232030  | Courgettes      | 0.45; 0.51; 0.51; 0.51; 0.53 | 0.53                       | Cucurbits with edible peel                | 1.5                        | 0.42                         | 0.37                          |
| 233010  | Melons          | 0.41; 0.41; 0.41; 0.41; 0.46; 0.60 | 0.6                        | Cucurbits with inedible peel              | 1.27                       | 0.55                         | 0.42                          |
| 233020  | Pumpkins        | 0.80; 0.80; 1.27         | 1.27                         | Cucurbits with inedible peel              | 1.27                       | 0.55                         | 0.42                          |
| 233030  | Watermelons     | 0.29; 0.30; 0.42; 0.61   | 0.61                         | Cucurbits with inedible peel              | 1.27                       | 0.55                         | 0.42                          |
| 234000  | Sweet corn      | 0.40; 0.45; 0.50; 0.54   | 0.54                         | –                                         | 0.54                       | 0.47                         | 0.48                          |
| 241010  | Broccoli        | 0.49; 0.56; 0.70         | 0.7                          | Flowering brassica                       | 0.7                        | 0.42                         | 0.41                          |
| 241020  | Cauliflowers    | 0.38; 0.39; 0.42; 0.45   | 0.45                         | Flowering brassica                       | 0.7                        | 0.42                         | 0.41                          |
| 242010  | Brussels sprouts | 0.53; 0.65; 0.70         | 0.7                          | Head brassica                            | 0.7                        | 0.42                         | 0.41                          |
| 242020  | Head cabbages   | 0.10; 0.17; 0.19; 0.19; 0.19; 0.31; 0.33; 0.35; 0.41; 0.62; 0.62 | 0.62 | Head brassica                       | 0.7                        | 0.42                         | 0.41                          |
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|--------|-------------------------|---------------------------|-------------------------------|------------------------------------------|-----------------------------|-------------------------------|-------------------------------|
| 243010 | Chinese cabbages        | 0.21; 0.36; 0.53          | 0.53                          | Leafy brassica & kohlrabi               | 2.9                         | 0.95                          | 0.56                          |
| 243020 | Kales                   | 0.56; 0.91; 2.90          | 2.9                           | Leafy brassica & kohlrabi               | 2.9                         | 0.95                          | 0.56                          |
| 244000 | Kohlrabies              | 0.47; 1.29; 1.29          | 1.29                          | Leafy brassica & kohlrabi               | 2.9                         | 0.95                          | 0.56                          |
| 251010 | Lamb's lettuces         | 1.10; 1.34; 4.0           | 4                             | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 251020 | Lettuces                | 0.16; 0.20; 0.25; 0.25; 0.28; 0.29; 0.30; 0.30; 0.37; 0.40; 0.48; 0.48; 0.49 | 0.49                          | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 251030 | Escaroles               | 0.44; 0.52; 0.99; 0.99; 0.99 | 0.99                          | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 251040 | Cresses                 | 0.90; 1.70               | 1.7                           | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 251050 | Land cresses            | –                         | –                             | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 251060 | Roman rocket            | 0.76                      | 0.76                          | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 251070 | Red mustards            | 1.47                      | 1.47                          | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 251080 | Baby leaf crops         | –                         | –                             | Leafy brassica & kohlrabi               | 2.9                         | 0.95                          | 0.56                          |
| 252010 | Spinaches               | 0.73; 0.97; 1.04; 1.30     | 1.3                           | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 252020 | Purslanes               | 1.13; 1.13; 1.31          | 1.31                          | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 252030 | Chards                  | 79; 1.79                 | 1.79                          | Lettuces & other salads plants and Spinaches & similars | 4                           | 0.90                          | 0.83                          |
| 253000 | Grape leaves            | 4.15                      | 4.15                          | –                                         | 4.15                        | 4.15                          | 4.15                          |
| 254000 | Watercresses            | 0.10; 0.77; 1.4           | 1.4                           | –                                         | 1.4                         | 0.76                          | 0.10                          |
| 255000 | Witloofs                | 0.51                      | 0.51                          | –                                         | 0.51                        | 0.51                          | 0.51                          |
| 256010 | Chervil                 | 0.73; 0.73                | 0.73                          | Fresh herbs                              | 6.77                        | 2.27                          | 1.20                          |
| 256020 | Chives                  | 0.59; 0.85; 0.90; 1.57     | 1.57                          | Fresh herbs                              | 6.77                        | 2.27                          | 1.20                          |
| 256030 | Celery leaves           | –                         | –                             | Fresh herbs                              | 6.77                        | 2.27                          | 1.20                          |
| 256040 | Parsley                 | 0.59; 0.85; 0.90; 1.49     | 1.49                          | Fresh herbs                              | 6.77                        | 2.27                          | 1.20                          |
| 256050 | Sage                    | –                         | –                             | Fresh herbs                              | 6.77                        | 2.27                          | 1.20                          |
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|--------|----------------------------|---------------------------|-------------------------------|------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| 256060 | Rosemary                   | 3.01                      | 3.01                          | Fresh herbs                              | 6.77                                | 2.27                                | 1.20                                |
| 256070 | Thyme                      | 5.55                      | 5.55                          | Fresh herbs                              | 6.77                                | 2.27                                | 1.20                                |
| 256080 | Basil                      | 3.85; 3.85                | 3.85                          | Fresh herbs                              | 6.77                                | 2.27                                | 1.20                                |
| 256090 | Laurel                     | 4.16                      | 4.16                          | Fresh herbs                              | 6.77                                | 2.27                                | 1.20                                |
| 256100 | Tarragon                   | 6.77                      | 6.77                          | Fresh herbs                              | 6.77                                | 2.27                                | 1.20                                |
| 260010 | Beans (with pods)          | 0.48; 0.57; 0.70; 0.80; 2.52; 4.40 | 4.4                          | –                                        | 4.4                                 | 1.58                                | 0.48                                |
| 260020 | Beans (without pods)       | 3.18                      | 3.18                          | Beans (without pods) & lentils            | 3.18                                | 3.18                                | 3.18                                |
| 260030 | Peas (with pods)           | 1.34; 2.46; 6.56          | 6.56                          | –                                        | 6.56                                | 3.45                                | 1.34                                |
| 260040 | Peas (without pods)        | 1.76                      | 1.76                          | –                                        | 1.76                                | 1.76                                | 1.76                                |
| 260050 | Lentils (fresh)            | 0.72; 1.03; 1.13; 2.05    | 2.05                          | Beans (without pods) & lentils            | 3.18                                | 3.18                                | 3.18                                |
| 270010 | Asparagus                  | 0.55; 1.53; 1.89          | 1.89                          | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270020 | Cardoons                   | 0.70; 2.31               | 2.31                          | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270030 | Celeries                   | 0.20; 0.35; 0.38; 1.10    | 1.1                           | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270040 | Florence fennels           | 0.20; 0.59               | 0.59                          | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270050 | Globe artichokes           | 0.75; 2.31; 3.20         | 3.2                           | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270060 | Leeks                      | 0.45; 0.53; 0.53; 1.89   | 1.89                          | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270070 | Rhubarbs                   | 0.21; 0.42; 0.56         | 0.56                          | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270080 | Bamboo shoots              | 1.9                      | 1.9                           | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 270090 | Palm hearts                | 1.60; 6.44               | 6.44                          | Stem vegetables                          | 6.44                                | 1.27                                | 0.65                                |
| 280010 | Cultivated fungi           | 0.91; 1.18; 2.86; 3.18; 3.67; 5.40 | 5.4                          | Fungi                                    | 5.4                                 | 2.72                                | 2.86                                |
| 280020 | Wild fungi                 | 0.91; 1.19; 2.44; 2.77; 2.86; 3.73; 4.20 | 4.2                          | Fungi                                    | 5.4                                 | 2.72                                | 2.86                                |
| 290000 | Algae                      | 0.13; 0.15; 0.28; 0.60; 0.60; 2.64 | 2.64                      | –                                       | 2.64                                | 0.73                                | 0.44                                |
| 300010 | Beans (dry)                | 6.35; 8.04; 11.0         | 11                            | Dry pulses                               | 13.03                               | 8.04                                | 7.30                                |
| 300020 | Lentils (dry)              | 5.19; 6.70; 7.38; 13.03  | 13.03                         | Dry pulses                               | 13.03                               | 8.04                                | 7.30                                |
| 300030 | Peas (dry)                 | 7.22; 10.37             | 10.37                         | Dry pulses                               | 13.03                               | 8.04                                | 7.30                                |
| 300040 | Lupins (dry)               | 5.16                     | 5.16                          | Dry pulses                               | 13.03                               | 8.04                                | 7.30                                |
| 401010 | Linseeds                   | 10.32; 12.0; 13.76     | 13.76                         | Oilseeds                                 | 21.5                                | 12.1                                | 12.0                                |
| 401020 | Peanuts                    | 6.75; 7.64               | 7.64                          | Oilseeds                                 | 21.5                                | 12.1                                | 12.0                                |
| 401030 | Poppy seeds                | 10                       | 10                            | Oilseeds                                 | 21.5                                | 12.1                                | 12.0                                |
| 401040 | Sesame seeds               | 15.8                     | 15.8                          | Oilseeds                                 | 21.5                                | 12.1                                | 12.0                                |
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|----------|-------------------------|---------------------------|-------------------------------|-----------------------------------------|--------------------------|----------------------------|-----------------------------|
| 401050   | Sunflower seeds         | 15.0; 17.0; 18.3; 21.5    | 21.5                          | Oilseeds                                | 21.5                     | 12.1                       | 12.0                        |
| 401060   | Rapeseeds               | 6.02                       | 6.02                          | Oilseeds                                | 6.02                     | 3.43                       | 3.43                        |
| 401070   | Soyabeans               | 10.32; 10.32; 12.9         | 12.9                          | Oilseeds                                | 12.9                     | 7.16                       | 7.16                        |
| 401080   | Mustard seeds           | 6.45                       | 6.45                          | Oilseeds                                | 6.45                     | 3.87                       | 3.87                        |
| 401090   | Cotton seeds            | 12.04                      | 12.04                         | Oilseeds                                | 12.04                    | 7.38                       | 7.38                        |
| 401100   | Pumpkin seeds           | –                          | –                             | Oilseeds                                | –                        | –                          | –                           |
| 401110   | Safflower seeds         | 17.33; 17.47               | 17.47                         | Oilseeds                                | 17.47                    | 10.8                       | 10.8                        |
| 401120   | Borage seeds            | 1.3                        | 1.3                           | Oilseeds                                | 1.3                      | 0.88                       | 0.88                        |
| 401130   | Gold of pleasure seeds  | –                          | –                             | Oilseeds                                | –                        | –                          | –                           |
| 401140   | Hemp seeds              | –                          | –                             | Oilseeds                                | –                        | –                          | –                           |
| 401150   | Castor beans            | –                          | –                             | Oilseeds                                | –                        | –                          | –                           |
| 402010   | Olives for oil production | 1.20; 1.54; 2.10; 2.26; 2.30; 2.51; 2.70 | 2.7                           | Olives                                  | 2.7                      | 2.11                       | 2.28                        |
| 402020   | Oil palms kernels       | –                          | No data                      | –                                        | No data                  | No data                    | No data                     |
| 402030   | Oil palms fruits        | –                          | No data                      | –                                        | No data                  | No data                    | No data                     |
| 402040   | Kapok                   | –                          | No data                      | –                                        | No data                  | No data                    | No data                     |
| 500010   | Barley                  | 3.01; 4.19; 4.98; 6.02     | 6.02                          | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 500020   | Buckwheat               | 5.84; 11.0                 | 11                            | –                                        | 11                       | 8.42                       | 8.42                        |
| 500030   | Maize                   | 1.63; 2.40; 2.84           | 2.84                          | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 500040   | Common millet           | 6.10                       | 6.1                           | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 500050   | Oat                     | 2.41; 4.22; 4.30; 6.26     | 6.26                          | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 500060   | Rice                    | 1.10; 1.80; 2.10; 2.20; 2.77; 2.88; 4.63; 5.24; 10.0; 10.0 | 10                             | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 500070   | Rye                     | 3.20; 3.44; 3.92; 4.50; 5.16 | 5.16                          | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 500080   | Sorghum                 | 2.32; 7.35; 8.60           | 8.6                           | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 500090   | Wheat                   | 3.18; 3.61; 3.63; 3.69; 4.10; 4.26; 4.34; 4.50; 5.53; 6.88; 8.60 | 8.6                            | Cereals (except buckwheat)              | 10                       | 4.40                       | 4.15                        |
| 610000   | Teas                    | 0.25; 0.25                 | 25                            | –                                        | 25                       | 25                         | 25.0                        |
| 620000   | Coffee beans            | 15.5; 17.0                 | 17                            | –                                        | 17                       | 16.3                       | 16.3                        |
### Code | Commodity | Individual values (mg/kg) | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)\(^{(a)}\) | Mean for the group (mg/kg)\(^{(a)}\) | Median for the group (mg/kg)\(^{(a)}\)
--- | --- | --- | --- | --- | --- | --- | ---
631000 | Herbal infusions from flowers | – | – | Extrapolation from lettuce | 0.49 | 0.33 | 0.30
632000 | Herbal infusions from leaves and herbs | – | – | Extrapolation from lettuce | 0.49 | 0.33 | 0.30
633000 | Herbal infusions from roots | – | – | Extrapolation from other root and tuber vegetables | 3 | 1.01 | 0.95
640000 | Cocoa beans | 1.5 | 1.5 | – | 1.5 | 1.50 | 1.50
650000 | Carobs | 5.71 | 5.71 | – | 5.71 | 5.71 | 5.71
700000 | Hops | No data | Data only available on beer | no data | no data | no data
810000 | Seed spices | 7.8; 8.67; 8.67; 9.1; 9.75; 9.75; 10.3; 10.67; 11.1; 13.7 | 13.7 | Data on several different seed spices (anise, black caraway, celery seed, coriander seed, cumin, dill seed, fennel, fenugreek and nutmeg) | 13.7 | 9.87 | 9.75
820000 | Fruit spices | 3.83; 9.10; 11.27; 11.3; 11.3 | 11.3 | Data on cardamom and pepper | 11.3 | 9.36 | 11.3
830000 | Bark spices | 3.39; 3.39; 3.39 | 3.39 | Data on cinnamon | 3.39 | 3.39 | 3.39
840000 | Root and rhizome spices | 1.44; 1.55; 2.0; 2.26; 2.26; 2.3 | 2.3 | Data on ginger and and horseradish (root spices) | 2.3 | 1.97 | 2.13
850000 | Bud spices | 3.47; 3.74 | 3.74 | Data on cloves and capers | 3.74 | 3.61 | 3.61
860000 | Flower pistil spices | 3.28 | 3.28 | Data on saffron | 3.28 | 3.28 | 3.28
870000 | Aril spices | 24.67 | 24.67 | Data on saffron | 24.7 | 24.7 | 24.7
900010 | Sugar beets roots | 0.64; 0.82; 1.25; 1.36; 2.0 | 2 | – | 2 | 1.21 | 1.25
900020 | Sugar canes | 0.50; 0.54; 0.83; 1.70 | 1.70 | – | 1.7 | 0.89 | 0.69
900030 | Chicory roots | 0.77; 1.40 | 1.40 | – | 1.4 | 1.09 | 1.09
| Grasses | 1.80 | 1.80 | – | 1.80 | 1.80 | 1.80
| Alfalfa/clover | 1.46 | 1.46 | – | 1.46 | 1.46 | 1.46
| Rapeseed forage | 1.26 | 1.26 | – | 1.26 | 1.26 | 1.26
| Maize silage | 1.52 | 1.52 | – | 1.52 | 1.52 | 1.52
| Cereals straws | 1.46; 4.3; 6.02 | 6.02 | Cereals straws | 6.02 | 6.02 | 6.02
| Code     | Commodity               | Individual values (mg/kg)                                                                                                                                                                                                 | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)(a) | Mean for the group (mg/kg)(a) | Median for the group (mg/kg)(a) |
|----------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------|-----------------------------|-------------------------------|-------------------------------|
| –        | Sugar beet leaves/ tops | 0.78; 1.75; 4.42                                                                                                                                                                                                         | 4.42                          | –                                      | 4.42                        | 2.31                          | 1.75                          |
| 1011010  | Swine muscle            | 0.36; 0.4; 0.41; 0.5; 0.5; 0.68; 0.70; 0.70; 0.70; 0.75; 0.87; 0.87; 0.88; 0.9; 0.92; 0.93; 0.98; 1.08; 1.1; 1.13; 1.16; 1.25; 1.5; 2.25; 6.85     | 6.85                          | –                                      | 6.85                        | 1.13                          | 0.88                          |
| 1011020  | Swine fat tissue        | 0.0; 0.13; 0.18; 0.20; 0.37; 0.41; 0.45; 0.47; 0.54; 1.0; 1.0; 1.06                                                                                                                                                     | 1.06                          | –                                      | 1.06                        | 0.46                          | 0.41                          |
| 1011030  | Swine liver             | 4.5; 5.70; 5.76; 5.8; 6.2; 6.49; 6.60; 6.77; 6.8; 6.83; 6.92; 7.06; 7.1; 7.65; 8.19; 8.4; 8.5; 8.7; 8.89; 9.0; 9.48; 10.1; 10.8; 10.8; 11.1; 11.6; 12.0; 12.2; 12.6; 13.0; 13.2; 13.5; 14.2; 14.4; 14.9; 15.3; 16.0; 16.8; 17.7; 18.3; 19.2; 20.7; 23.7; 24.0; 24.0; 27.3; 33.3; 35.1; 60.5; 76.8; 84.3 | 84.3                          | –                                      | 84.3                        | 16.5                          | 11.6                          |
| 1011040  | Swine kidney            | 3.57; 5.63; 6.0; 6.1; 6.2; 6.25; 6.65; 6.73; 6.75; 7.15; 7.25; 7.25; 7.3; 7.58; 7.74; 7.75; 7.9; 8.4; 8.50; 8.5; 8.75; 9.25; 14; 25 | 25.0                          | –                                      | 25.0                        | 8.18                          | 7.28                          |
| 1012010  | Bovine muscle           | 0.3; 0.375; 0.4; 0.498; 0.564; 0.677; 0.75; 0.75; 0.765; 0.775; 0.87; 0.87; 0.90; 0.9; 0.9; 0.9; 0.9; 1.05; 1.05; 1.25; 1.41; 1.50; 1.56; 1.6; 1.60; 1.7; 1.77; 2.2 | 2.2                           | Bovine and horse muscle            | 2.2                          | 1.02                          | 0.9                           |
| 1012020  | Bovine fat tissue       | 0.175; 0.28; 0.39; 0.425; 0.50                                                                                                                                                                                        | 0.5                           | Bovine and horse fat tissue           | 0.5                          | 0.35                          | 0.39                          |
### Table

| Code     | Commodity          | Individual values (mg/kg)                                                                 | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)
|----------|---------------------|------------------------------------------------------------------------------------------|-------------------------------|------------------------------------------|-------------------------------|
| 1012030  | Bovine liver        | 1.2; 1.44; 1.82; 2.2; 2.77; 3.41; 5.3; 6.17; 6.25; 6.78; 11.9; 13.4; 13.7; 15.0; 18.7; 19.2; 20.4; 20.4; 21.0; 23.5; 25.0; 27.6; 28.0; 28.0; 30.3; 30.6; 32.0; 32.0; 33.7; 36.9; 37.0; 37.8; 38.0; 39.0; 39.0; 39.2; 40.0; 40.0; 41.5; 43.7; 44.0; 44.4; 44.9; 46.0; 46.1; 46.7; 53.0; 53.0; 54.0; 54.3; 55.0; 57.0; 58.5; 59.0; 60.0; 60.9; 64.0; 64.6; 72.6; 74.0; 80.0; 80.1; 85.0; 87.0; 89.6; 91.0; 92.7; 93.0; 97.5; 97.55; 106; 107; 108; 109; 112; 114; 118.65; 120; 122; 126; 127; 130; 130; 133; 138; 141; 143; 151; 153; 156; 157; 157.4; 157.83; 158; 168; 169; 176; 186; 190; 195; 198; 199; 214; 216; 222; 246; 246; 256; 257; 264; 273; 288; 303; 312; 326; 345; 359; 374; (454)\(^{(b)}\) | 374              | Bovine and horse liver                                                            | 374              | 101               | 64.3               |
| 1012040  | Bovine kidney       | 0.875; 3.70; 3.70; 3.85; 3.89; 4.26; 4.34; 4.40; 4.46; 4.65; 4.94; 4.97; 5.10; 5.31; 6.34; 8.15; 10.0 | 10               | Bovine and horse kidney                                                            | 10               | 4.89              | 4.61              |
| 1013010  | Sheep muscle        | 0.90; 1.0; 1.1; 1.22; 1.25; 1.25; 1.32; 1.47; 1.70; 2.32 | 2.3              | Sheep and goat muscle                                                            | 2.56             | 1.35              | 1.25              |
| 1013020  | Sheep fat tissue    | 0.0; 0.175; 0.425; 0.57 | 0.57             | Sheep and goat fat tissue                                                          | 0.57             | 0.29              | 0.30              |
| 1013030  | Sheep liver         | 69.79; 76.0; 89.8; 90.0; 96.7; 100; 131.4 | 131             | Sheep and goat liver                                                              | 131             | 84               | 90               |
| 1013040  | Sheep kidney        | 3.52; 3.75; 3.95; 4.46; 5.39 | 5.4              | Sheep and goat kidney                                                              | 5.39             | 3.85              | 3.85              |
| 1014010  | Goat muscle         | 1.0; 0.45; 2.56 | 2.6              | Sheep and goat muscle                                                              | 2.56             | 1.35              | 1.25              |
| 1014020  | Goat fat tissue     | –                                                             | –                | Sheep and goat fat tissue                                                          | 0.57             | 0.29              | 0.30              |
| 1014030  | Goat liver          | 30.0; 33; 94.5; 117 | 117             | Sheep and goat liver                                                              | 131             | 84               | 90               |
| 1014040  | Goat kidney         | 2.0                                                             | 2.0              | Sheep and goat kidney                                                              | 5.39             | 3.85              | 3.85              |
| 1015010  | Equine muscle       | –                                                             | –                | Bovine and horse muscle                                                            | 2.2             | 1.02              | 0.9               |
| 1015020  | Equine fat tissue   | –                                                             | –                | Bovine and horse fat tissue                                                        | 0.50             | 0.35              | 0.39              |
| 1015030  | Equine liver        | 5.3; 5.6; 6.0; 6.4; 6.7 | 6.7              | Bovine and horse liver                                                              | 374             | 101              | 64.3              |
| 1015040  | Equine kidney       | –                                                             | –                | Bovine and horse kidney                                                            | 10              | 4.89              | 4.61              |

\(^{(b)}\) Some values are rounded due to uncertainty in the original data sources.

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| Code     | Commodity       | Individual values (mg/kg) | Max for the commodity (mg/kg) | Comment (e.g. grouping or extrapolation) | Max for the group (mg/kg)(a) | Mean for the group (mg/kg)(a) | Median for the group (mg/kg)(a) |
|----------|-----------------|---------------------------|-------------------------------|------------------------------------------|-------------------------------|-------------------------------|--------------------------------|
| 1016010  | Poultry muscle  | 0.003; 0.048; 0.176; 0.20; 0.20; 0.30; 0.31; 0.36; 0.4; 0.40; 0.42; 0.42; 0.43; 0.44; 0.44; 0.5; 0.53; 0.55; 0.57; 0.6; 0.63; 0.63; 0.63; 0.67; 0.67; 0.70; 0.8; 0.83; 0.85; 0.89; 0.9; 1.0; 1.07; 1.1; 1.10; 1.2; 1.36; 1.40; 1.60; 1.60; 2.42; 2.53; 3.03; 3.06; 3.06; 3.30; 5.94; 5.94; 5.94 | 5.9 | – | 5.9 1.11 0.65 |
| 1016020  | Poultry fat tissue | 0; 0; 0 | 0 | – | 0 0 0 |
| 1016030  | Poultry liver | 3.22; 3.78; 4.07; 4.08; 4.42; 4.6; 4.92; 5.10; 5.10; 6.90; 6.90; 7.14; 12; 13.4; 59.60; 59.62; 66.7; 75.20; 75.22 | 75.2 | – | 75.2 22.2 6.90 |
| 1020010  | Cattle milk | 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.10; 0.13; 0.23; 0.65 | 0.65 | Ruminants and horse milks | 0.65 0.22 0.10 |
| 1020020  | Sheep milk | 0.26; 0.46; 0.60 | 0.60 | Ruminants and horse milks | 0.65 0.22 0.10 |
| 1020030  | Goat milk | 0.11; 0.46 | 0.46 | Ruminants and horse milks | 0.65 0.22 0.10 |
| 1020040  | Horse milk | 0.30 | 0.30 | Ruminants and horse milks | 0.65 0.22 0.10 |
| 1030000  | Birds eggs | 0.17; 0.55; 0.58; 0.59; 0.62; 0.62; 0.62; 0.62; 0.70; 0.70; 0.99; 1.10 | 1.1 | Including data on hens, duck, goose and quail eggs | 1.1 0.69 0.62 |

(a): Max, mean and median values were calculated for the relevant groups as defined in column ‘Comment’.
(b): The maximal value of 454 mg/kg retrieved in this survey is extremely high compared to the rest of the data set. Furthermore, this single value was also found in the European monitoring data where the distribution of the results also implies that it is abnormally high. Therefore, this value was disregarded from the assessment.
## Annex B – Summary of monitoring data

### Plant commodities

| Code   | Commodity       | n = (a) | n = (b) (> LOQ) | Mean(c) (mg/kg) | Percentile (mg/kg)(d) | Max(e) (mg/kg) | Samples origin(f) |
|--------|-----------------|---------|-----------------|-----------------|-----------------------|----------------|------------------|
| 110010 | Grapefruits     | 98      | 89              | 0.49            | 0.69 0.77 0.90 1.23   | 3.55           | CN, ES, FR, IL, MX, PE, SZ, TR, US, ZA, Known |
| 110020 | Oranges         | 10      | 5               | 0.51            | n.r. n.r. n.r.       | 0.59           | ES, GR, UY, ZA, Unknown |
| 110030 | Lemons          | 7       | 3               | 0.53            | n.r. n.r. n.r.       | 0.55           | ES, IT, TR |
| 110050 | Mandarinins     | 8       | 4               | 0.59            | n.r. n.r. n.r.       | 0.63           | ES, TR |
| 120020 | Brazil nuts     | 60      | 60              | 18.92           | 20.73 21.24 21.95 22.08 | 22.2           | BO, BR, Unknown |
| 120060 | Hazelnuts/cobnuts | 10       | 10             | 15.13           | 15.60 16.95 17.63 18.03 | 18.3           | TR, Unknown |
| 120090 | Pine nut kernels | 103      | 103             | 15.96           | 32.41 33.58 33.81 34.00 | 34.96         | CN, IT, PK, TR, Unknown |
| 120110 | Walnuts         | 55      | 55              | 12.64           | 15.76 16.13 17.24 19.00 | 20.4           | CL, DE, FR, HU, MD, US, Unknown |
| 130010 | Apples          | 128     | 64              | 0.5             | n.r. n.r. n.r.       | 1.5            | AR, BR, CL, DE, FR, IT, NZ, ZA, Unknown |
| 130020 | Pears           | 52      | 36              | 0.8             | 2.00 2.00 2.00 3.19   | 4.43           | AR, CL, CN, DE, ES, IT, NL, PT, ZA, Unknown |
| 130030 | Quinces         | 1       | 0               | < 2             | n.r. n.r. n.r.       | < 2            | DE |
| 140010 | Apricots        | 45      | 30              | 0.76            | n.r. n.r. n.r.       | 1.6            | DE, ES, FR, GR, IT, TR |
| 140020 | Cherries (sweet)| 65      | 48              | 0.77            | n.r. n.r. n.r.       | 1.18           | DE, ES, GR, IT, PL, TR, US, Unknown |
| 140030 | Peaches         | 36      | 30              | 0.89            | n.r. n.r. n.r.       | 1.45           | CL, DE, ES, IT, SK |
| 140040 | Plums           | 52      | 38              | 0.62            | n.r. n.r. n.r.       | 0.96           | BA, CL, DE, ES, GR, HU, IT, ZA |
| 151010 | Table grapes    | 258     | 207             | 1.28            | 2.38 3.65 6.24 7.81   | 9.6            | AR, BR, CL, CY, DE, EG, ES, GR, IN, IT, MA, NA, PE, TR, ZA, Unknown |
| 151020 | Wine grapes     | 10      | 10              | 0.26            | n.r. n.r. n.r.       | 1.2            | DE |
| 152000 | Strawberries    | 193     | 68              | 0.37            | n.r. n.r. n.r.       | 1.2            | BE, DE, ES, GR, MA, NL, PL, US |
| 153010 | Blackberries    | 3       | 2               | 0.95            | n.r. n.r. n.r.       | 1.4            | DE, IT, MX |
| 153020 | Dewberries      | 1       | 1               | 0.79            | n.r. n.r. n.r.       | 0.79           | DE |
| 153030 | Raspberries (red and yellow) | 32      | 19              | 0.61            | n.r. n.r. n.r.       | 1.19           | DE, ES, FR, IT, MX, NL, PT |
| 154010 | Blueberries     | 31      | 5               | 0.6             | n.r. n.r. n.r.       | 0.97           | AT, CL, DE, ES, MA, PL |
| 154020 | Cranberries     | 2       | 0               | < 2             | n.r. n.r. n.r.       | < 2            | US |
| 154030 | Currants (black, red and white) | 21      | 8               | 0.78            | n.r. n.r. n.r.       | 1.1            | DE, PL |
| 154040 | Gooseberries (green, red and yellow) | 6       | 2               | 0.77            | n.r. n.r. n.r.       | 0.82           | DE |

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| Code   | Commodity                          | n = (a) | n = (b) (> LOQ) | Mean(c) (mg/kg) | Percentile (mg/kg)(d) | Max(e) (mg/kg) | Samples origin(f) |
|--------|------------------------------------|---------|-----------------|-----------------|----------------------|---------------|------------------|
| 161010 | Dates                              | 1       | 1               | 1.73            | n.r.                 | n.r.          | 1.73             |
|        |                                    | 8       | 6               | 7.85            | 18.48                | 21.14         | BR, IT, TR       |
| 161020 | Table olives                        | 2       | 2               | 2.95            | n.r.                 | n.r.          | ES, GR           |
| 161040 | Kumquats                            | 1       | 0               | < 2             | n.r.                 | n.r.          | < 2              |
| 161060 | Kaki/Japanese persimmons            | 10      | 4               | 0.22            | n.r.                 | n.r.          | ES, IL           |
| 162010 | Kiwi fruits (green, red, yellow)    | 13      | 11              | 1.54            | 2.11                 | 2.14          | ES, FR, GR, IT, NZ |
| 162020 | Litchis/lychees                     | 3       | 3               | 2.73            | 3.06                 | 3.11          | MG               |
| 162030 | Passionfruits/maracujas             | 1       | 1               | 3.55            | n.r.                 | n.r.          | CO               |
| 163010 | Avocados                            | 3       | 3               | 2.9             | 3.14                 | 3.18          | CL, IL           |
| 163020 | Bananas                             | 25      | 23              | 1.08            | n.r.                 | n.r.          | CO, CR, DO, EC, PE, Unknown |
| 163030 | Mangoes                             | 29      | 29              | 0.6             | n.r.                 | n.r.          | 1.1              |
| 163040 | Papayas                             | 6       | 6               | 0.39            | n.r.                 | n.r.          | 0.48             |
| 163050 | Granate apples/pomegranates         | 2       | 2               | 1.44            | n.r.                 | n.r.          | IL               |
| 163070 | Guavas                              | 2       | 2               | 0.74            | n.r.                 | n.r.          | 0.78             |
| 163080 | Pineapples                          | 18      | 17              | 0.88            | n.r.                 | n.r.          | 1.3              |
| 211000 | Potatoes                            | 572     | 273             | 0.86            | 2.00                 | 2.00          | AT, BE, CY, DE, EG, ES, FR, GB |
| 212020 | Sweet potatoes                      | 3       | 1               | 0.68            | n.r.                 | n.r.          | 0.68             |
| 213010 | Beetroots                           | 20      | 9               | 0.77            | n.r.                 | n.r.          | 1.13             |
| 213020 | Carrots                             | 125     | 73              | 0.46            | n.r.                 | n.r.          | 0.82             |
| 213030 | Celeriacs/turnip rooted celeries    | 41      | 30              | 1.16            | 2.00                 | 2.00          | DE, NL, PL, Unknown |
| 213060 | Parsnips                            | 5       | 2               | 1.02            | n.r.                 | n.r.          | 1.38             |
| 213070 | Parsley roots/Hamburg roots parsley | 3       | 1               | 1.46            | n.r.                 | n.r.          | 1.46             |
| 213080 | Radishes                            | 76      | 59              | 0.17            | n.r.                 | n.r.          | 0.67             |
| 213090 | Salsiflies                          | 9       | 8               | 1.3             | n.r.                 | n.r.          | 1.9              |
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| Code   | Commodity                     | n = (a) | n = (b) (> LOQ) | Mean(c) (mg/kg) | Percentile (mg/kg) | Max(e) (mg/kg) | Samples origin(f) |
|--------|-------------------------------|---------|-----------------|-----------------|-------------------|----------------|------------------|
| 213100 | Swedes/rutabagas             | 3       | 0               | n.r.            | 2.65             | 3.42           | < 2              | DE               |
| 220010 | Garlic                       | 56      | 56              | 1.93            | 2.65             | 3.79           | CN, DE, EG, ES, FR, IT, NL, ZW, Unknown |
| 220020 | Onions                       | 68      | 38              | 0.55            | 2.81             | 0.93           | AU, DE, EG, ES, NL, NZ, PL |
| 220030 | Shallots                     | 2       | 0               | < 2             | n.r.             | < 2            | DE, FR           |
| 220040 | Spring onions/green onions and Welsh onions | 11 | 3 | 0.51 | n.r. | n.r. | n.r. | 0.52 | DE, IT, NL |
| 231010 | Tomatoes                     | 87      | 52              | 0.37            | 2.00             | 2.17           | BE, DE, ES, IL, IT, MA, NL, PT |
| 231020 | Sweet peppers/bell peppers   | 68      | 40              | 0.56            | 2.00             | 2.12           | BE, DE, ES, FR, GR, HU, IL, IT, MA, NL, TR, VN |
| 231030 | Aubergines/eggplants         | 43      | 29              | 0.46            | n.r.             | 0.87           | DE, ES, IT, NL, TR, Unknown |
| 232010 | Cucumbers                    | 119     | 39              | 0.31            | n.r.             | 1.06           | AT, BE, BG, DE, ES, GR, NL, PL, TR |
| 232030 | Courgettes                   | 65      | 35              | 0.71            | n.r.             | 2              | BE, DE, ES, IT, MA, NL, PT, TR, Unknown |
| 233010 | Melons                       | 13      | 12              | 0.19            | n.r.             | 0.35           | BR, ES, HU, Unknown |
| 233020 | Pumpkins                     | 14      | 10              | 0.51            | n.r.             | 0.71           | DE, FR           |
| 233030 | Watermelons                  | 98      | 79              | 0.47            | n.r.             | 2.09           | BR, CR, ES, GR, HU, IR, IT, MK, PA, RS, TR, Unknown |
| 234000 | Sweet corn                   | 84      | 82              | 0.88            | 1.15             | 2.01           | DE, ES, FR, MA, NL, SN, Unknown |
| 241010 | Broccoli                     | 31      | 21              | 0.52            | 1.25             | 0.78           | DE, ES, IT, NL |
| 241020 | Cauliflowers                 | 47      | 35              | 0.28            | 1.41             | 0.98           | DE, ES, FR, IT, NL, Unknown |
| 242010 | Brussels sprouts             | 162     | 102             | 0.42            | 1.55             | 0.72           | BE, DE, GB, IT, NL, Unknown |
| 242020 | Head cabbages                | 81      | 41              | 0.26            | 2.00             | 0.65           | DE, EG, ES, NL, PL, PT, Unknown |
| 243010 | Chinese cabbages/pe-tsai     | 16      | 13              | 0.37            | 2.00             | 0.64           | DE, Unknown |
| 243020 | Kales                        | 127     | 112             | 1.24            | 3.69             | 62             | BE, DE, Unknown |
| 244000 | Kohlrabies                   | 71      | 26              | 0.28            | 2.34             | 1.32           | DE, ES, IT, PL, Unknown |
| 251010 | Lamb's lettuce/corn salads   | 31      | 21              | 0.93            | 2.34             | 1.3            | DE, FR, IT |
| 251020 | Lettuces                     | 166     | 90              | 2.57            | 3.28             | 101            | BE, DE, ES, IT, Unknown |
| 251030 | Escaroles/broad-leaved endives | 13 | 11 | 0.44 | n.r. | n.r. | n.r. | 0.63 | DE, IT |
| 251060 | Roman rocket/rucola          | 61      | 53              | 0.81            | 7.03             | 14.2           | DE, FR, IT, Unknown |
| 252010 | Spinaches                    | 95      | 57              | 1.59            | 7.87             | 10.6           | BE, DE, ES, IT, TR, ZA, Unknown |
| Code     | Commodity                        | n = (a) | n = (b) (> LOQ) | Mean(c) (mg/kg) | Percentile (mg/kg)(d) | Max(e) (mg/kg) | Samples origin(f) |
|----------|----------------------------------|---------|-----------------|-----------------|-----------------------|---------------|------------------|
| 252030   | Chards/beet leaves              | 3       | 0               | < 2             | n.r.                  | n.r.          | < 2              | DE, IT           |
| 253000   | Grape leaves and similar species| 1       | 1               | 64              | n.r.                  | n.r.          | 64               | TR               |
| 254000   | Watercresses                    | 1       | 1               | 1.25            | n.r.                  | n.r.          | 1.25             | CZ               |
| 255000   | Witloofs/Belgian endives        | 30      | 17              | 0.51            | n.r.                  | n.r.          | 0.64             | BE, DE, FR, NL   |
| 256010   | Fresh herbs                     | 530     | 514             | 1.85            | 3.01                  | 5.49          | 8.88             | 16.96            | BE, DE, EG, ES, ET, FR, IL, IN, IT |
| 260010   | Beans (with pods)               | 80      | 53              | 0.78            | n.r.                  | n.r.          | 1.52             | DE, EG, ES, ET, IT, KE, MA, NL, PL, SN, TR |
| 260030   | Peas (with pods)                | 4       | 2               | 1.14            | n.r.                  | n.r.          | 1.32             | DE, TR, ZW       |
| 260040   | Peas (without pods)             | 2       | 1               | 1.42            | n.r.                  | n.r.          | 1.42             | DE, Unknown      |
| 270010   | Asparagus                       | 73      | 39              | 0.79            | n.r.                  | n.r.          | 1.87             | DE, ES, GR, IT, PE, PL |
| 270030   | Celeries                        | 5       | 1               | 0.24            | n.r.                  | n.r.          | 0.24             | ES               |
| 270040   | Florence fennels                | 7       | 1               | 0.7             | n.r.                  | n.r.          | 0.7              | DE, IT           |
| 270060   | Leeks                           | 47      | 21              | 0.38            | n.r.                  | n.r.          | 0.77             | DE, ES, NL, Unknown |
| 270070   | Rhubarbs                        | 31      | 9               | 0.35            | n.r.                  | n.r.          | 0.5              | DE, NL, Unknown  |
| 280010   | Cultivated fungi                | 229     | 207             | 2.2             | 3.10                  | 3.50          | 3.96             | 4.14             | BE, CN, DE, HU, KR, NL, PL, Unknown |
| 280020   | Wild fungi                      | 29      | 26              | 5.39            | 6.14                  | 7.11          | 15.74            | 27.12            | CN, DE, LT, MK, PL, RU, Unknown |
| 300010   | Beans (dry)                     | 100     | 100             | 7.21            | 9.30                  | 10.83         | 11.82            | 13.46            | AR, CN, DE, ES, GR, KG, NL, TH, TR, Unknown |
| 300020   | Lentils (dry)                   | 211     | 211             | 9.19            | 11.60                 | 12.18         | 13.00            | 13.79            | CA, DE, ES, IT, LB, NL, SY, TR, US, Unknown |
| 300030   | Peas (dry)                      | 117     | 115             | 6.11            | 7.63                  | 7.96          | 8.32             | 9.71             | AE, AR, BE, CA, DE, IT, PL, SK, TR, TZ, US, Unknown |
| 401010   | Linseeds                        | 96      | 96              | 12.96           | 15.20                 | 15.98         | 16.49            | 18.11            | AR, CA, DE, HU, KZ, RO, RU, Unknown |
| 401030   | Poppy seeds                     | 80      | 80              | 16.05           | 20.01                 | 20.63         | 22.80            | 26.64            | AT, CZ, DE, NL, TR, Unknown |
| 401040   | Sesame seeds                    | 18      | 18              | 16.11           | 18.92                 | 21.10         | 21.20            | 21.26            | IN, SD, UG, Unknown |
| 401050   | Sunflower seeds                 | 101     | 101             | 18.41           | 21.10                 | 21.90         | 23.25            | 24.00            | AR, BG, CN, DE, HU, RO, SK, TR, Unknown |
| 401080   | Mustard seeds                   | 14      | 14              | 6.17            | 6.18                  | 10.47         | 14.44            | 16.81            | CA, DE, Unknown |
| 401100   | Pumpkin seeds                   | 2       | 2               | 11.35           | n.r.                  | n.r.          | n.r.             | 12.3             | DE               |
| 500010   | Barley                          | 83      | 83              | 4.09            | 5.22                  | 6.17          | 7.98             | 9.19             | AT, DE, Unknown  |
| 500020   | Buckwheat and other pseudo-cereals| 2   | 2               | 6.68            | n.r.                  | n.r.          | 7.35             | DE, RU           |
| 500040   | Common millet/proso millet      | 1       | 1               | 6.73            | n.r.                  | n.r.          | 6.73             | DE               |
| Code   | Commodity                                      | n = (a) | n = (b) (- LOQ) | Mean(c) (mg/kg) | Percentile (mg/kg)(d) | Max(e) (mg/kg) | Samples origin(f) |
|--------|-----------------------------------------------|---------|-----------------|----------------|-----------------------|----------------|-------------------|
| 500050 | Oat                                           | 3       | 3               | 5.09           | 5.54                  | 5.59           | 5.62              | 5.63              | 5.64              | DE                |
| 500060 | Rice                                          | 264     | 262             | 2.54           | 4.07                  | 7.24           | 9.01              | 10.34             | 12.2              | FR, IN, IT, KH, LA, LK, PK, TH, US, Unknown |
| 500070 | Rye                                           | 157     | 157             | 3.57           | 4.30                  | 5.40           | 7.48              | 7.92              | 8.43              | DE, PL, Unknown   |
| 500090 | Wheat                                         | 351     | 351             | 4.13           | 5.47                  | 5.93           | 6.65              | 7.26              | 10.1              | AT, CA, CZ, DE, HR, LV, TR, Unknown |
| 610000 | Teas                                          | 176     | 130             | 2.46           | 10.70                 | 15.68          | 17.93             | 19.05             | 21.8              | CN, IN, JP, LK, TR, TW, Unknown |
| 620000 | Coffee beans                                   | 115     | 115             | 14.03          | 15.96                 | 17.71          | 18.78             | 20.12             | 23.4              | BR, CR, GT, PA, PG, VN, Unknown |
| 631000 | Herbal infusions, dried                       | 74      | 48              | 0.17           | n.r.                  | n.r.           | n.r.              | 0.63              | CG, DE, EG, HR, HU, PL, RO, UY, Unknown |
| 700000 | Hops, dried                                   | 8       | 8               | 149.81         | 272                   | 321            | 346               | 360               | 370               | CZ, DE, GB        |
| 840000 | Root and rhizome spices (Ginger, Turmeric/ curcuma) | 58      | 58              | 4.86           | 5.97                  | 8.56           | 8.97              | 9.65              | 10.32             | CN, IN, Unknown   |

**Animal commodities**

| Code   | Commodity            | n = (a) | n = (b) | Mean(c) (mg/kg) | Percentile (mg/kg)(d) | Max(e) (mg/kg) | Samples origin(f) |
|--------|----------------------|---------|---------|----------------|-----------------------|----------------|-------------------|
| 1011010| Swine muscle         | 18      | 18      | 0.68          | n.r.                  | n.r.           | 1.26              | DE, DK, GB, Unknown |
| 1011030| Swine liver          | 14      | 14      | 9.71          | 16.65                 | 18.23          | 18.71             | 19.01             | 19.2              | BE, DE, Unknown   |
|        | Bovine meat          | 89      | 61      | 2.03          | 1.41                  | 1.62           | 1.74              | 24.20             | 33                | AT, DE, NL, Unknown |
| 1012010| Bovine muscle        | 23      | 23      | 0.84          | 1.63                  | 1.75           | 1.88              | 1.96              | 2.02              | DE, FR, NL        |
| 1012030| Bovine liver         | 206     | 206     | 86.68         | 196                   | 256            | 320               | 358               | 454               | DE, NL, Unknown   |
| 1012040| Bovine kidney        | 1       | 1       | 3.45          | n.r.                  | n.r.           | n.r.              | 3.45              | DE                |                  |
| 1013010| Sheep muscle         | 124     | 119     | 1.03          | 1.44                  | 1.57           | 1.76              | 1.94              | 2.95              | AR, AU, BE, DE, GB, NL, NZ, Unknown |
|        | Goat meat            | 57      | 35      | 1.03          | 1.10                  | 1.12           | 1.38              | 3.26              | 5.5               | DE, Unknown       |
|        | Horses, asses, mules or hinnies meat          | 1       | 1       | 2.1           | n.r.                  | n.r.           | n.r.              | n.r.              | 2.1               | DE                |
| 1016010| Poultry muscle       | 144     | 144     | 3.47          | 5.43                  | 5.94           | 6.62              | 6.92              | 7.1               | DE, FR, GB, HU, NL, PL, Unknown |
| 1016030| Poultry liver        | 1       | 1       | 3.2           | n.r.                  | n.r.           | n.r.              | n.r.              | 3.2               | DE                |
|        | Other farm animals meat | 392   | 386     | 1.84          | 2.42                  | 2.70           | 3.32              | 4.27              | 8.9               | AT, DE, FR, HU, NL, NZ, PL, Unknown |
| 1017010| Other farm animals muscle | 77    | 73      | 1.68          | 2.28                  | 2.66           | 2.77              | 2.85              | 3                 | DE, ES, FR, NZ, Unknown |
| 1020000| Milk and milk products | 433   | 184     | 0.24          | n.r.                  | n.r.           | n.r.              | n.r.              | 1.1               | AT, DE, Unknown   |
| Code   | Commodity                             | n = (a) | n = (b) (> LOQ) | Mean(c) (mg/kg) | Percentile (mg/kg)(d) | Max(e) (mg/kg) | Samples origin(f) |
|--------|---------------------------------------|---------|-----------------|-----------------|-----------------------|----------------|------------------|
| 1030000| Bird’s eggs                           | 145     | 131             | 0.58            | 0.91 1.00 1.00 1.00   | 3.55           | DE, NL           |
| 1070000| Wild terrestrial animal vertebrate    | 184     | 181             | 1.72            | 2.28 2.51 2.88 3.22   | 3.9            | DE (further details in EFSA, 2014) |

LOQ: limit of quantification; n.r.: not relevant (Percentile were only calculated if n > 2 and MAX value > LOQ for enforcement; i.e. MAX > 2 mg/kg).
(a): Number of monitoring results available (from year 2009 to 2015).
(b): Number of results above the LOQ.
(c): Average value considering only results above LOQ.
(d): Percentiles 90th, 95th, 97.5th and 99th calculated considering all results. Values below the LOQ were interpreted as positive values; these values were substituted by the LOQ of the measurement.
(e): Highest value considering all monitoring results.
(f): Country codes indicating the origin of the samples.