REASONED OPINION

Modification of the existing MRLs for chlorpyrifos in various crops and in products of animal origin[1]

European Food Safety Authority[2]

European Food Safety Authority (EFSA), Parma, Italy

SUMMARY

In accordance with Article 6 of Regulation (EC) No 396/2005, Spain, herewith referred as the evaluating Member State (EMS), received an application from Makhteshim Chemical Works to modify the existing MRLs for the active substance chlorpyrifos in several crops. Spain drafted an evaluation report according to Article 8 of Regulation (EC) No 396/2005, which was submitted to the European Commission and forwarded to EFSA on 1 December 2010.

In accordance with Article 6 of Regulation (EC) No 396/2005, Spain, herewith referred as the evaluating Member State (EMS), received an application from Dow AgroSciences, on behalf of a consortium of manufacturers, to modify the existing MRLs for the active substance chlorpyrifos in several crops. Spain drafted an evaluation report according to Article 8 of Regulation (EC) No 396/2005, which was submitted to the European Commission and forwarded to EFSA on 1 December 2010.

Considering that both applications refer to the modification of existing MRLs for chlorpyrifos, to optimise the evaluation work, EFSA addressed the MRL applications in one reasoned opinion.

EFSA derives the following conclusions based on the evaluation reports drafted by Spain, the Commission Review Report, the Draft Assessment Report and its addenda prepared under the Directive 91/414/EEC and the JMPR report.

The toxicological profile of chlorpyrifos was assessed in the framework of the peer review under Directive 91/414/EEC. The data were sufficient to derive an ADI of 0.01 mg/kg bw/day and an ARfD of 0.1 mg/kg/bw.

The metabolism of chlorpyrifos in primary crops after foliar application was investigated during the peer review under the Directive 91/414/EEC. Studies with the structurally related compound chlorpyrifos-methyl were also used to reveal the metabolic profile of the active substance. The peer review established the residue definition for enforcement as parent compound and for risk assessment as "*chlorpyrifos + 3,5,6-trichloropyridinol (TCP) + conjugates, expressed as chlorpyrifos*". The results of two new metabolism studies on peas and radish assessed in the framework of these

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[2] Correspondence: pesticides.mrl@efsa.europa.eu

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applications are consistent with the previous findings. It is noted that 3,5,6-trichloropyridinol (TCP) is a metabolite that is also formed after the use of chlorpyrifos-methyl and triclopyr.

Several supervised residue trials on the crops under consideration with chlorpyrifos formulated as emulsifiable concentrate (EC), dispersible granule (WG) and capsule suspension (CS) were provided. Based on the results from the use leading to the more critical residues among the uses sufficiently supported by data, the following modifications of the existing MRLs are proposed: 0.01* mg/kg for sweet corn, maize, rape seeds, sugar beets; 0.1 mg/kg for barley, wheat; 0.4 mg/kg for globe artichokes; 0.5 mg/kg for plums, cauliflowers; 0.6 mg/kg for tomatoes, aubergines, broccoli; 0.8 mg/kg for raspberries, head cabbage; 1 mg/kg for cherries, Brussels sprouts; 1.5 mg/kg for citrus and pome fruits, peppers; 2 mg/kg for apricots, peaches, table and wine grapes and 4 mg/kg for bananas. The MRLs are already fixed at a level corresponding to the intended use of chlorpyrifos on strawberries and no modification is proposed. Furthermore, assuming that the residue definitions for enforcement and risk assessment established for the other commodities apply to feed items as well and in case of a future introduction of the category in Regulation (EC) No. 396/2005, EFSA derived the following MRL proposals for feed items: 1.0 mg/kg on wheat, barley straw, 1.5 mg/kg on sugar beet leaves and 3.0 mg/kg on grass forage (fresh). As regards to the use on beans (with pods), dry beans and olives the data are not adequate to support the MRL proposal.

Validated analytical methods are available to enforce the proposed MRLs for chlorpyrifos, however for enforcing the MRLs on the oil-based commodities additional data regarding repeatability to complete the validation of the method of analysis according to EU guidelines should be submitted.

Studies investigating the nature of chlorpyrifos residues in processed commodities were assessed in the peer review and showed that the compound progressively degrades to TCP under the processing conditions representative for pasteurization, boiling/cooking and sterilization. Several processing studies were provided and the data were sufficient to derive the following processing factors, which are recommended to be included in Annex VI of Regulation (EC) No 396/2005:

- Citrus, peeled: < 0.03
- Banana, peeled: 0.02
- Grape, wine: <0.2
- Grapes, dry pomace: 8.74
- Tomato, juice: <0.04
- Tomato, puree: <0.06
- Tomato, canned: <0.04
- Barley, beer: <0.1
- Barley, brewing malt: 0.36
- Wheat, bran: 3.38
- Wheat, white flour: 0.38
- Wheat, white bread: 0.34
- Wheat, wholemeal flour: 1.31
- Wheat, wholemeal bread: 0.72

The occurrence of chlorpyrifos residues in rotational crops was assessed in the peer review. Based on the available information on the nature and magnitude of residues in succeeding crops, it was concluded that significant residue levels of chlorpyrifos and its soil metabolites are unlikely to occur in rotational crops provided that the compound is used according to the proposed use patterns.

The calculated livestock dietary burden exceeded the trigger value of 0.1 mg/kg (dry matter) for the four relevant food-producing animal species. Based on the metabolism of chlorpyrifos in livestock, the peer review established the enforcement residue definition as parent compound and the risk assessment residue definition as "*chlorpyrifos + 3,5,6-trichloropyridinol (TCP) + conjugates, expressed as chlorpyrifos*". A validated analytical method is available to enforce the MRL in animal commodities. The results of livestock feeding studies showed that, at the calculated maximum dietary burden, residues of chlorpyrifos exceeding the LOQ of 0.01 mg/kg may be observed in bovine and swine fat and muscle only. The following MRLs are proposed: 0.05 mg/kg for swine fat and meat and 0.4 mg/kg for ruminant fat and meat. The existing MRLs on milk and eggs are confirmed by the outcome of the dietary burden, while on the remaining products of swine and ruminant origin the proposed MRL is 0.01* mg/kg. The lowering of the MRL at 0.05* to 0.01* mg/kg in poultry edible

tissues is also proposed based on the sensitivity of the analytical assay. A validated analytical method is available to enforce the proposed MRLs for chlorpyrifos in animal commodities.

The consumer risk assessment was performed with revision 2 of the EFSA Pesticide Residues Intake Model (PRIMo). For the calculation of the acute and the chronic exposure, EFSA used the median residue and the highest residue values derived from the residue trials leading to the most critical use on the crop under considerations and from the livestock feeding studies as corrected with the conversion factor (CF) for risk assessment. For the products of animal origin the median residue and the highest residue values derived according to the risk assessment residue definition were also used as input values. In addition, the peeling factor for citrus and bananas and the yield factor for unprocessed wine grapes were included in the calculations. The estimated exposures were then compared with the toxicological reference values for chlorpyrifos.

No long-term consumer intake concerns were identified for any of the European diets incorporated in the EFSA PRIMo. The total calculated intake values ranged from 8 to 50.4 % of the ADI. Among the crops under consideration, the higher contributors to the theoretical maximum daily intake (TMDI) were apples (17 % of the ADI, DE child diet) and tomatoes (7.7 % of the ADI, WHO Cluster diet B).

A potential acute consumer risk was identified in relation to the residues expected on table grapes (101.5 % of the ARfD) treated with the capsule suspension (CS) according to the supported critical GAP. As no additional refinements for table grapes are possible, EFSA assessed the safety of the MRL derived for the alternative less critical use of the emulsifiable concentrate (EC) and dispersible granule (WG) formulations. For the alternative GAP on table grapes and for the remaining proposed uses no acute intake concerns were identified. The estimated highest intake was 89.1 % of the ARfD.

Consequently, EFSA proposes to amend the current MRLs as shown in the table herewith reported. It is important to highlight that the conclusions reached in this opinion and the risk assessment are valid only if Member States confirm that no more critical GAP than that proposed by the EMS is still authorised for mandarins, head cabbage, globe artichokes, barley and sugar beets, which requires maintaining the existing MRLs. A new consumer risk assessment is needed if the assumption is not valid.

Code number[(a)]	**Commodity**	**Existing EU MRL (mg/kg)**	**Proposed EU MRL (mg/kg)**	**Justification for the proposal**
Enforcement residue definition: chlorpyrifos (F)				
110010	Grapefruit (Shaddocks, pomelos, sweeties, tangelo (except mineola), ugli and other hybrids)	0.3	1.5	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on mandarins and oranges.
110020	Oranges (Bergamot, bitter orange, chinotto and other hybrids)	0.3	1.5	
110030	Lemons (Citron, lemon)	0.2	1.5	
110040	Limes	0.3	1.5	
110990	Others citrus fruits	0.3	1.5	
110050	Mandarins	2.0	1.5	Before lowering the MRL on mandarins, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
130000	Apples	0.5	1.5	The MRL proposal is sufficiently supported

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
130020	Pears (Oriental pears)	0.5	1.5	by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on apples and pears.
130030	Quinces	0.5	1.5	
130040	Medlar	0.5	1.5	
130050	Loquat	0.5	1.5	
130990	Others pome fruits	0.5	1.5	
140010	Apricots	0.05	2.0	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from data on peaches.
140020	Cherries (sweet cherries, sour cherries)	0.3	1.0	The MRL proposals are sufficiently supported by data and no risk for consumers was identified for the intended use.
140030	Peaches (Nectarines and similar hybrids)	0.2	2.0	
140040	Plums (Damson, greengage, mirabelle, sloe	0.2	0.5	
151010	Table grapes	0.5	2.0	The MRL proposal is sufficiently supported by data and no consumer risk was identified for the intended use of the EC/WG formulations. Although sufficiently supported by data no final proposal could be derived for the more critical use of the CS formulation as a potential short-term consumer risk could not be excluded.
151020	Wine grapes	0.5	2.0	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use.
152000	Strawberries	0.2	0.2	No change to the existing MRL is required for the intended use. The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use.
153030	Raspberries (Wineberries)	0.5	0.8	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use.
163020	Bananas (Dwarf banana, plantain, apple banana)	3.0	4.0	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended indoor use.
231010	Tomatoes (Cherry tomatoes, tree tomato, *Physalis*, gojiberry, wolfberry (*Lycium barbarum and L. chinense*)	0.5	0.6	The MRL proposals are sufficiently supported by data and no risk for consumers was identified for the intended uses. The MRL proposal on aubergines was extrapolated from data on tomatoes.
231030	Aubergines (egg plants) (Pepino)	0.5	0.6	
231020	Peppers (Chilli peppers)	0.5	1.5	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended uses.
234000	Sweet corn	0.05*	0.01*	The MRL proposal was extrapolated from

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
				data on immature maize and no risk for consumers was identified for the intended uses.
241010	Broccoli (Calabrese, Chinese broccoli, Broccoli raab)	0.05*	0.6	The MRL proposals are sufficiently supported by data and no risk for consumers was identified for the intended uses.
241020	Cauliflower	0.05*	0.5	
242010	Brussels sprouts	0.05*	1.0	
242020	Head cabbage	1	0.8	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. Before lowering the MRL on head cabbages, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
260010	Beans (with pods) (Green bean (French beans, snap beans), scarlet runner bean, slicing bean, yardlong beans)	0.05*	0.05*	Residue data are not sufficient to derive a MRL proposal.
270050	Globe artichokes	1	0.4	The MRL proposal is sufficiently supported by data if chlorpyrifos is applied according to the proposed GAP up to pre-flowering. No risk for consumers was identified for the modified intended use. Before lowering the MRL, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
300010	Beans (Broad beans, navy beans, flageolets, jack beans, lima beans, field beans, cowpeas)	0.05*	0.05*	Residue data are not sufficient to derive a MRL proposal.
401060	Rape seed (Bird rapeseed, turnip rape)	0.05*	0.01*	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended uses.
402010	Olives for oil production	0.05*	0.05*	Residue data are not sufficient to derive a MRL proposal.
500010	Barley	0.2	0.1	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on barley and wheat. Before lowering the MRL, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
500030	Maize	0.05*	0.01*	The MRL proposal is sufficiently supported by data and no risk for consumers was

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
				identified for the intended use
500090	Wheat (Spelt, triticale)	0.05*	0.1	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on barley and wheat.
900010	Sugar beet (root)	0.2	0.01*	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended uses. Before lowering the MRL, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
1011010	Swine, meat	-	0.05	The MRL proposals are sufficiently supported by data and no risk for consumers was identified. No change to the existing MRLs is required on milk and bird's eggs products.
1011020	Swine, fat of lean meat	-	0.05	
1011030 1011040 1011050 1011990	Swine, liver, kidney, edible offal, others	-	0.01*	
1012010 1013010 1014010	Bovine, sheep, goat, meat	-	0.4	
1012020 1013020 1014020	Bovine, sheep, goat, fat	-	0.4	
1012030 1013030 1014030	Bovine, sheep, goat, Liver	-	0.01*	
1012040 1013040 1014040	Bovine, sheep, goat, kidney	-	0.01*	
1012050 1013050 1014050	Bovine, sheep, goat, edible offal	-	0.01*	
1012990 1013990 1014990	Bovine, sheep, goat, others	-	0.01*	
1016000	(f) Poultry -chicken, geese, duck, turkey and Guinea fowl-, ostrich, pigeon	0.05*	0.01*	
1020000	(ii) Milk and cream, not concentrated, nor containing added sugar or sweetening matter, butter and other fats derived from milk, cheese and curd	0.01*	0.01*	
1030000	(iii) Birds' eggs, fresh preserved or cooked	0.01*	0.01*	

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
	Shelled eggs and egg yolks fresh, dried, cooked by steaming or boiling in water, moulded, frozen or otherwise preserved whether or not containing added sugar or sweetening matter			
Enforcement residue definition: chlorpyrifos[(b)]				
	Wheat, barley straw	-	1.0	In view of a future introduction of a category of crops or parts of crops exclusively used for animal feed. The MRL proposals are sufficiently supported by data and no risk for consumers was identified.
	Sugar beet, leaves	-	1.5	
	Grass forage (fresh)	-	3.0	

(a): According to Annex I of Regulation (EC) No 396/2005.
(b): If the new category of crops or parts of crops exclusively used for animal feed will be introduced in Annex I of Regulation (EC) No 396/2005, separate residue definitions for feed items can be discussed.
(*): Indicates that the MRL is set at the limit of analytical quantification.
(F): Fat-soluble.

KEY WORDS

Chlorpyrifos, citrus, pome fruits, stone fruits, grapes, strawberries, cane fruits, bananas, tomatoes, aubergines, pepper, sweet corns, flowering and head brassica, cereals, sugar beets, Regulation (EC) No 396/2005, consumer risk assessment, organophosphates, trichloropyridinol (TCP).

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BACKGROUND

Regulation (EC) No 396/2005[3] establishes the rules governing the setting of pesticide MRLs at European Union level. Article 6 of that Regulation lays down that a party requesting an authorisation for the use of a plant protection product in accordance with Council Directive 91/414/EEC[4], shall submit to a Member State, when appropriate, an application to set or modify an MRL in accordance with the provisions of Article 7 of that Regulation.

Spain, hereafter referred to as the evaluating Member State (EMS), received an application from the company Makhteshim Chemical Works[5] to modify the existing MRLs for the active substance chlorpyrifos in several crops. This application was notified to the European Commission and EFSA and subsequently evaluated by the EMS in accordance with Article 8 of the Regulation.

Spain received also an application from the company Dow AgroSciences, on behalf of a consortium of manufacturers[6], to modify the existing MRLs for the active substance chlorpyrifos in several crops. This application was notified to the European Commission and EFSA and subsequently evaluated by the EMS in accordance with Article 8 of the Regulation.

After completion, the evaluation reports of the EMS were submitted to the European Commission who forwarded the applications, the evaluation reports and the supporting dossiers to EFSA on 1 December 2010. The applications were included in the EFSA Register of Questions with the reference number EFSA-Q-2010-01480 and EFSA-Q-2010-01481 with the same subject:

Chlorpyrifos - Application to modify the existing MRLs in various crops

Overall, combining the two evaluation reports, Spain proposed to modify the existing MRLs of chlorpyrifos as reported in the table below:

Commodity	**Existing EU MRL (mg/kg)**	**EMS Proposed EU MRL (mg/kg)**
Enforcement residue definition: chlorpyrifos		
grapefruit, oranges, limes, other citrus fruits	0.3	1.5
lemons	0.2	
mandarins	2.0	
pome fruits	0.5	1.0
apricots	0.05	1.5
cherries	0.3	0.8
peaches, nectarines	0.2	1.5
plum	0.2	0.5 (CXL)
table grapes	0.5	0.5
wine grapes	0.5	1.5
strawberries	0.2	0.3 (CXL)
blackberries	0.5	0.7
dewberries	0.05	
raspberries	0.5	
other cane fruits	0.05*	
banana	3.0	3.0
pepper	0.5	1.0

[3] Regulation (EC) No 396/2005 of the Parliament and of the Council of 23 February 2005. OJ L 70, 16.03.2005, p. 1-16.
[4] Council Directive 91/414/EEC of 15 July 1991. OJ L 230, 19.08.1991, p. 1-32.
[5] Makhteshim Chemical Works Ltd., San Vicente Mártir, 16 1er entresuelo, Ptas n. 3-5, 46002 Valencia, Spain.
[6] Dow AgroSciences, on behalf of the Consortium of Cheminova A/S, Dow AgroSciences Ltd and Makhteshim-Agan Ltd., 3, Milton Park, OX14 4RN Abingdon (Oxfordshire), United Kingdom.

Commodity	Existing EU MRL (mg/kg)	EMS Proposed EU MRL (mg/kg)
tomato	0.5	0.5
eggplant	0.5	0.5
sweet corn	0.05*	0.01*
cauliflower	0.05*	0.5
broccoli	0.05*	
other flowering brassica	0.05*	
head cabbage	1.0	1.0 (CXL)
Brussels sprouts	0.05*	0.8
Beans with pod	0.05*	0.01*
globe artichoke	1.0	0.3
rapeseeds	0.05*	0.01*
maize	0.05*	0.05 (CXL)
barley	0.2	0.2
wheat	0.05*	0.2
sugar beet	0.2	0.05 (CXL)
swine, fat	-	0.05
swine, meat, other products	-	0.01*
bovine, sheep, goat, horse fat	-	0.2
bovine, sheep, goat, horse, meat, other products	-	0.01*
Poultry, products	0.05*	0.01*
Pasture	-	3.0

The EMS also proposed to lower all existing MRL values for plant and animal products equal to the LOQ of 0.05* mg/kg to the LOQ of 0.01* mg/kg.

EFSA then proceeded with the assessment of the application as required by Article 10 of the Regulation.

EFSA requested from Spain same clarifications on the supervised residue trials and the proposed GAPs. A reply was submitted by Spain on 24 October 2011 and taken into consideration by EFSA for the finalization of this reasoned opinion.

TERMS OF REFERENCE

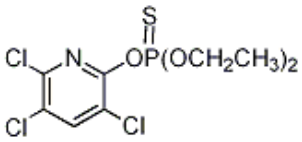
In accordance with Article 10 of Regulation (EC) No 396/2005, EFSA shall, based on the evaluation report provided by the evaluating Member State, provide a reasoned opinion on the risks to the consumer associated with the application.

In accordance with Article 11 of that Regulation, the reasoned opinion shall be provided as soon as possible and at the latest within three months (which may be extended to six months where more detailed evaluations need to be carried out) from the date of receipt of the application. Where EFSA requests supplementary information, the time limit laid down shall be suspended until that information has been provided.

In this particular case the calculated deadline for providing the reasoned opinion is 1 March 2011 for both applications.

THE ACTIVE SUBSTANCE AND ITS USE PATTERN

Chlorpyrifos is the ISO common name for *O,O*-diethyl *O*-3,5,6-trichloro-2-pyridyl phosphorothioate (IUPAC). The chemical structure and molecular weight of the compound are herewith reported.



Molecular weight: 350.6 g/mol

Chlorpyrifos is a non-systemic organophosphate (OP) insecticide with contact, stomach and respiratory action. Chlorpyrifos action is due to the inhibition of acetyl-cholinesterase (AChE inhibitor) in the pest nerves and subsequent accumulation of acetylcholine in the nerve endings. Noteworthy is that chlorpyrifos shares a common structure with another OP, chlorpyrifos-methyl[7], from which it differs for the presence of the ethyl group instead of the methyl group. Chlorpyrifos is active against sucking and chewing pests, representatives of *Coleoptera*, *Diptera*, *Homoptera* and *Lepidoptera* in a wide range of crops.

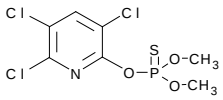
Chlorpyrifos was evaluated according to Council Directive 91/414/EEC with Spain designated as rapporteur Member State (RMS) and included in Annex I of the above cited Directive by Commission Directive 2005/72/EC[8] for use as insecticide. As Regulation (EC) No 1107/2009[9] replaced Directive 91/414/EEC from 14 June 2011, chlorpyrifos is deemed approved under the new Regulation in accordance to Commission Implementing Regulation (EU) No 540/2011[10]. The representative use evaluated in the peer review was the foliar application on grape vines. The Draft Assessment Report (DAR) of chlorpyrifos was not peer reviewed by EFSA, therefore no EFSA conclusion is available.

The EU MRLs for chlorpyrifos are established in Annexes II and IIIB of Regulation (EC) No 396/2005 (Appendix C). The existing EU MRLs for chlorpyrifos on the various crops under consideration are set at a range of values from the LOQ of 0.05 mg/kg to 3 mg/kg.

Codex Alimentarius has established CXLs for several commodities, including part of the crops under consideration: CXLs are set at 0.01 mg/kg for sweet corns; 0.05 mg/kg for cauliflowers, maize and sugar beets; 0.3 mg/kg for strawberries; 0.5 mg/kg for peaches, plums, grapes and wheat; 1 mg/kg for citrus, pome fruits and head cabbages; 2 mg/kg for pepper, broccoli and bananas; 0.01* mg/kg for edible offal of pigs and poultry; 0.01 mg/kg for cattle kidney and liver, edible offal of sheep, poultry meat (fat); 0.02 mg/kg for meat (fat) of pigs; 1 mg/kg for meat (fat) of cattle and sheep.

The intended GAPs for which modifications of the existing MRLs are requested in the EU are detailed in Appendix A. The GAPs highlighted in grey were not assessed in the framework of this assessment because identified as less critical in view of the expected residue behaviour and the MRL proposals.

[7] Chlorpyrifos-methyl: *O,O*- dimethyl *O*-3,5,6-trichloro-2-pyridyl phosphorothioate.



[8] Commission Directive 2005/72/EC of 21 October 2005. OJ L 279, 22.10.2005, p. 63-69.

[9] Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009. OJ L 309, 24.11.2009, p. 1-50.

[10] Commission Implementing Regulation (EU) No 540/2011 of 23 May 2011. OJ L 153, 11.06.2011, p. 1-186.

ASSESSMENT

EFSA bases its assessment on the evaluation reports submitted by the EMS (Spain, 2010a, 2010b), the Draft Assessment Report (DAR) and its addenda prepared under Council Directive 91/414/EEC (Spain, 1999, 2000, 2002, 2003), the Commission Review Report on chlorpyrifos (EC, 2005) as well as the JMPR Evaluation report (FAO, 2000). The assessment is performed in accordance with the legal provisions of the Uniform Principles for the Evaluation of the Authorization of Plant Protection Products adopted by Commission Regulation (EU) No 546/2011[11] and the currently applicable guidance documents relevant for the consumer risk assessment of pesticide residues (EC, 1996, 1997a, 1997b, 1997c, 1997d, 1997e, 1997f, 1997g, 2000, 2008, 2010a, 2011b; 2011; OECD, 2007, 2008, 2011a).

1. Methods of analysis

1.1. Methods for enforcement of residues in food of plant origin

Analytical methods for the determination of chlorpyrifos residues in plant commodities were assessed in the DAR and its addendum (Spain, 1999, 2002) and in the evaluation reports (Spain, 2010a, 2010b). Methods using capillary gas chromatography (GC) are available to determine parent chlorpyrifos in high water, high acid content and in dry matrices at the LOQ of 0.01 mg/kg. The newly developed high-performance liquid chromatography (HPLC) method has been fully validated on water content matrices (Spain, 2010a). For the group of oil-based commodities, which was not covered by the methods assessed in the DAR, the proposed methods of analysis are lacking validation data on the repeatability parameter (Spain, 2010a, 2010b).

The multi-residue QuEChERS method developed by the EU Reference Laboratories for Residues of Pesticides (www.eurl-pesticides.eu) is also applicable for monitoring purposes. The capillary gas chromatography equipped with mass spectrum detection (GC-MSD) analyses chlorpyrifos residues achieving acceptable recovery rates in the matrices reported in the following table.

Table 1-1: Overview of the validation data for chlorpyrifos reported by EURLs.

Chromatographic system	Matrix type	Spiking levels (mg/kg)		Recovery details			No of Labs
		min	max	Mean (%)	CV (%)	Range 70-120	
chlorpyrifos							
GC	Acidic	0.005	0.5	101	8.4	97 %	8
GC	Dry (cereals, dry pulses)	0.01	0.2	106	8.9	90 %	2
GC	Sugar containing	0.01	0.2	99	4.7	100 %	2
GC	Water containing	0.005	1.0	101	9.0	97 %	11

Retrieved 28.06.2011 from EU Laboratories for Residues of Pesticides web site: http://www.eurl-pesticides-datapool.eu

Since the commodities under consideration belong to the group of high water, high acid, high oil content and dry matrices, EFSA concludes that sufficiently validated analytical methods for enforcing the proposed MRLs for chlorpyrifos in plants are available with the exception of oilseeds. For this

[11] Commission Regulation (EU) No 546/2011 of 10 June 2011. OJ L 155, 11.06.2011, p. 127-175.

commodity group, it is necessary to submit additional validation data regarding repeatability in order to ensure that the analytical method is appropriate for enforcement purpose.

1.2. Methods for enforcement of residues in food of animal origin

An analytical method for the quantification of chlorpyrifos residues in commodities of animal origin was evaluated in the DAR addendum prepared for the peer review under Directive 91/414/EEC (Spain, 2002). The method uses gas chromatography (GC) to determine parent chlorpyrifos in kidney, liver, milk, muscle, fat and egg samples and was validated at the LOQ of 0.01 mg/kg for all tested animal matrices.

EFSA concludes that sufficiently validated analytical methods for enforcing the proposed MRLs of chlorpyrifos in food of animal origin are available.

2. Mammalian toxicology

The toxicological profile of the active substance chlorpyrifos was assessed in the framework of the peer review under Directive 91/414/EEC. The data were sufficient to derive toxicological reference values for chlorpyrifos (EC, 2005). The toxicological reference values are compiled in Table 2-1.

Table 2-1: Overview of the toxicological reference values

	Source	Year	Value	Study relied upon	Safety factor
chlorpyrifos					
ADI	EC	2005	0.01 mg/kg bw/d	2 yr rats, mice, dogs	100
ARfD	EC	2005	0.1 mg/kg bw	Acute and delayed neurotoxicity, rat	100

Metabolism studies in both mammalians and plants have shown that chlorpyrifos, chlorpyrifos-methyl and triclopyr form 3,5,6-trichloropyridinol[12] (TCP) to a certain extent. The toxicity of TCP was assessed by EFSA in the framework of the peer review under Directive 91/414/EEC of the active substance triclopyr (EFSA, 2005). Although the database was limited and not sufficient to derive a final ADI, the experts proposed the same ADI value as for triclopyr (0.03 mg/kg bw/day), since the metabolite did not show a toxicity higher than triclopyr. As for the ARfD, a tentative value of 0.25 mg/kg bw was derived. Due to the lack of the typical organophosphate structure in the TCP molecule, it is likely that chlorpyrifos and TCP have different mode of action. Therefore, a complete definition of the toxicological profile of TCP would be desirable.

3. Residues

3.1. Nature and magnitude of residues in plant

3.1.1. Primary crops

3.1.1.1. Nature of residues

The metabolism of chlorpyrifos was assessed in the DAR and its addendum (Spain, 1999, 2003). Additional studies in peas and radish have been evaluated in the evaluation reports (Spain, 2010a, 2010b). The results of studies conducted with the structurally related compound chlorpyrifos-methyl were also used to reveal the metabolic profile of the active substance.

The overview of the metabolism study designs is presented in the table below.

[12] 3,5,6-trichloro-2-pyridinol (TCP): 3,5,6-trichloro-2(1H)-pyridinone. Molecular Weight: 198.4.

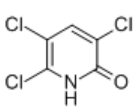


Table 3-1: Summary of available metabolism studies in plants

Group	Crop	Active and label position	Application details				
			Method F or G[(a)]	Rate	No (Interval)	Sampling	Remarks
Fruits and fruiting vegetable	Oranges	2,6 ^{14}C chlorpyrifos	Spray, F	3.97 kg a.s./ha	1	0, 6, 21 DAT	Samples of fruits (peel, pulp), leaves.
	Apples	2,6 ^{14}C chlorpyrifos	Spray, F	0.1 kg a.s./hL	7 (unlabelled a.s) 2 (labelled a.s.)	14 DALA	Supportive.
	Tomatoes	2,6 ^{14}C chlorpyrifos-methyl	Spray, G	0.0075 g a.s./hL	2 (8 d)	During applications, 5, 20 DALA	Supportive.
		2,6 ^{14}C chlorpyrifos-methyl	Spray, F	0.99 kg a.s./ha	1	0, 5, 13, 26, 42 DAT	BCCH 64-85
Leafy vegetables	Head cabbage	2,6 ^{14}C chlorpyrifos	Spray, G (3 d) then F	1.43 kg a.s./ha	1	0, 7, 14, 21, 42 DAT	BCCH 46-49 Samples of head, leaves, secondary heads.
	Lettuce	2,6 ^{14}C chlorpyrifos-methyl	Spray, G	0.75 g a.s./hL	2 (8 d)	During applications, 21 DALA	Supportive.
Cereals	Maize	2,6 ^{14}C chlorpyrifos	Granular + Foliar	223 mg a.s./ m row 0.275 kg a.s./ha	2 (47 d)	49 (forage), 92 (fodder, grain), DALA	Supportive.
			Soil, G	2.2 kg a.s./ha	1	14 DAT	Supportive.
Root and tuber vegetables	Radish	2,6 ^{14}C chlorpyrifos	Spray, F	1.92 kg a.s./ha	1	0, 7, 14, 21, 35 DAT	BBCH 45. Not assessed in the peer review.
Pulses and oilseeds	Soya beans	2,6 ^{14}C chlorpyrifos	Spray, G	1.11 kg a.s./ha	1	14 (forage), 52 (beans) DAT	Supportive.
	Peas with pods	2,6 ^{14}C chlorpyrifos	Spray, F	1.9 kg a.s./ha	1	0, 7, 14, 21, 28 DAT	BBCH 81. Not assessed in the peer review.

(a): Outdoor/field use (F) or glasshouse/protected crops/indoor application (G).

Under the peer review only the studies performed in tomatoes, oranges and cabbage were considered fully valid. The results from the other tests were considered as providing supportive information.

After foliar application, the total residues rapidly declined during the first week. Thereafter, a slower decline was observed in plants. The parent compound, 3,5,6-trichloropyridinol (TCP) and polar metabolites represented the main part of the residues. No other metabolite was present at significant level. The formation of the polar metabolites increased with time between application and harvest; in particular on cabbage and tomatoes, where the polar fraction represented the majority of radioactive residues at harvest (75 % TRR at 42 DAT and 55.8 % TRR at 42 DAT, respectively). These polar metabolites were characterised as TCP conjugated mainly with glucose and malonic acid. In oranges, 99 % of the TRR remained associated with the peel, mostly as parent compound. Residues in pulp were < 0.01 mg-equivalent/kg at all time points.

The results of the two new studies on peas and radish are consistent with the results of previous plant metabolism studies. They demonstrated that the parent compound is a good marker for monitoring and confirmed that the polar metabolites represent a major component of the residues at harvest (pods 42.5 % at 28 DAT; radish roots: 44.7 % at 35 DAT).

The metabolic pattern after foliar application in four different crop groups showed to be similar, mainly following a single metabolic pathway, which included the hydroxylation to form 3,5,6-TCP and polar residues, mainly TCP conjugates.

The peer review established the parent chlorpyrifos as residue definition for monitoring and the residue definition of chlorpyrifos + TCP + conjugates, expressed as chlorpyrifos for risk assessment (EC, 2005).

EFSA concludes that the residue definitions derived during the peer review of chlorpyrifos are applicable to the crops under consideration.

3.1.1.2. Magnitude of residues

Supervised field trials on the crops under consideration were assessed in the evaluation reports (Spain, 2010a, 2010b). All samples were analysed for both chlorpyrifos and total TCP residues.

When for a single GAP more than one formulation was reported, the residue trials employing the emulsifiable concentrate (EC) and the water dispersible granule (WG) chlorpyrifos-based products were considered to produce comparable residues (EC, 2011). The residue trials employing the capsule suspension (CS) formulation were assessed separately unless it was demonstrated that for the proposed use the formulation type had no effect on the chlorpyrifos residue profile.

For certain crops, the use leading to the highest residues (critical GAP or cGAP) could not be clearly identified, therefore the results from trials performed according to the different proposed GAPs and different formulation types needed to be compared in order to identify the “worst-case use” for residues. However, when a less critical GAP could clearly be identified, it was not assessed in the framework of this evaluation as encompassed by the most critical use.

It is noteworthy to mention that when the residue value was higher at a longer PHI, EFSA has included the value from this data point in the calculation to derive the MRL proposal and the risk assessment input values.

a. Citrus fruits

A total of 26 supervised residue trials (13 on oranges and 13 on mandarins, including clementines) was performed with different formulations over more than two seasons in Italy and Spain. The extrapolation to the whole group of citrus fruits was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). One study on mandarins was disregarded because

conducted at an exaggerate application rate compared to the intended GAP. In the four side-by-side bridging studies to compare the CS and the EC/WG formulations, the concentrations of chlorpyrifos residues were within the same range. In all trials the interval between applications was not as proposed in the GAP (around four instead of two months), however the other parameters were within the acceptable limit (25 % deviation). Considering that in crops chlorpyrifos residues at harvest showed to be mostly influenced by the final application, the residue behaviour is unlikely to be affected by a longer application interval, therefore the deviation was accepted. Since the data from trials on oranges and mandarins appeared to belong to a similar population (Mann-Whitney U-Test, FAO, 2009), they were pooled in a single dataset to derive the MRL proposal of 1.5 mg/kg for the intended use of chlorpyrifos on citrus fruits.

b. Pome fruits

To identify the critical GAP (worst-case use) on pome fruits for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

<u>NEU</u>

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (EC/WG/CS formulation).* A total of 17 trials on apples and 14 trials on pears was conducted with different formulations during more than two seasons in NEU. The extrapolation to the whole group of pome fruits was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). Eleven trials on apples and nine trials on pears were considered as acceptable to derive the MRL proposal and the risk assessment values. Although these trials, except two studies, were conducted with two instead of one application, the residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible. The other parameters were within the acceptable range of deviation (± 25 %) and the trials were taken into consideration to derive the MRL proposal and perform the risk assessment. One result recorded after the use of the CS formulation on apples (1.12 mg/kg) was identified as potential outlier and disregarded because it was not matching the residue decline pattern (EC, 1997g; FAO, 2009). Since the data from trials on apples and pears and from trials employing the EC and CS formulations appeared to belong to a similar population (Mann-Whitney U-Test. FAO, 2009), they were pooled in single dataset to derive the MRL proposal for the group of pome fruits.

GAP*: 2 x 0.5 kg a.s./ha; interval min. 14 d; PHI 21 d (CS formulation).* Seven trials on apples and one trial on pears were conducted with the CS formulation during more than two seasons in NEU. The extrapolation from apples to the whole group of pome fruits was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). All trials were reflecting the proposed GAP. From the decline studies it was evident that the total residues on apples were slowly decreasing between 21 and 31 days after the second application, with one sample where residue values were higher at the last PHI point of 43 days. The residue value from the trial on pears was combined with the residue values obtained in the apple studies to derive the MRL proposal for the group of pome fruits.

<u>SEU</u>

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (EC/WG/CS formulation).* A total of 15 trials on apples and 12 trials on pears was conducted with different formulations during more than two seasons in SEU. The extrapolation to the whole group of pome fruits was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). Overall, ten trials on apples and seven trials on pears were considered as acceptable to derive the MRL proposal and the risk assessment values. Although these trials, except two studies, were conducted with two instead of one application, the residue levels when measured immediately before the last application showed that the contribution of the first application

to the terminal residues was negligible. The other parameters were within the acceptable range of deviation (± 25 %) and the trials were taken into consideration to derive the MRL proposal and perform the risk assessment. Since the data from trials on apples and pears and from trials employing the EC and CS formulations appeared to belong to a similar population (Mann-Whitney U-Test. FAO, 2009), they were pooled in single dataset to derive the MRL proposal for the group of pome fruits.

GAP*: 2 x 0.5 kg a.s./ha; interval min. 14 d; PHI 21 d (CS formulation).* Eight trials on apples and one trial on pears were conducted with the CS formulation during more than two seasons in SEU. The extrapolation from apples to the whole group of pome fruits was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). All trials were reflecting the proposed GAP. From the decline studies it was evident that the total residues on apples were slowly decreasing between 21 and 31 days after the second application, with one sample where residue values were higher at the last PHI point of 44 days. The residue value from the trial on pears was combined with the residue values obtained in the apple studies to derive the MRL proposal for the group of pome fruits.

EFSA concludes that the foliar application (1 x 0.96 kg a.s./ha) of the EC, WG and CS formulations with a 21-day PHI in NEU is the most critical use to derive the MRL proposal and the risk assessment input values on pome fruits.

c. Apricots, peaches, nectarines

To identify the critical GAP (worst-case use) on apricots, peaches and nectarines for the MRL proposal and the risk assessment the following intended SEU uses were assessed.

GAP: *1 x 1.08 kg a.s./ha; PHI 21 d (EC/WG/CS formulation).* A total of 37 supervised residue trials (26 on peaches and 11 on apricots) was performed with different formulations over more than two seasons in SEU. Although apricots and peaches are individually major crops in SEU, a minimum of eight trails, with minimum four apricot trials, is sufficient to extrapolate to apricots, peaches and nectarines (EC, 2011). Overall, 18 trials on peaches and 7 trials on apricots were considered as acceptable to derive the MRL proposal and the risk assessment values. Eleven peach trials were conducted with two instead of one application. The residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible and the data from these trials were taken into consideration to derive the MRL proposal and the risk assessment values. While the data from trials on peaches and apricots could be combined together (Mann-Whitney U-Test, FAO, 2009), they data obtained from trials employing the EC/WG and CS formulations showed not to belong to a similar population (Mann-Whitney U-Test, FAO, 2009), therefore the MRLs were calculated for the single datasets.

GAP: *2 x 0.5 kg a.s./ha; interval min. 14 d; PHI 21 d (CS formulation).* Ten supervised residue trials on peaches were performed with the CS formulation over two seasons in SEU. The extrapolation to apricots was proposed and is in accordance with the provision of the EU guidance document version in force when the application was submitted (EC, 2008). All trials were compliant with the intended GAP and considered as acceptable to derive the MRL proposal and the risk assessment values.

EFSA concludes that the two foliar applications (2 x 0.5 kg a.s./ha) of the CS formulation with a 21-day PHI is the most critical use to derive the MRL proposal and the risk assessment input values on peaches, nectarines and apricots.

d. Cherries

To identify the critical GAP (worst-case use) on cherries for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

NEU

GAP*: 1 x 0.96 kg a.s/ha; PHI 21 d (EC/WG/CS formulation).* A total of ten supervised residue trials on sweet and sour cherries was performed with different formulations during two seasons. Cherries are a major crop in NEU, therefore a minimum of eight trials is required to derive a MRL proposal (EU, 2011). One of the submitted residue studies was disregarded because conducted with an application rate lower than the rate proposed in the GAP. Overall, nine trials were considered as acceptable to derive the MRL proposal and the risk assessment values. Although the two side-by-side bridging studies were conducted with two instead of one application, the residue levels measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible and the trials were taken into consideration and included in the calculation. Additionally, the two groups of data from trials with one (5 trials) and two (4 trials) applications were statistically tested as belonging to a similar sample population (Mann-Whitney U-Test, FAO, 2009), thus confirming that the number of applications did not affect the final residues in these trials.

GAP*: 2 x 0.5 kg a.s./ha; interval min. 14 d; PHI 30 d (CS formulation).* Eight supervised residue trials on sweet and sour cherries were performed with the CS formulation over two seasons in NEU. All trials were compliant with the intended GAP and considered as acceptable to derive the MRL proposal and the risk assessment values.

SEU

GAP: *1 x 0.96 kg a.s/ha; PHI 45 d (EC/WG/CS formulation).* Residues trials on cherries reflecting the proposed GAP were not available and no MRL proposal can be derived for the intended use.

GAP*: 2 x 0.5 kg a.s./ha; interval min. 14 d; PHI 30 d (CS formulation).* Eight supervised residue trials on sweet and sour cherries were performed with the CS formulation over two seasons in SEU. Cherries are a minor crop in SEU, therefore a minimum of four trials is required to derive a MRL proposal (EU, 2011). All trials were compliant with the intended GAP and considered as acceptable to derive the MRL proposal and the risk assessment values.

EFSA concludes that the two foliar applications (2 x 0.5 kg a.s./ha) of the CS formulation with a 30-day PHI in NEU is the most critical use to derive the MRL proposal and the risk assessment input values on cherries.

e. Plums

To identify the critical GAP (worst-case use) on plums for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

NEU

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (EC/WG/CS formulation).* No residue trials supporting the proposed GAP were submitted and no MRL proposal can be derived for the intended use.

GAP*: 2 x 0.5 kg a.s./ha; interval min 14 d; PHI 21 d (CS formulation).* Eight supervised residue trials on plums were performed with the CS formulation over two seasons. All trials were compliant with the intended GAP and considered as acceptable to derive the MRL proposal and the risk assessment values. One sample value (0.28 mg/kg) was identified as potential outlier (Dixon's text) but it was maintained in the dataset assuming that this high value is reflecting a variation that may occur in the agricultural practice. There were no explanations and no obvious defects in the trial to justify its exclusion (EC, 1997g; FAO, 2009).

SEU

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (EC/WG/CS formulation).* No residue trials supporting the proposed GAP were submitted and no MRL proposal can be derived for the intended use.

GAP: *2 x 0.5 kg a.s./ha; interval min 14 d; PHI 21 d (CS formulation).* Four supervised residue trials on plums were performed with the CS formulation over two seasons. Plums are considered as a minor crop in NEU until April 2013, therefore a minimum of four trials is required to derive a MRL proposal (EU, 2011). All trials were compliant with the intended GAP and considered as acceptable to derive the MRL proposal and the risk assessment values.

EFSA concludes that the two foliar applications (2 x 0.5 kg a.s./ha) of the CS formulation with a 21-day PHI in NEU is the most critical use to derive the MRL proposal and the risk assessment input values on plums.

f. Grapes

In support to the intended GAPs 75 supervised residue studies on table and wine grapes performed during more than two seasons were provided (Spain, 2010a, 2010b). The results from trials conducted on grapes with the EC and CS formulation were assessed separately as investigations revealed that combining the data in a single dataset was not appropriate (i.e. Mann-Whitney U-Test, FAO, 2009). To identify the critical GAP (worst-case use) on table and wine grapes for the MRL proposal and the risk assessment the following intended uses were assessed.

Table grapes

SEU

GAP: *1 x 0.65 kg a.s./ha; PHI 21 d (EC/WG formulation).* Residue trials on table grapes employing the EC/WG formulation and reflecting the proposed GAP were not available. Table grapes are a major crop in SEU with a minimum of eight trials required to support the MRL proposal, but extrapolation between wine to table grapes and vice versa is possible (EC, 2011). Therefore, 16 trials conducted with the EC/WG formulation on both table and wine grapes were considered as acceptable to derive the MRL proposal and the risk assessment values. Although these trials were conducted with two instead of one application, the residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible and these trials were taken into consideration to derive the MRL.

GAP: *1 x 0.65 kg a.s./ha; PHI 21 d (CS formulation).* Four trials on table grapes employing the CS formulation were fully matching the proposed GAP. However, two results were identified as potential outlier: one (3.7 mg/kg) was disregarded because it was not matching the residue decline pattern, while the other value (0.97 mg/kg) was maintained in the dataset assuming that this high value is showing a variation that may occur in the agricultural practice. There were no explanation and no obvious defects in the trial to justify its exclusion (EC, 1997g; FAO, 2009). Table grapes are a major crop in SEU with a minimum of eight trials required to support the MRL proposal, but extrapolation between wine to table grapes and vice versa is possible (EC, 2011). Therefore, the results from one trial matching the proposed GAP but conducted on wine grapes plus four trials conducted with two instead of one application on both table and wine grapes were added to complete the dataset. Overall, eight trials were considered as acceptable to derive the MRL proposal and the risk assessment values. The two groups of data from trials with one (4 trials) and two (4 trials) applications were statistically tested as belonging to a similar sample population (Mann-Whitney U-Test, FAO, 2009), thus confirming that the number of applications did not affect the final residues in these trials.

GAP*: 2 x 0.36 kg a.s./ha; interval min 14 d; PHI 60 d (CS formulation)*. Two trials on table grapes employing the CS formulation were reflecting the proposed GAP. Table grapes are a major crop in SEU, therefore a minimum of eight trials is required to derive the MRL proposal (EC, 2011). Since the extrapolation between wine to table grapes and vice versa is possible (EC, 2011), four trials on wine grapes employing the CS formulation and reflecting the intended GAP were included in the dataset. Overall, six trials were considered as acceptable but the total number is not sufficient to derive a MRL proposal.

EFSA concludes that the the foliar application (1 x 0.65 kg a.s./ha) of the CS formulation with a 21-day PHI is the most critical use to derive the MRL proposal and the risk assessment input values on table grapes.

Wine grapes

NEU

GAP: 2 x 0.36 kg a.s./ha; interval min 14 d; PHI 21 d (EC/WG formulation). Nine supervised residue trials performed with the EC formulation on wine grapes were compliant with the proposed NEU use and considered as acceptable to derive the MRL proposal and the risk assessment values. Wine grapes are a major crop in NEU, therefore the minimum number of residue trials to support the MRL proposal (eight trials) required in the guidance document (EC, 2011) is available.

GAP: 2 x 0.36 kg a.s./ha; interval min 14 d; PHI 21 d (CS formulation). A total of 18 supervised residue trials performed with the CS formulation on wine grapes was compliant with the proposed NEU use and considered as acceptable to derive the MRL proposal and the risk assessment values. Wine grapes are a major crop in NEU, therefore the minimum number of residue trials to support the MRL proposal (eight trials) required in the guidance document (EC, 2011) is available.

SEU

GAP: 1 x 0.72 kg a.s./ha; PHI 35 d (CS formulation). Thirteen trials on wine grapes employing the CS formulation were considered as acceptable to derive the MRL proposal and the risk assessment values. Although these trials, except one study, were conducted with two instead of one application, the residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible and the deviation was accepted. Wine grapes are a major crop in SEU, therefore the minimum number of residue trials to support the MRL proposal (eight trials) required in the guidance document (EC, 2011) is available.

GAP: 2 x 0.36 kg a.s./ha; interval min 14 d; PHI 21 d (EC/WG/CS formulation). Residue trials employing the EC/WG formulation and reflecting the proposed GAP were not provided. Eighteen trials conducted on wine grapes with the CS formulation were reflecting the proposed GAP and considered as acceptable to derive the MRL proposal and the risk assessment values. Wine grapes are a major crop in SEU, therefore the minimum number of residue trials to support the MRL proposal (eight trials) required in the guidance document (EC, 2011) is available.

EFSA concludes that the two foliar applications (2 x 0.36 kg a.s./ha) of the CS formulation with a 21-day PHI in NEU is the most critical use to derive the MRL proposal and the risk assessment input values on wine grapes.

g. Strawberries

To identify the critical GAP (worst-case use) on strawberries for the MRL proposal and the risk assessment the following intended use in the Northern and the Southern Europe were assessed.

NEU. *GAP: 1 x 0.72 kg a.s./ha; PHI 15 (EC/WG/CS formulation).* A total of 12 supervised residue trials on strawberries was performed with different formulations during two seasons. Strawberries are a major crop in NEU and at least eight trials are required to derive a MRL proposal (EC, 2011). The two side-by-side bridging studies comparing the EC and CS formulation were not reflecting the proposed GAP and were disregarded. Overall, eight trials employing the CS formulation only were reflecting the proposed GAP and considered to derive the MRL proposal and the risk assessment values.

SEU. *GAP: 1 x 0.72 kg a.s./ha; PHI 15 d (EC/WG/CS formulation).* A total of 12 supervised residue trials on strawberries was performed with different formulations during two seasons. Strawberries are a major crop in SEU and at least eight trials are required to derive the MRL proposal (EC, 2011). The two side-by-side bridging studies comparing the EC and CS formulation were conducted with two instead of one application. The residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible and the deviation was accepted. Overall, two trials employing the EC formulation and ten trials employing the CS formulation were reflecting the proposed GAP and considered to derive the MRL proposal and the risk assessment values.

EFSA concludes that the NEU GAP of the CS formulation is the most critical use to derive the MRL proposal and the risk assessment input values on strawberries.

h. Raspberries

A total of 12 supervised residue trials on raspberries was performed with the EC and CS formulations over two seasons. Raspberries are a minor crop in NEU, therefore a minimum of four trials is required to derive a MRL proposal (EC, 2011). The two side-by-side bridging studies comparing the EC and CS formulation were not reflecting the proposed GAP and were disregarded. Overall, eight trials employing the CS formulation were reflecting the proposed GAP and considered to derive the MRL proposal of 0.8 mg/kg and the risk assessment values.

i. Bananas

Two trials on bananas conducted with the EC formulation in 2008 plus the results of three trials from 1994 included in the DAR (Spain, 1999) were provided. Bananas are a minor crop in SEU therefore a minimum of four trials is required (EC, 2011). All these trials were reflecting the proposed GAP and considered as acceptable to derive the MRL proposal of 0.4 mg/kg and the risk assessment values. Residues in pulp were assessed in two studies and amounted to 0.01 and 0.03 mg/kg for chlorpyrifos and to < 0.02 mg/kg for total TCP, respectively.

j. Tomatoes, aubergines

To identify the critical GAP (worst-case use) on tomatoes and aubergines for the MRL proposal and the risk assessment the following intended outdoor and indoor uses on tomatoes were assessed.

NEU. *GAP: 1 x 0.72 kg a.s./ha; PHI 5 d (EC/WG/CS formulation).* A total of 19 supervised residue trials on different tomato varieties, including cherry tomatoes, was performed with different formulations during two seasons. Tomatoes are a major crop in NEU, therefore a minimum of eight trials is generally required (EC, 2011). Extrapolation to aubergines was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). Only four trials employing the CS formulation were compliant with the proposed GAP. The total number of valid trials is not sufficient to derive the MRL proposal.

SEU

GAP: 1 x 0.72 kg a.s./ha; PHI 5 d (EC/WG/CS formulation). A total of 26 supervised residue trials on different tomato varieties, including cherry tomatoes, was performed with different formulations during two seasons. Tomatoes are a major crop in SEU, therefore a minimum of eight trials is generally required (EC, 2011). Extrapolation to aubergines was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). Only the two side-by-side bridging studies were reflecting the proposed GAP in terms of application rate and PHI, however the number of applications was two instead of one. The total number of valid trials is not sufficient to derive the MRL proposal.

GAP: 1 x 0.5 kg a.s. /ha; PHI 5 d (CS formulation). Eight trials conducted over two seasons with the CS formulation and complying with the proposed GAP were provided and were all considered as acceptable to derive the MRL proposal and the risk assessment values. Extrapolation to aubergines was proposed and is in accordance with the provision of the EU guidance document (EC, 2011).

EU. *GAP: 1 x 0.5 kg a.s. /ha; PHI 5 d (Indoor; CS formulation)*. A total of 16 trials was performed with the CS formulation over two seasons in different tomato varieties. Extrapolation to aubergines was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). Overall, eight trials were reflecting the proposed GAP and were used to derive the MRL proposal and the risk assessment values.

EFSA concludes that the indoor foliar application is the most critical use to derive the MRL proposal and the risk assessment input values on tomatoes and by extrapolation on aubergines.

k. Peppers

To identify the critical GAP (worst-case use) on peppers for the MRL proposal and the risk assessment the following intended outdoor and indoor uses were assessed.

SEU

GAP: 1 x 0.72 kg a.s./ha; PHI 5 d (EC/WG/CS formulation). A total of 21 supervised residue trials was performed with different formulations during two seasons. Peppers are a major crop in SEU therefore a minimum of eight trials is required (EC, 2011). Residue trials on peppers employing the EC/WG formulation and reflecting the proposed GAP were not available. Eight trials belonging to a single season (2007) and employing the CS formulation were reflecting the proposed GAP and were considered to derive the MRL proposal and the risk assessment values.

GAP: 1 x 0.5 kg a.s./ha; PHI 5 d (CS formulation). Eight supervised residue trials applying the CS formulation were provided. Peppers are a major crop in SEU therefore a minimum of eight trials is required (EC, 2011). All trials were compliant with the intended GAP and considered as acceptable to derive the MRL proposal and the risk assessment values.

EU. *GAP: 1 x 0.5 kg a.s./ha; PHI 5 d (Indoor; CS formulation)*. A total of 16 trials was performed with the CS formulation over two seasons. Overall, eight trials were reflecting the proposed GAP and were considered to derive the MRL proposal and the risk assessment values.

EFSA concludes that the indoor foliar application is the most critical use to derive the MRL proposal and the risk assessment input values on pepper.

l. Sweet corns

NEU. *GAP: 2 x 0.75 kg a.s./ha; interval min. 60 d; PHI 28 d (CS formulation*). A total of 12 trials on different maize varieties reflecting the proposed GAP was provided. Since sweet corns are a minor

crop in NEU and data on immature maize can be extrapolated to sweet corns (EC, 2011), all trials can be considered as acceptable to derive the MRL proposal and the risk assessment values. In grain, chlorpyrifos residues were below the LOQ of 0.01 mg/kg in all samples.

SEU. *GAP: 2 x 0.75 kg a.s./ha; interval min. 60 d; PHI 28 d (CS formulation).* A total of 9 trials on different maize varieties were reflecting the proposed GAP. Since sweet corns are a minor crop in SEU and data on immature maize can be extrapolated to sweet corns (EC, 2011), all trials can be considered as acceptable to derive the MRL proposal and the risk assessment values. In grain, chlorpyrifos residues were below the LOQ of 0.01 mg/kg in all samples.

EFSA concludes on a MRL proposal of 0.01* mg/kg for the intended uses on sweet corns. The MRL proposal was extrapolated from data on immature maize.

m. Broccoli

To identify the critical GAP (worst-case use) on broccoli for the MRL proposal and the risk assessment the following intended uses were assessed.

NEU

GAP*: 1 x 0.96 kg a.s./ha; PHI 21 d (Foliar application; EC/WG/CS formulation).* A total of 11 trials was performed with different formulations over more than two seasons on broccoli. Broccoli are a minor crop in NEU, therefore a minimum of four trials is required (EC, 2011). Four trials employing the CS formulation were fully matching the proposed GAP, while in the remaining five CS trials and two EC trials two instead of one application were sprayed onto the crop. As the residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible, these trials were taken into consideration to estimate the values. In the side-by-side comparative study, chlorpyrifos residues in the samples obtained after the CS and EC application were below the LOQ of 0.01 mg/kg and 0.02 mg/kg, respectively. Overall, all trials (two EC and nine CS trials) were considered as acceptable to derive the MRL proposal and the risk assessment values.

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (Field drench application; EC/WG/CS formulation).* Residue trials on broccoli reflecting the proposed GAP were not available and no MRL proposal can be derived for the intended use.

SEU

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d* (*Foliar application; EC/WG/CS formulation).* A total of 13 trials was performed with different formulations over more than two seasons on broccoli. Broccoli are a minor crop in SEU, therefore a minimum of four trials is required (EC, 2011). Two trials employing the CS formulation were fully matching the proposed GAP while in the remaining eleven trials two instead of one application were sprayed onto the crop. As the residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible, the trials were taken into consideration to estimate the values. Overall, all trials (seven EC and six CS trials) were considered as acceptable to derive the MRL proposal and the risk assessment values. The two groups of data from trials with the EC and CS formulations appeared to belong to a similar population (Mann-Whitney U-Test, FAO, 2009), therefore the results were combined in a single dataset.

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (Field drench application; EC/WG/CS formulation).* Residue trials on broccoli reflecting the proposed GAP were not available and no MRL proposal can be derived for the intended use.

EFSA concludes that the SEU foliar application is the most critical use to derive the MRL proposal and the risk assessment input values on broccoli. The intended drench application use is not adequately supported by data.

n. Cauliflowers

To identify the critical GAP (worst-case use) on cauliflowers for the MRL proposal and the risk assessment the following intended uses were assessed.

NEU

GAP *1 x 0.96 kg a.s./ha; PHI 21 d (Foliar application; EC/WG/CS formulation).* A total of 17 trials employing different formulations was performed over more than two seasons on cauliflowers. Cauliflowers are a major crop in NEU, therefore a minimum of eight trials is required (EC, 2011). Four trials employing the CS formulation were compliant with the proposed GAP. Although 13 trials were conducted with two or three instead of one application, the residue levels when measured immediately before the last application showed that the contribution of the first applications to the terminal residues was negligible and the trials were taken into consideration. Overall, all trials (nine EC and eight CS trials) were considered as acceptable to derive the MRL proposal and the risk assessment values. The two groups of data from trials with the EC and CS formulations appeared to belong to a similar population (Mann-Whitney U-Test, FAO, 2009), therefore the results were combined in a single dataset.

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (Field drench application; EC/WG/CS formulation).* None of the submitted residue trials on cauliflower was reflecting the proposed GAP as a 0.2 % solution in water at 100 mL/plant was applied as soil drench followed by two foliar applications.

SEU

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (Foliar application; EC/WG/CS formulation).* Residue trials on cauliflowers employing the EC/WG formulation and reflecting the proposed GAP were not available Six trials employing the CS formulation were performed over more than two seasons on cauliflowers. Cauliflowers are considered as a minor crop in SEU until April 2013, therefore a minimum of four trials is required to derive a MRL proposal (EU, 2011). Two trials were fully matching the proposed GAP. Although four trials were conducted with two instead of one application, the residue levels when measured immediately before the last application showed that the contribution of the first application to the terminal residues was negligible and the trials were taken into consideration for the estimation of the values. Overall, all the CS trials were considered as acceptable to derive the MRL proposal and the risk assessment values.

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (Field drench application; EC/WG/CS formulation).* Residue trials on cauliflowers reflecting the proposed GAP were not available and no MRL proposal can be derived for the intended use.

EFSA concludes that the NEU foliar application is the most critical use to derive the MRL proposal and the risk assessment input values on cauliflowers. The intended drench application use is not adequately supported by data.

o. Head cabbages

To identify the critical GAP (worst-case use) on head cabbages for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

NEU

GAP 1 x 0.96 kg a.s./ha; PHI 21 d (Foliar application; EC/WG/CS formulation). A total of 30 supervised residue trials was performed with different formulations over more than two seasons. Head cabbages are a major crop in NEU and a minimum of eight trials is required to derive the MRL proposal (EC, 2011). One study was disregarded because the PHI was not reflecting the intended GAP. Eight studies conducted with the CS formulation were fully matching the proposed GAP. Although 21 trials were performed with two or three instead of one application, the last application is considered more relevant for to the terminal residues and the results from these trials were taken into consideration to complete the dataset. Two results (1.63 mg/kg; 1.16 mg/kg) obtained after the application of the CS formulation were identified as potential outliers and discarded because not matching the observed chlorpyrifos degradation curve (EC, 1997g; FAO, 2009). Overall, 27 trials (eleven EC and sixteen CS trials) were considered as acceptable to derive the MRL proposal and the risk assessment values. The two groups of data from trials with the EC and CS formulations appeared to belong to a similar population (Mann-Whitney U-Test, FAO, 2009), therefore the results were combined in a single dataset.

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (Field drench application).* None of the submitted residue trials on cabbage was reflecting the proposed GAP as a 0.2 % solution in water at 100 mL/plant was applied as soil drench followed by two foliar applications.

SEU

GAP*: 1 x 0.96 kg a.s./ha; PHI 21 d (Foliar application; EC/WG/CS formulation).* A total of 22 trials was performed with different formulations over more than two seasons. Head cabbages are a minor crop in SEU and a minimum of four trials is required to derive a MRL proposal (EC, 2011). One study was disregarded because the PHI was not reflecting the intended GAP. Four studies conducted with the CS formulation and one study with the EC formulation fully matched the proposed GAP. Although 16 trials were performed with two instead of one application, the last application is considered more relevant for to the terminal residues and the results from these trials were taken into consideration for the estimation of the values. Overall, 21 trials (nine EC and twelve CS trials) were considered as acceptable to derive the MRL proposal and the risk assessment values. The two groups of data from trials with the EC and CS formulations appeared to belong to a similar population (Mann-Whitney U-Test, FAO, 2009), therefore the results were combined in a single dataset

GAP: *1 x 0.96 kg a.s./ha; PHI 21 d (Field drench application; EC/WG/CS formulation).* Residue trials on head cabbages reflecting the proposed GAP were not available and no MRL proposal can be derived for the intended use.

EFSA concludes that the NEU foliar application is the most critical use to derive the MRL proposal and the risk assessment input values on head cabbages. The intended drench application use is not adequately supported by data.

p. Brussels sprouts

To identify the critical GAP (worst-case use) on Brussels sprouts for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

NEU. GAP*: 1 x 0.96 kg a.s./ha; PHI 21 d (EC/WG/CS formulation).* A total of 25 trials with different formulations was performed over more than two seasons. Brussels sprouts are a minor crop in NEU, therefore a minimum of four trials is required to derive a MRL proposal (EC, 2011). Eight trials conducted with the CS formulation reflected the proposed GAP. Although nine trials employing the EC formulation were performed with three instead of one application, the last application is

considered more relevant for the terminal residues and the results from these trials were taken into consideration to estimate the values. Overall, 17 trials (9 EC and 8 CS trials) were considered as acceptable to derive the MRL proposal and the risk assessment values. The data obtained after the EC and the CS formulation use showed not to belong to a similar population (Mann-Whitney U-Test, FAO, 2009), therefore MRLs were calculated for the single datasets in order to establish the formulation leading to the highest residues.

SEU. *GAP: 1 x 0.96 kg a.s./ha; PHI 21 d (EC/WG/CS formulation).* Residue trials on Brussels sprouts employing the EC/WG formulation and reflecting the proposed GAP were not available. Four supervised residue trials performed with the CS formulation over two seasons and reflecting the proposed GAP were submitted. Since Brussels sprouts are a minor crop in SEU (EC, 2011), the number of valid trials is sufficient to derive the MRL proposal and the risk assessment values.

EFSA concludes that the SEU GAP with the CS formulation is the most critical use to derive the MRL proposal and the risk assessment input values on Brussels sprouts.

q. Beans (with pods)

Four trials conducted over a single season (2007) were reflecting the proposed GAP. Since fresh beans are a major crop in SEU, a minimum of eight trials is generally required (EC, 2011). The number of trials is not sufficient to derive the MRL proposal for the intended use on beans with pods.

r. Beans (dry)

Two trials conducted over a single season (2007) were reflecting the proposed GAP. Since dry beans are a major crop in SEU, a minimum of eight trials is generally required (EC, 2011). The number of trials is not sufficient to derive the MRL proposal for the intended use on dry beans.

s. Globe artichoke

A total of 19 supervised residue trials was performed with the EC and CS formulation over more than two seasons in SEU. Artichokes are a minor crop in SEU, therefore a minimum of four trials is required (EC, 2011). For the EC formulation no residue trials complying with the GAP were available. Four trials employing the CS formulation and conducted over a single season (2007) with a single application at the intended nominal rate were reflecting the proposed GAP as per the number of application, the rate and the PHI. However, chlorpyrifos was applied before florescence, therefore the MRL can only be proposed when the intended use on globe artichokes is limited to the growth stage BBCH 51 as recommended by the EMS.

t. Rapeseeds

To identify the critical GAP (worst-case use) on rapeseeds for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

NEU

GAP*: 1 x 0.48 kg a.s./ha; PHI n.a. (EC/WG/CS formulation).* A total of 18 trials was performed with different formulations over two seasons. Rapeseeds are a major crop in NEU, therefore a minimum of eight trials is required to derive a MRL proposal (EC, 2011). Both seed and straw were sampled. Overall, four EC trials and seven CS trials were considered as acceptable to derive the MRL proposal and the risk assessment values. The application was made 71 to 108 days before harvest. Chlorpyrifos

residues were not determined in any of the seed samples, regardless to the formulation used. Chlorpyrifos residues ranged from <0.01 to 0.02 mg/kg in the straw samples.

GAP*: 2 x 0.25 kg a.s./ha; interval min. 7 d; end of inflorescence emergence (BBCH 59); PHI n.a. (CS formulation).* Two trials reflecting the proposed GAP and performed in 2006 were available. Only seeds were sample. Chlorpyrifos residues were not detected (<0.003 mg/kg). Chlorpyrifos is a not systemic substance and the application on rapeseeds is proposed to be before the consumable part of the plants has started to form (BBCH 59). In accordance with the provision of the EU guidance document when two residue trials confirm that no residues are foreseen in the harvest product, no further studies are required to support the MRL proposal (EC, 2011).

SEU. GAP: *2 x 0.25 kg a.s./ha; interval min. 7 d; end of inflorescence emergence (BBCH 59); PHI n.a. (CS formulation).* Two trials reflecting the proposed GAP and performed in 2006 were available. Only seeds were sample. Chlorpyrifos residues were below the LOQ (0.01 mg/kg), thus confirming that no residues are foreseen in the harvest product (EC, 2011). The data can be considered sufficient to support the MRL proposal.

EFSA concludes on the MRL proposal at the limit of quantification of 0.01* mg/kg for the intended uses on rapeseeds.

u. Olives for oil production

No valid trials are available to support the intended GAP and no MRL proposal can be derived for the intended use.

v. Barley; wheat

To identify the critical GAP (worst-case use) on barley and wheat for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

NEU. GAP*: 2 x 0.72 kg a.s./ha; interval min. 60 d*; *end of heading (BBCH 59); PHI n.a. (EC/WG/CS formulation).* Eighteen supervised residue trials on barley and ten supervised residue trials on wheat were performed with the EC and CS formulations over more than two seasons. Barley and wheat are major crops in NEU, therefore a minimum of eight trials per crop is usually required. Extrapolation between barley and wheat allowing the reduction of the minimum number of trials to eight of any of the barley or wheat was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). Both grain and straw were sampled. Only two trials on barley and three trials on wheat with the CS formulation were considered as reflecting the proposed GAP. Additional two studies conducted with the EC formulation at an overdose rate (up to + 40 %) on wheat could be included in the calculation as they indicated that chlorpyrifos residues were below the LOQ and the LOD, respectively. Overall, two studies on barley and five studies on wheat were considered as acceptable but the total number of valid trials is not sufficient to derive the MRL proposal.

SEU. GAP: *2 x 0.72 kg a.s./ha; interval min. 60 d; end of heading (BBCH 59); PHI n.a. (EC/WG/CS formulation).* Ten supervised residue trials on barley and ten supervised residue trials on wheat were performed with the EC and CS formulations over more than two seasons. Barley and wheat are major crops in SEU, therefore a minimum of eight trials per crop is usually required. Extrapolation between barley and wheat allowing the reduction of the minimum number of trials to eight of any of the barley or wheat was proposed and is in accordance with the provision of the EU guidance document (EC, 2011). Both grain and straw were sampled. Overall, six trials on barley and four studies on wheat were considered as acceptable to derive the MRL proposal and the risk assessment values.

EFSA concludes that the MRL proposal on barley and wheat can only be derived for the SEU use. A possible MRL proposal on straw as feed item and the input value for the livestock dietary burden assessment were calculated based on the SEU use as well.

w. Maize grain

To identify the critical GAP (worst-case use) on maize and sweet corns for the MRL proposal and the risk assessment the following intended uses in the Northern and the Southern Europe were assessed.

NEU

GAP: *2 x 0.75 kg a.s./ha; interval min. 60 d; PHI 28 d (CS formulation).* See section l. Sweet corns.

GAP: *2 x 0.72 kg a.s./ha; interval min. 60 d; PHI 60 d (EC/WG/CS formulation).* Ten supervised residue trials (2 EC and 8 CS trials) on different maize varieties were reflecting the proposed GAP. Maize is major crop in NEU therefore a minimum of eight trials are required (EC, 2011). Both grain and stover were sampled. In grain, chlorpyrifos residues were below the LOQ of 0.01 mg/kg in all samples. In stover, chlorpyrifos ranged from 0.08 mg/kg to 2.06 mg/kg.

SEU

GAP: *2 x 0.75 kg a.s./ha; interval min. 60 d; PHI 28 d (CS formulation).* See section l. Sweet corns.

GAP: *2 x 0.72 kg a.s./ha; interval min. 60 d; PHI 60 d (EC/WG/CS formulation).* Eight supervised residue trials (1 EC and 7 CS trials) on different maize varieties were reflecting the proposed GAP. Maize is major crop in SEU therefore a minimum of eight trials are required (EC, 2011). Both grain and stover were sampled. In grain. chlorpyrifos residues were below the LOQ of 0.01 mg/kg in all samples. In stover, chlorpyrifos ranged from 0.04 mg/kg to 0.35 mg/kg.

EFSA concludes on a MRL proposal of 0.01* mg/kg for the intended uses on maize. The NEU use on maize represents the critical GAP for a future MRL proposal on stover.

x. Sugar beat roots

To identify the critical GAP (worst-case use) on sugar beets for the MRL proposal and the risk assessment and on sugar beet leaves for the MRL setting, if a new category for feed items is included in Annex I of Regulation (EC) 396/2005, and for the dietary burden assessment in livestock, the following intended uses in the Northern and the Southern Europe were assessed.

NEU. GAP: *1 x 0.96 kg a.s./ha; PHI 60 d (EC/WG/CS formulation).* A total of 24 supervised residue trials was performed with different formulations over more than two seasons. Sugar beets are a major crop in NEU, therefore a minimum of eight trials is required (EC, 2011). Both roots and leaves were sampled. Residue trials employing the EC/WG formulation and reflecting the proposed GAP were not available. Eight trials belonging to a single season (2007) and employing the CS formulation were reflecting the proposed GAP. In roots, chlorpyrifos was below the LOQ (two samples) and the LOD (six samples). In leaves, chlorpyrifos residues ranged from <LOD (<0.003 mg/kg) to 0.68 mg/kg.

SEU. *GAP:1 x 0.96 kg a.s./ha; PHI 60 d (EC/WG/CS formulation).* A total of 16 supervised residue trials was performed with different formulations over more than two seasons. Sugar beets are a major crop in SEU, therefore a minimum of eight trials is required (EC, 2011). Both roots and leaves were sampled. Residue trials employing the EC/WG formulation and reflecting the proposed GAP were not available. Eight trials belonging to a single season (2007) and employing the CS formulation were

reflecting the proposed GAP. In roots, chlorpyrifos was below the LOQ (one sample) and the LOD (seven samples). In leaves, chlorpyrifos residues ranged from <LOD (<0.003 mg/kg) to 0.07 mg/kg.

EFSA derives a MRL proposal of 0.01* mg/kg for the intended uses on sugar beets and concludes that the NEU use on sugar beets represents the critical GAP for a future MRL proposal on sugar beet leaves as feed item and the livestock dietary burden assessment.

y. Pasture

A total of 17 trials was performed with the EC and CS formulations over more than two seasons in NEU. The two bridging studies were conducted with two applications of either the EC or the CS formulation. Additional seven trials conducted with the CS formulation reflected the proposed GAP for dose rate and PHI but were conducted with a single application. Since the data from the decline trials showed that there are no significant residues before final application, the residues at harvest are associated with the final application, therefore these trials were taken into consideration to complete the dataset. Overall, 11 trials (2 EC and 9 CS trials) were considered as acceptable to derive the MRL proposal, if a new category for feed items is included in Annex I of Regulation (EC) 396/2005, and the values for the dietary burden in livestock.

The results of the residue trials, the related risk assessment input values (highest residue, median residue, conversion factor) and the MRL proposals calculated according to the OECD methodology (OECD, 2011a) are summarised in Table 3-2. When different GAPs and formulations were intended to be applied on the individual crop, EFSA has derived the MRL proposal from the use leading to the more critical residues among the uses adequately supported by data.

For risk assessment purpose, the results of the analysis for total TCP were converted into chlorpyrifos equivalents by using a conversion factor of 1.77 based on the ratio between the molecular weights of the compounds.

Chlorpyrifos and TCP residue demonstrated to be stable on samples of banana, bean, cauliflower, peach, onion for up to 12 and 14 months, respectively, and of alfalfa, fruit nut, sugar beet, corn, orange, sweet potato, tomato and sorghum for a period ranging from 30 to 1716 days (Spain, 2003). According to the EMS information, the notifier is conducting a new storage stability study in various crop specimens (Spain, 2010a; 2010b). In the supervised residue trials the samples were stored deep frozen for up to of 691 days. The residue data can be acceptable with regard to storage stability, however EFSA suggests having plain confirmation of the validity based on the results from the on-going storage stability study.

According to the EMS, the analytical methods used to analyse supervised residue trial samples have been sufficiently validated and were proven to be fit for purpose (Spain, 2010a, 2010b).

EFSA considers that the data are sufficient to derive the following MRL proposals for the intended use of chlorpyrifos: 0.01* mg/kg for sweet corn, maize, rape seeds, sugar beets; 0.1 mg/kg for barley, wheat; 0.4 mg/kg for globe artichokes; 0.5 mg/kg for plums, cauliflowers; 0.6 mg/kg for tomatoes, aubergines, broccoli; 0.8 mg/kg for raspberries, head cabbage; 1 mg/kg for cherries, Brussels sprouts; 1.5 mg/kg for citrus and pome fruits, peppers; 2 mg/kg for apricots, peaches, table and wine grapes and 4 mg/kg for bananas. The MRLs are already fixed at a level corresponding to the intended use of chlorpyrifos on strawberries and no modification is proposed. Although sufficiently supported by data no final proposal could be derived for the intended use of the capsule suspension (CS) formulation on table grapes due to consumer safety concerns. As regards to the use on beans (with pods), dry beans and olives the data are not adequate to support the MRL proposal.

Furthermore, assuming that the residue definitions for enforcement and risk assessment established for the other commodities apply to feed items as well and in case of a future introduction of the category in Regulation (EC) No. 396/2005. EFSA derived the following MRL proposals for feed items: 1.0 mg/kg on wheat, barley straw, 1.5 mg/kg on sugar beet leaves and 3.0 mg/kg on grass forage (fresh).

Table 3-2: Overview of the available residues trials data

Commodity	Residue Region [a]	Outdoor /Indoor	Individual trial results (mg/kg) [b] and GAP (when relevant)		Median residue (mg/kg) [d]	Highest residue (mg/kg) [e]	MRL proposal (mg/kg)	Median CF [f]	Comments
			Enforcement (chlorpyrifos)	Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)[c]					
Enforcement residue definition: chlorpyrifos									
Oranges, Mandarins →Citrus	SEU	Outdoor	*Mandarins* EC/WG: 0.10; 0.22; 0.32; 0.35; 0.40; 2 x 0.60; 0.65; 0.81; 0.83 CS: 0.09[h]; 0.29 *Oranges* EC/WG: 0.20; 0.24; 0.26[h]; 0.39; 0.44; 0.45; 0.54; 0.55; 0.65; 0.66[h]; 0.72 CS: 0.17; 0.26	*Mandarins* EC/WG: 0.22; 0.44; 0.51; 0.54; 0.55; 0.56; 0.76; 0.86; 1.03; 1.17 CS: 0.19[h]; 0.27 *Oranges* EC/WG: 0.41[h]; 0.45; 0.52; 2 x 0.53[h]; 0.54; 0.55; 0.64; 0.69; 0.76; 0.84 CS: 0.27; 0.34	0.4	0.83	1.5	1.4	Combined datasets. R_{ber}= 1.25 R_{max}= 0.93 OECD MRL= 1.5
Apples, Pears → Pome fruits	NEU	Outdoor	GAP: 1x 0.96 kg a.s./ha; PHI 21d; EC/WG/CS form. *Apples* EC: 0.02[h]; 0.04; 0.08[h]; 0.14; 0.16; 0.53; 0.83 CS: 0.03; *0.40*[h]; 0.28[h] *Pears* EC: 0.03; 0.10; 0.13[h]; 0.14; 0.14[h]; 0.38 CS: 0.02; 0.10[h]; *0.12*	*Apples* EC: 0.02[h]; 0.03[h]; 0.06; 0.07; 0.11; 0.53; 0.81 CS: 0.03; 0.27[h]; *0.36*[h] *Pears* EC: 0.04; 0.13; 0.15[h]; 0.25; 0.25[h]; 0.30 CS: 0.05; *0.16*; 0.17[h]	**0.13**	**0.83**	**1.5**	1.1	Combined datasets. R_{ber}= 0.70 R_{max}= 0.93 OECD MRL= 1.5

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)					
			GAP: 2x 0.5 kg a.s./ha; PHI 21 d; CS formulation *Apples*: 0.08; 0.14; 0.18(h); 0.21(h); 0.28; 0.29(h); 0.34(h) *Pears*: 0.07	*Apples*: 0.07; 0.18; 0.29(h); 0.36(h); 0.38(h); 0.45(h); 0.68 *Pears*: 0.05	0.20	0.34	0.6	1.3	Combined datasets. R_{ber}= 0.58 R_{max}= 0.52 OECD MRL= 0.6
	SEU	Outdoor	GAP: 1x 0.96 kg a.s./ha; PHI 21d; EC/WG/CS form. *Apples* EC: 0.05; 0.08; 0.12; 0.16(h); 0.35(h); 0.40(h) CS: 0.05(h); 0.07; *0.21; 0.34* *Pears* EC: 2 x 0.02, 0.03; 0.13; 0.15; CS: 0.13; 0.25	*Apples* EC: 0.11, 0.13; 0.13(h); 0.19(h); 0.21; 0.30(h) CS: 0.08(h); 0.2; *0.2*; *0.40* *Pears* EC: 2 x 0.07; 0.16; 0.19; 0.21 CS: 0.13; 0.21	0.13	0.40	0.7	1.6	Combined datasets. R_{ber}= 0.46 R_{max}= 0.45 OECD MRL= 0.7
			GAP: 2x 0.5 kg a.s./ha; PHI 21 d; CS formulation *Apples*: 0.07; 0.11(h); 0.13; 2 x 0.13(h); 0.14(h); 0.16(h); 0.18 *Pears*: 0.20	*Apples*: 0.11; 0.13; 0.13(h); 2 x 0.14(h); 0.16(h); 0.20(h); 0.29 *Pears*: 0.20	0.13	0.20	0.5	1.0	Combined datasets. R_{ber}= 0.34 R_{max}= 0.25 OECD MRL= 0.5
Peaches → Apricots	SEU	Outdoor	GAP: 1x 1.08 kg a.s./ha; PHI 21 d; EC/WG/CS form. *Peaches* EC/WG: 0.02; 0.02(h); 3 x 0.04; 0.05(h); 0.09; 0.44 *Apricots* EC: 0.01; *0.03;* 0.07; 0.09; 0.20	*Peaches* EC/WG: 0.04(h); 2 x 0.06; 0.07; 0.08; 0.12(h); 0.13; 0.46 *Apricots* EC: *0.05*; 0.09; 0.11; 0.28; 0.49	0.04	0.44	0.6	2.0	Combined datasets R_{ber}= 0.13 R_{max}= 0.40 OECD MRL= 0.6

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	**Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)**					
			Peaches CS: 0.04; 0.10; 0.15(h); *0.36; 0.44; 0.63*(h); *0.71*(h); *0.72; 0.74; 0.75* *Apricots* CS: 0.02; 0.03	*Peaches* CS: 0.06; 0.11; 0.25(h); *0.34; 0.49*; 2 x *0.76*(h); *0.90*(h); *0.99*; *1.10* *Apricots* CS: 2 x 0.05;	0.40	0.75	2.0	1.4	Combined datasets R_{ber}= 0.76 R_{max}= 1.24 OECD MRL= 2.0
			GAP: 2x 0.5 kg a.s./ha; PHI 21 d; CS formulation *Peaches* 0.02; 0.03; 0.23; 0.24; 0.37; 0.50; 0.57; 0.63; 0.79; 0.83 *Apricots*: -	*Peaches* 2 x 0.09; 0.23; 0.29; 0.52; 0.58; 0.83; 0.94; 1.01; 1.03 *Apricots*: -	**0.44**	**0.83**	**2.0**	1.4	R_{ber}= 1.34 R_{max}= 1.27 OECD MRL = 2.0
Cherries	NEU	Outdoor	GAP: 1x 0.96 kg a.s./ha; PHI 21 d; EC/WG/CS form. EC: 2 x <0.01 CS: 2 x <0.01; 3 x *<0.01; 0.01; 0.03*(i)	EC: <0.02; 0.07 CS: *<0.02*; 0.02; 0.03; 2 x *0.04; 0.06; 0.08*	0.01	0.03	0.04	3.0	Combined datasets. R_{ber}= 0.02 R_{max}= 0.03 OECD MRL=0.04
			GAP: 2x 0.5 kg a.s./ha; PHI 30 d; CS formulation <0.01; 0.02; 0.04; 2 x 0.09; 0.16; 0.20; 0.64(i)	0.04; 0.05; 0.07; 2 x 0.18; 0.23; 0.40; 0.9	0.09	**0.64**	**1.0**	2.0	R_{ber}= 0.38 R_{max}= 0.81 OECD MRL=1.0
	SEU	Outdoor	GAP: 1x 0.96 kg a.s./ha; PHI 45 d ; EC/WG/CS form. EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				

Commodity	Residue Region [a]	Outdoor /Indoor	Individual trial results (mg/kg) [b] and GAP (when relevant)		Median residue (mg/kg) [d]	Highest residue (mg/kg) [e]	MRL proposal (mg/kg)	Median CF [f]	Comments
			Enforcement (chlorpyrifos)	Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)[c]					
			GAP: 2x 0.5 kg a.s./ha; PHI 30 d; CS formulation 0.01; 0.02; 2 x 0.09; 0.14; 0.18; 0.23; 0.56[i]	2 x 0.02; 0.14; 0.18; 0.25; 0.32; 0.45; 0.56	**0.12**	0.56	0.9	1.7	R_{ber}= 0.44 R_{max}= 0.73 OECD MRL = 0.9
Plums	NEU	Outdoor	GAP: 1x 0.96 kg a.s./ha; PHI 21 d; EC/WG/CS form. EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				
			GAP: 2x 0.5 kg a.s./ha; PHI 21 d; CS formulation 0.03[h]; 0.04; 2 x 0.05; 0.08[h]; 0.11[h]; 0.13; 0.28[h][i]	0.02[h]; 3 x 0.07; 2 x 0.11[h]; 0.14; 0.41[h]	**0.07**	**0.28**	**0.5**	1.4	R_{ber}= 0.25 R_{max}= 0.36 OECD MRL = 0.5
	SEU	Outdoor	GAP: 1x 0.96 kg a.s./ha; PHI 35 d; EC/WG/CS form. EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				
			GAP: 2x 0.5 kg a.s./ha; PHI 21 d; CS formulation 0.01[h]; 0.02; 0.02[h]; 0.03	0.02[h]; 2 x 0.04; 0.04[h]	0.02	0.03	0.06	2.0	R_{ber}= 0.06 R_{max}= 0.06 OECD MRL=0.06
Table grapes	SEU	Outdoor	GAP: 1x 0.65 kg a.s./ha; PHI 21 d; EC/WG/CS form. EC/WG: 0.01; 0.02; 2 x 0.03; 0.03(t); 0.04; 0.04[h](t); 2 x 0.05; 0.06; 0.07; 0.15(t); 0.16; 0.18[h](t); 0.24; 0.26(t)	EC/WG: 0.02(t); 0.04; 2 x 0.06; 0.07; 0.08; 0.09(t); 0.11; 0.12; 0.14; 0.16(t); 0.16[h](t) ; 0.27; 0.28[h](t); 0.30; 0.39(t)	0.05	0.26	0.5	1.8	R_{ber}= 0.32 R_{max}= 0.29 OECD MRL = 0.5

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	**Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)**					
			CS: 0.02; *0.03*(t); 0.05; *0.16*(t); 0.19(h)(t); 0.20(t); *0.57*; *0.97*(i)(t)	CS: *0.03*(t); 0.07; 0.09; *0.17*(t); 0.28(t); 0.31(h) (t); 1.*42*(t); *1.55*(t)	**0.18**	**0.97**	**2.0**	1.6	R_{ber}= 0.95 R_{max}= 1.33 OECD MRL = 2.0
			GAP: 2x 0.36 kg a.s./ha; PHI 60d; CS formulation 0.07; 0.08(h); 0.16; 0.19; 0.57(t); 0.58(t);	0.09; 0.13(h); 0.43; 0.56(t); 0.79(t); 1.37	The number of relevant trials is not sufficient to derive a MRL proposal for the proposed use.				
Wine grapes	NEU	Outdoor	GAP: 2x 0.36 kg a.s./ha; PHI 21; EC/WG/CS form. EC: 3 x 0.03; 0.04; 2 x 0.05; 0.06; 0.01; 0.19	EC: 0.03; 2 x 0.04; 0.07; 0.08; 0.09; 0.10; 0.12; 0.14	0.06	0.19	0.3	1.4	R_{ber}= 0.16 R_{max}= 0.23 OECD MRL = 0.3
			CS: 0.05(h); 0.07; 0.10; 0.11; 0.14; 0.15; 0.16; 0.35; 0.38; 0.40; 0.47; 0.62; 0.68(h); 0.69; 0.72; 0.87(h); 0.91; 0.93(h)	CS: 0.07; 0.07(h); 2 x 0.11; 0.13; 0.23; 0.26; 0.42; 0.52; 0.54; 0.56; 0.58(h); 0.61; 0.79(h); 0.83; 0.86(h); 1.01; 1.03	**0.39**	**0.93**	**2.0**	1.1	R_{ber}= 1.40 R_{max}= 1.20 OECD MRL = 2.0
	SEU	Outdoor	GAP: 1x 0.72 kg a.s./ha; PHI 35 d; CS formulation 0.01; 2 x 0.02; 2 x 0.03; 3 x 0.05; 0.06; 0.07; 0.16; 0.24; *0.51*	0.04; 2 x 0.06; 2 x 0.07; 0.08; 0.09; 0.11; 0.12; 0.14; 0.27; 0.30; *1.24*	0.05	0.51	0.7	2.0	R_{ber}= 0.23 R_{max}= 0.47 OECD MRL = 0.7

Commodity	Residue Region [a]	Outdoor /Indoor	Individual trial results (mg/kg) [b] and GAP (when relevant)		Median residue (mg/kg) [d]	Highest residue (mg/kg) [e]	MRL proposal (mg/kg)	Median CF [f]	Comments
			Enforcement (chlorpyrifos)	Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)[c]					
			GAP: 2x 0.36 kg a.s./ha; PHI 21; EC/WG/CS form. EC/WG: - CS: 0.02[h]; 2 x 0.03; 0.09; 0.10; 2 x 0.12; 0.26; 0.36[h]; 0.37; 0.39[h]; 0.43[h]; 0.48[h]; 0.49[h]; 0.62; 0.75; 0.86; 1.04	EC/WG: - CS: 0.04[h]; 2 x 0.06; 0.11; 0.13; 0.32; 0.36 0.43; 3 x 0.58[h]; 0.59[h]; 0.63; 0.65[h]; 0.74; 0.97; 1.4; 1.57	0.37	1.04	2.0	1.5	R_{ber}= 1.02 R_{max}= 1.11 OECD MRL = 2.0
Strawberries	NEU	Outdoor	EC/WG: - CS: 2 x <0.01; 0.01; 3 x 0.02; 0.06; 0.11[i]	EC/WG: - CS: 2 x 0.02; 2 x 0.03; 0.05; 0.06; 0.11; 0.17	**0.02**	**0.11**	**0.2**	2.0	R_{ber}= 0.09 R_{max}= 0.14 OECD MRL = 0.2
	SEU	Outdoor	EC/WG: *0.02*; *0.05* CS: *2 x <0.01*; 2 x *0.01*; *0.02*; *0.03*; 2 x 0.04; *0.04*; *0.09*[i]	EC/WG: *0.04*; *0.09* CS: *0.02*; 2 x *0.03*; *0.05*; *0.06*; 2 x 0.08; *0.08*; *0.09*; 0.13	0.02	0.09	0.15	2.0	R_{ber}= 0.08 R_{max}= 0.09 OECD MRL=0.15
Raspberries	NEU	Outdoor	EC/WG: - CS: 0.08; 0.13; 0.18; 0.22; 0.30; 2 x 0.24; 0.52[i]	EC/WG: - CS: 0.08; 0.15; 2 x 0.24; 0.27; 0.28; 0.43; 0.60	0.23	0.52	0.8	1.2	R_{ber}= 0.57 R_{max}= 0.66 OECD MRL = 0.8
Bananas	SEU	Indoor	0.36[h]; 0.48; 1.12; 1.55; 1.58	0.27[h]; 0.60; 1.24; 2.09; 2.34	1.12	1.58	4.0	1.3	R_{ber}= 3.13 R_{max}= 3.45 OECD MRL = 4.0
Tomatoes → Aubergines	NEU	Outdoor	GAP: 1x 0.72 kg a.s./ha; PHI 5 d; EC/WG/CS form EC: - CS: 0.05; 0.10; 0.14; 0.20	EC: - CS: 0.04; 0.12; 0.15; 0.20	The number of relevant trials is not sufficient to derive a MRL proposal for the proposed use.				
	SEU	Outdoor	GAP: 1x 0.72 kg a.s./ha; PHI 5 d; EC/WG/CS form EC: 0.02; 0.07[h] CS: 0.03; 0.06	EC: 0.05[h]; 0.08 CS: 0.07; 0.08	The number of relevant trials is not sufficient to derive a MRL proposal for the proposed use.				

Commodity	Residue Region [a]	Outdoor /Indoor	Individual trial results (mg/kg) [b] and GAP (when relevant)		Median residue (mg/kg) [d]	Highest residue (mg/kg) [e]	MRL proposal (mg/kg)	Median CF [f]	Comments
			Enforcement (chlorpyrifos)	Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)[c]					
			GAP: 1x 0.5 kg a.s./ha; PHI 5 d; CS formulation 2 x 0.04; 0.04[h]; 0.07; 0.08[h]; 0.11[h]; 0.12; 0.16	0.04, 0.05[h]; 0.07; 0.13[h]; 0.14; 0.16; 0.18[h]; 0.25	0.08	0.16	0.3	1.6	R_{ber}= 0.24 R_{max}= 0.22 OECD MRL = 0.3
	EU	Indoor	0.10[h]; 0.11[h]; 0.12; 0.14[h]; 0.22; 0.25; 2 x 0.33	0.13; 0.14[h]; 0.16[h]; 0.22[h]; 0.31; 0.32; 0.34; 0.40	**0.18**	**0.33**	**0.6**	1.4	R_{ber}= 0.62 R_{max}= 0.51 OECD MRL= 0.6
Peppers	SEU	Outdoor	GAP: 1x 0.72 kg a.s./ha; PHI 5 d; EC/WG/CS form EC/WG: - CS: 0.03; 0.08, 0.10; 0.11; 0.13; 0.20; 0.24; 0.30	EC/WG: - CS: 0.06; 0.09; 2 x 0.14; 0.22; 0.25; 0.32; 0.44	0.12	0.30	0.5	1.4	R_{ber}= 0.46 R_{max}= 0.43 OECD MRL= 0.5
			GAP: 1x 0.5 kg a.s./ha; PHI 5 d; CS formulation 0.07; 0.12; 0.14; 2 x 0.16; 0.19; 0.31[h]; 0.33	0.04; 0.09; 0.14; 2 x 0.20; 0.18; 0.29[h]; 0.38	0.16	0.33	0.6	1.0	R_{ber}= 0.56 R_{max}= 0.47 OECD MRL= 0.6
	EU	Indoor	0.20; 2 x 0.21[h]; 0.23; 0.25; 0.38; 0.60[h]; 0.69	0.14; 0.20[h]; 2 x 0.25; 0.25[h]; 0.32; 0.45; 0.68[h]	**0.24**	**0.69**	**1.5**	1.0	R_{ber}= 1.09 R_{max}= 0.97 OECD MRL= 1.5
Maize→Sweet corns	NEU	Outdoor	12 x <0.01	12 x <0.02	0.01	0.01	0.01*	2.0	R_{ber}= 0.02 R_{max}= 0.01 OECD MRL = 0.01*
	SEU	Outdoor	9 x <0.01	9 x <0.02	0.01	0.01	0.01*	2.0	R_{ber}= 0.02 R_{max}= 0.01 OECD MRL = 0.01*

Commodity	Residue Region [a]	Outdoor /Indoor	Individual trial results (mg/kg) [b] and GAP (when relevant)		Median residue (mg/kg) [d]	Highest residue (mg/kg) [e]	MRL proposal (mg/kg)	Median CF [f]	Comments
			Enforcement (chlorpyrifos)	Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)[c]					
Broccoli	NEU	Outdoor	GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; foliar application EC: 0.02; 0.03 CS: 2 x <0.01; *<0.01*[h]; *0.02; 0.07*; 0.12; 0.19; *0.20*; 0.30	EC: 0.06; 0.55 CS: 0.03; *0.07*; 0.07[h]; 0.07; *0.11*; 0.15; 0.28; *0.31*; 0.32	**0.03**	0.30	0.5	2.1[g]	Combined datasets. R_{ber}= 0.37 R_{max}= 0.37 OECD MRL= 0.5
			GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; field drench application EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				
	SEU	Outdoor	GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; foliar application EC: 5 x <0.01; 0.03; 0.05 CS: 2 x <0.01; *0.15; 0.16;* 0.26; 0.42[i]	EC: 3 x <0.02; 0.02; 0.04; 0.09; 0.19 CS: 2 x *0.2;* 0.03; 0.05; 0.39; 0.61	0.01	**0.42**	**0.6**	2.0	Combined datasets. R_{ber}= 0.31 R_{max}= 0.43 OECD MRL= 0.6.
			GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; field drench application EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				
Cauliflowers	NEU	Outdoor	GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; foliar application EC: 4 x <0.01; 3 x 0.02; 0.02[h]; 0.34 CS: 2 x <0.01; *0.09*[h]*; 0.15; 0.02; 0.03*[h]; 2 x 0.21	EC: 3 x <0.02; 0.03; 2 x 0.04; 0.05[h]; 0.08; 0.31 CS: 2 x 0.02; *0.02; 0.05*[h]; *0.14*[h]; 0.16; 0.21; *0.32*	**0.02**	**0.34**	**0.5**	2.0	Combined datasets. R_{ber}= 0.24 R_{max}= 0.31 OECD MRL= 0.5

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	**Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)**					
			GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; field drench application EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				
	SEU	Outdoor	GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; foliar application EC/WG: - CS: 3 x <0.01; 2 x *<0.01*(h); 0.03	EC/WG: - CS: *2 x <0.02*(h); 3 x <0.02; 0.05	0.01	0.03	0.05	2.0	R_{ber}= 0.03 R_{max}= 0.04 OECD MRL=0.05
			GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; field drench application EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				
Head cabbage	NEU	Outdoor	GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; foliar application EC: 7 x <0.01; 0.02; 0.11(h); 0.22; 0.69 CS: 6 x <0.01; *<0.01*; 0.01; *0.01*; *0.02*; 2 x *0.02*(h); *0.03*(h); 0.04; *0.04*(h); 0.13	EC: 2 x <0.02; 5 x 0.02; 0.03; 0.16(h); 0.30; 0.87 CS: 4 x <0.02; *<0.02;* 0.02; *0.02*; 0.03; 0.04; *0.04*; 3 x *0.04*(h); 0.06; *0.07*(h); 0.17	**0.01**	**0.69**	0.7	2.0	Combined datasets. R_{ber}= 0.06 R_{max}= 0.36 OECD MRL = 0.7
			GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; field drench application EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)					
	SEU	Outdoor	GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; foliar application EC: 6 x <0.01; 0.01; 0.03; 0.06 CS: 3 x <0.01; 0.01; *0.01*; 0.05; 0.09; *0.19; 0.28; 0.32*; 0.46; 0.64(i)	EC: 4 x <0.02; 0.02; 2 x 0.03; 0.05; 0.16 CS: 3 x <0.02; *0.04*; 0.06; 0.08; *0.22*; 0.24; *0.43*; *0.52*; 0.76; 1.51	0.01	0.64	**0.8**	2.0	Combined datasets. R_{ber}= 0.28 R_{max}= 0.52 OECD MRL = 0.8
			GAP: 1 x 0.96 kg a.s./ha; PHI 21 d; field drench application EC/WG: - CS: -	EC/WG: - CS: -	No MRL proposal can be estimated for the proposed use.				
Brussels sprout	NEU	Outdoor	EC: <0.01; 0.03; 0.04; 0.06; 0.08; 2 x 0.11; 0.22; 0.27	EC: 0.02; 0.06; 0.11; 0.13; 0.15; 0.17; 0.18; 0.29; 0.36	0.08	0.27	0.5	1.6	R_{ber}= 0.33 R_{max}= 0.37 OECD MRL = 0.5
			CS: 0.13; 0.14(h); 0.17; 0.26; 0.27; 0.28; 2 x 0.31	CS: 0.18; 0.19(h); 0.23; 0.25; 0.28; 0.30; 0.32; 0.51	0.27	0.31	0.7	1.2	R_{ber}= 0.61 R_{max}= 0.47 OECD MRL = 0.7
	SEU	Outdoor	0.23; 0.34; 0.36(h); 0.43	0.25; 0.34; 0.49(h); 0.68	**0.35**	**0.43**	**1.0**	1.2	R_{ber}= 0.83 R_{max}= 0.77 OECD MRL = 1.0
Beans (with pods)	SEU	Outdoor	0.02; 2 x 0.05; 0.20	0.09; 0.13; 0.23; 0.74	The number of relevant trials is not sufficient to derive a MRL proposal for the proposed use.				
Beans (dry)	SEU	Outdoor	2 x 0.02	<0.02; 0.02	The number of relevant trials is not sufficient to derive a MRL proposal for the proposed use.				
Globe artichoke	SEU	Outdoor	EC/WG: - CS: 0.07; 0.10; 0.12; 0.16	EC/WG: - CS : 0.11; 0.15; 0.17; 0.24	0.11	0.16	0.4	1.5	R_{ber}= 0.29 R_{max}= 0.30 OECD MRL = 0.4

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	**Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)**					
Rapeseeds	NEU	Outdoor	GAP: 1x 0.48 kg a.s./ha; PHI n.a.; EC/WG/CS form **Seeds** EC: 4 x <0.01 CS: 7 x < 0.01	**Seeds** EC: 4 x 0.02 CS: 5 x <0.02; 0.02; 0.31	0.01	0.01	0.01*	2.0	Combined datasets. CHP < LOD. R_{ber}= 0.02 R_{max}= 0.01 OECD MRL = 0.01*
			GAP: 2x 0.25 kg a.s./ha; PHI n.a.; CS formulation 2 x <0.01	2 x <0.09	0.01	0.01	0.01*	n.c.	Chlorpyrifos: 2 x <LOD
	SEU	Outdoor	GAP: 2x 0.25 kg a.s./ha; PHI n.a.; CS formulation 2 x <0.01	2 x <0.09	0.01	0.01	0.01*	n.c.	
Olives	SEU	Outdoor	-	-	No MRL proposal can be estimated for the proposed use.				
Maize	NEU	Outdoor	GAP: 2x 0.75 kg a.s./ha; PHI 28 d; CS formulation **Grain** See "Maize→sweet corns"	**Grain** See "Maize→sweet corns"	0.01	0.01	0.01*	2.0	R_{ber}= 0.02 R_{max}= 0.01 OECD MRL = 0.01*
			GAP: 2x 0.72 kg a.s./ha; PHI 60 d; EC/WG/CS form **Grain:** EC: 2 x <0.01 CS: 8 x <0.01	**Grain:** EC: 2 x <0.02 CS: 8 x <0.02	0.01	0.01	0.01*	2.0	Combined datasets. R_{ber}= 0.02 R_{max}= 0.01 OECD MRL = 0.01*
			Stover EC: 0.61; 1.40 CS: 2 x 0.08; 0.09; 0.12, 0.20; 0.25; 0.78; 2.06	**Stover** EC: 1.54; 2.22 CS: 0.14; 0.15; 0.16; 0.25; 0.34; 0.85; 1.24; 2.39	0.23	2.06	4.0(l)	1.7	Combined datasets. R_{ber}= 1.87 R_{max}= 2.53 OECD MRL = 4.0

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	**Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)**					
	SEU	Outdoor	GAP: 2x 0.75 kg a.s./ha; PHI 28 d; CS formulation **Grain** See Maize→sweet corn	**Grain** See Maize→sweet corn	0.01	0.01	0.01*	2.0	R_{ber}= 0.02 R_{max}= 0.01 OECD MRL = 0.01*
			GAP: 2x 0.72 kg a.s./ha; PHI 60 d; EC/WG/CS form **Grain** EC: <0.01; CS: 7 x >0.01	**Grain** EC: <0.02; CS: 7 x >0.02	0.01	0.01	0.01*	2.0	Combined datasets. R_{ber}= 0.02 R_{max}= 0.01 OECD MRL = 0.01*
			Stover EC: 0.27 CS: 0.04; 0.05; 0.08; 2 x 0.12; 0.14; 0.35	**Stover** EC: 0.58 CS: 0.20; 2 x 0.21; 0.22; 0.30; 0.31; 0.48	0.12	0.35	0.6	2.4	Combined datasets. R_{ber}= 0.48 R_{max}= 0.50 OECD MRL = 0.6
Barley, Wheat	NEU	Outdoor	**Grains** *Barley* EC: - ; CS: <0.01; 0.11(i) *Wheat* EC: *Overdosed*: 2 x <0.01 CS: 3 x <0.01	**Grains** *Barley* EC: -; CS: 0.11; 0.65 *Wheat* EC: *Overdosed*: 0.02; 0.09 CS: 0.06; 0.17; 0.21	Combined datasets. The number of relevant trials is not sufficient to derive a MRL proposal for the proposed use.				
			Straw *Barley* EC: - ; CS: 0.08; 0.41	**Straw** *Barley* EC: - ; CS: 0.16; 0.62	Combined datasets. The number of relevant trials is not sufficient to derive a MRL proposal for the proposed use.				
			Wheat EC: *Overdosed*: 0.35; 0.77 CS: 0.04; 0.13; 0.38	*Wheat* EC: *Overdosed*: 1.55, 1.69 CS: 0.29; 0.79; 1.2					

Commodity	Residue Region [a]	Outdoor /Indoor	Individual trial results (mg/kg) [b] and GAP (when relevant)		Median residue (mg/kg) [d]	Highest residue (mg/kg) [e]	MRL proposal (mg/kg)	Median CF [f]	Comments
			Enforcement (chlorpyrifos)	**Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)[c]**					
	SEU	Outdoor	**Grains** *Barley* EC: <0.01; 0.01 CS: <0.01; 0.02; 0.05; 0.07 *Wheat* EC: <0.01 CS: 3 x <0.01	**Grains** *Barley* EC: 0.05; 0.09 CS: 0.05; 0.1; 0.22; 0.3 *Wheat* EC: <0.02 CS: 2 x <0.02; 0.16	0.01	0.07	0.1	5.0	Combined datasets. R_{ber}= 0.05 R_{max}= 0.08 OECD MRL = 0.1
			Straw *Barley* EC: 0.05; 0.11 CS: 0.06; 0.11; 0.21; 0.5 *Wheat* EC: 0.02 CS: 0.03; 0.16; 0.52	**Straw** *Barley* EC: 0.19; 0.55 CS: 0.17; 0.56; 0.64; 1.0 *Wheat* EC: 0.07 CS: 0.17; 0.54; 1.45	0.11	0.52	1.0[l]	3.4	Combined datasets. R_{ber}= 0.56 R_{max}= 0.72 OECD MRL = 1.0
Sugar beet	NEU	Outdoor	**Roots** EC/WG: - CS: 8 x <0.01	**Roots** EC/WG: - CS: 7 x <0.02; 0.03	0.01	0.01	0.01*	2.0	CHP: 6 x <LOD. R_{ber}= 0.02 R_{max}= 0.01 OECD MRL=0.01
			Leaves EC/WG: - CS: 2 x <0.01; 0.03; 0.04; 0.09; 0.12; 0.49; 0.68	**Leaves** EC/WG: - CS: 2 x 0.05; 0.17; 0.27; 0.30; 0.38; 1.22; 1.26	0.06	0.68	1.5[l]	4.2	R_{ber}= 0.79 R_{max}= 1.0 OECD MRL = 1.5
	SEU	Outdoor	**Roots** EC/WG: - CS: 7 x <0.01; 0.01	**Roots** EC/WG:-; CS: 5 x <0.02; 0.03; 0.08; 0.12	0.01	0.01	0.01*	2.0	CHP: 7 x <LOD. R_{ber}= 0.02 R_{max}= 0.01 OECD MRL=0.01

Commodity	Residue Region (a)	Outdoor /Indoor	Individual trial results (mg/kg) (b) and GAP (when relevant)		Median residue (mg/kg) (d)	Highest residue (mg/kg) (e)	MRL proposal (mg/kg)	Median CF (f)	Comments
			Enforcement (chlorpyrifos)	**Risk assessment (chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos)(c)**					
			Leaves EC/WG: - CS: 6 x <0.01; 0.03; 0.07	**Leaves** ECWG: -; CS: <0.02; 0.04; 0.08; 0.11; 0.14; 0.18; 0.27; 0.33	0.01	0.07	0.15	8.5	R_{ber}= 0.05 R_{max}= 0.09 OECD MRL=0.15
Pasture	NEU	Outdoor	EC: 0.52; 0.90 CS: *0.18*; 0.31; *0.34*; *0.35*; *0.37*; 0.59; *0.84*; *1.25*; *2.02*(i)	EC: 1.03; 1.95 CS: *0.71*; *0.85*; *0.89*; 0.91; 1.06; *1.12*; *2.71*; *3.15*; *4.33*	0.52	2.02	3.0(l)	2.2	Combined datasets. R_{ber}= 1.80 R_{max}= 2.22 OECD MRL = 3.0

Note: In the trials where the number of applications deviated from the intended GAP, the results from trials conducted with one application are reported in *italics*.
The critical values for deriving the MRL proposal and for risk assessment are indicated in bold.
(a): NEU (Northern and Central Europe), SEU (Southern Europe and Mediterranean), EU (i.e. outdoor use) or Import (country code).
(b): EC (emulsifiable concentrate), WG (water dispersible granule), CS (capsule suspension) formulation.
(c): For risk assessment purpose, the amount of total TCP were converted into chlorpyrifos equivalents by using a conversion factor of 1.77, based on the molecular weight ratio.
(d): Median value of the individual trial results according to the enforcement residue definition.
(e): Highest value of the individual trial results according to the enforcement residue definition.
(f): Median conversion factor for enforcement to risk assessment obtained by calculating the median of the individual conversion factors for each residues trial.
(g): As the individual residue value was below the LOQ in most of the samples, the median conversion factor was calculated only for each pair of residue values with quantifiable amounts.
(h): Residue value obtained at a longer PHI.
(i): Statistically detected as potential outlier (Dixon's Q-test) but no information and no obvious defects in the trial justified its exclusion from the calculation (EC, 1997g; FAO, 2009).
(l): MRL proposal to be included in Regulation (EC) No 369/2005 if classification in Annex I is extended to feed products.
(t): Table grape sample.
(*): Indicates that the MRL is set at the limit of analytical quantification (LOQ).
n.c.: not calculated.

3.1.1.3. Effect of industrial processing and/or household preparation

The nature of chlorpyrifos residues after processing was investigated in studies performed at three test conditions representing pasteurization, baking/brewing/boiling and sterilization (20 minutes at 90°C, pH 4; 60 minutes at 100°C pH 5; 20 minutes at 120°C, pH 6) during the peer review (Spain, 2003). Under the representative processing conditions the compound was almost completely degraded to TCP with desethyl chlorpyrifos (DES) as a significant intermediate under the sterilisation conditions. The studies demonstrated that for processed commodities the residue definition for risk assessment shall take into account the occurrence of the metabolite TCP (Spain, 2003).

Regarding the magnitude of residues, specific processing studies were submitted by the applicant in the framework of the MRL applications (Spain, 2010a; 2010b). The samples for processing were taken from the supervised residue trials and analysed for chlorpyrifos and its metabolites TCP. In the studies on grapes, both red (two studies) and white (one study) grapes were processed into wine. For the calculation of the processing and conversion factors, the LOQ value of 0.01 mg/kg was used when the residues were recorded as below the individual LOD of the analytical methods. Since no significant residues occurred in the raw agricultural commodity (≤ LOQ), no processing studies are required for rape seeds, maize and sugar beets (EC, 1997d).

An overview of the available processing studies is given in Table 3-3.

Table 3-3: Overview of the available processing studies

Processed commodity	**Number of studies**	**Median PF** [(a)]	**Median CF** [(b)]	**Individual PF**	
				Chlorpyrifos (CHP)	**Total TCP, as CHP equivalents**
Enforcement residue definition: chlorpyrifos					
citrus, peeled	12	< 0.03	n.a.	Residues in the edible portion: *Oranges*: 5 x <0.01; 0.012 mg/kg *Mandarins*: 6 x <0.01 mg/kg	
Banana, peeled	5	0.02	n.a.	<0.007; <0.02; 0.02; 0.09; 0.13 mg/kg	
Orange, juice	1	Processing factors cannot be recommended for enforcement purposes as only one or two studies are available for each type of processing.		Residue in the processed product:	
				0.03 mg/kg	0.04 mg/kg
Orange, essential oil	1			0.76 mg/kg	0.57 mg/kg
Apple, juice	1			<0.01 mg/kg	<0.02 mg/kg
Apple, puree	1			<0.01 mg/kg	<0.02 mg/kg
Apple, dry pomace	1			2.92 mg/kg	3.39 mg/kg
Grapes, raisin	2			0.17; 0.95	0.77; 0.87
Grapes, must	3	0.39	2.0	<0.2; 0.39; 0.42[(c)]	0.17; 0.26; 0.5[(c)]
Grapes, dry pomace	3	8.74	1.66	4.28; 8.74[(c)]; 19.26	3.37; 6.81[(c)]; 10.53
Grapes, wine at bottling	3	<0.2	2.0	<0.2; <0.19[(d)]; <0.32	0.17; 0.26; 0.33[(d)]
Grapes, wine at 6 months after bottling	3	<0.2	2.0	<0.2; <0.19[(d)]; <0.32	0.17; 0.26; 0.42[(d)]

Processed commodity	Number of studies	Median PF [(a)]	Median CF [(b)]	Individual PF	
				Chlorpyrifos (CHP)	Total TCP, as CHP equivalents
Tomatoes, juice	3	<0.04	2.0	*Indoor:* <0.03; <0.06 *Outdoor*: <0.04	*Indoor:* <0.06; <0.14 Outdoor: 0.17
Tomatoes, puree	3	<0.06	2.0	*Indoor:* <0.03; <0.06 Outdoor: 0.54	*Indoor:* <0.06; <0.14 Outdoor: 1.81
Tomatoes, canned	3	<0.04	2.0	*Indoor:* <0.03; 0.14 *Outdoor*: <0.04	*Indoor:* <0.06; <0.14 Outdoor: 0.17
Head cabbage, outer leaves	2	Processing factors cannot be recommended for enforcement purposes as only one or two studies are available for each type of processing.		Residue in the processed product:	
				0.09 mg/kg; 0.23 mg/kg	0.53 mg/kg; 0.96 mg/kg
Head cabbage, inner leaves	2			2 x <0.01 mg/kg	<0.2 mg/kg; 0.02 mg/kg
Head cabbage, sauerkraut	1			<0.01 mg/kg	<0.02 mg/kg
Head cabbage, cooked	2			2 x <0.01 mg/kg	2 x <0.02 mg/kg
Barley, cleaned grain	3	0.85	4.55	0.39; 2 x 0.85	0.84; 0.82; 1.03
Barley, beer	3	<0.10	4.40	<0.01; <0.10; <0.12	0.04; 0.08; 0.09
Barley, brewer's malt	3	0.36	9.98	0.31; 0.36; 0.47	0.71; 0.76; 0.99
Barley, brewer's yeast	3	<0.11	11.0	<0.01; 0.11; <0.12	0.21; 0.22; 0.25
Barley, malt sprout	3	0.22	2.84	0.20; 0.22; 0.51	0.11, 0.20; 0.62
Barley, spent grain	3	0.21	4.39	0.19; 0.21; 0.40	0.25; 0.29; 0.37
Wheat, bran	3	3.38	3.06	2.22; 3.38; <30.9	3.12; 19.21; 29.5
Wheat, white flour	3	0.38	2.55	0.31; 0.38; 1.20	0.16; 1.30; 1.58
Wheat, white bread	3	0.34	1.77	0.28; 0.34; 4.70	0.11; 2 x <1.00
Wheat, wholemeal flour	3	1.31	3.21	0.69; 1.31; 6.20	0.69; 6.89; 7.29
Wheat, wholemeal bread	3	0.72	4.13	0.47; 0.72; <4.70	0.69; 4.90; 5.48
Maize, flour	3	No value	-	Residues in RAC <LOQ	
Maize, oil	3	No value	-	Residues in RAC <LOQ	
Maize, presscake	3	No value	-	Residues in RAC <LOQ	

(a): Median processing factor obtained by calculating the median of the individual processing factors of each processing study according to the enforcement residue definition.

(b): Median conversion factor for enforcement to risk assessment obtained by calculating the median of the individual conversion factors, which expresses the ratio between the residue level in the processed commodity according to the residue definition for risk assessment and the residue level in the processed commodity according to the residue

definition for enforcement. For risk assessment purpose, the amounts of total TCP were converted into chlorpyrifos equivalents by using a conversion factor of 1.77, based on the molecular weight ratio.

(c) Two methods of wine processing were used to produce the process fractions, heating and maceration. The result represents the mean of the two values obtained after the use of the two different methods.

3.1.2. Rotational crops

3.1.2.1. Preliminary considerations

Some of the crops under consideration can be grown in rotation with other plants and therefore the possible occurrence of residues in succeeding crops resulting from the use on primary crops has to be assessed. The soil degradation studies demonstrated that the degradation rate of chlorpyrifos and its metabolite is moderate, with a maximum DT_{90f} of 248 and 319 days, respectively (EC, 2005). Thus, further studies investigating the nature and magnitude of the compound and its metabolite uptake in rotational crops are required (EC, 1997c).

3.1.2.2. Nature and magnitude of residues

Rotational field crop studies were assessed in the DAR (Spain, 1999). The succeeding crops investigated were representing leafy, root and tuber vegetables, pulses and oilseeds and cereals.

A set of rotational crops was planted in soil previously treated with ^{14}C-chlorpyrifos at a rate of 2.24 kg a.s./ha (wheat, soybeans and sugar beets), 5.6 kg a.s./ha (wheat, lettuce, spinach and turnips planted 30 days after treatment (DAT); wheat, soybean, lettuce and sugar beets planted 129 DAT; wheat planted 365 DAT) and 5.4 kg a.s./ha (carrots, lettuce, and wheat planted 30 and 132 DAT). Crops were analysed at various times and at maturity for uptake of the ^{14}C activity.

The studies were performed with higher application rates (*ca*. 5.6 times the maximum rate envisaged among the crops under consideration grown in rotation). Chlorpyrifos was only found in trace amounts, if at all. Other components of the residues were the metabolites 3,5,6-trichloro-2-pyridinol (TCP) and 3,5,6-trichloro-2-methoxypyridine[13] (TMP) in low levels, but the main portion of the residues appeared to be the result of incorporation into natural plant components, such as starch, cellulose, and lignin.

Based on the available information on the nature and magnitude of the residues, it can be concluded that relevant residue levels of chlorpyrifos and its soil metabolites are unlikely to occur in rotational crops provided that the compound is used according to the proposed patterns.

3.2. Nature and magnitude of residues in livestock

The use of chlorpyrifos resulted in significant residue levels in the products under consideration and in their by-products which might be fed to livestock.

3.2.1. Dietary burden of livestock

The median and maximum dietary burden for livestock was calculated using the agreed European methodology (EC, 1996). The input values for the dietary burden calculation were selected according to the latest FAO recommendations (FAO, 2009) considering the livestock intake from the feed products under consideration. Since no other uses of chlorpyrifos on potential feed items are currently authorised in Europe, the dietary burden was calculated considering the intake of the proposed uses only.

[13] 2,3,5-trichloro-6-methoxypyridine.

The input values derived from the supervised residue trials data were multiplied by the conversion factors for enforcement to risk assessment (see Table 3-2). The processing factor of 3.8 was used for wheat bran (see Table 3-3). The following default processing factors were also used: 2.5 for pomace, 1 for silage, 4 for hay, 2 for press-cake of oilseeds containing 50 % of fat.

The input values for the dietary burden calculation are summarized in Table 3-4. The default processing factors have been shown in brackets.

Table 3-4: Input values for the dietary burden calculation

Commodity	**Median dietary burden**		**Maximum dietary burden**	
	Input value (mg/kg)	**Comment**	**Input value (mg/kg)**	**Comment**
Risk assessment residue definition: chlorpyrifos + TCP + conjugates, expressed as chlorpyrifos				
Citrus pomace	1.4 (0.4*1.4*2.5)	Median residue*CF*PF(2.5)	1.4 (0.4*1.4*2.5)	Median residue*CF*PF(2.5)
Apple pomace	0.36 (0.13*1.1*2.5)	Median residue*CF*PF(2.5)	0.36 (0.13*1.1*2.5)	Median residue*CF*PF(2.5)
Grass, fresh	1.14 (0.52*2.2)	Median residue*CF	4.44 (2.02*2.2)	Highest residue*CF
Grass, hay	4.6 (0.52*2.2*4)	Median residue*CF*PF(4)	17.6 (0.52*2.2*4)	Highest residue*CF*PF(4)
Grass, silage	1.14 (0.52*2.2*1)	Median residue*CF*PF(1)	4.44 (0.52*2.2*1)	Highest residue*CF*PF(1)
Cabbage	0.02 (0.01*2)	Median residue*CF	1.38 (0.69*2)	Highest residue*CF
Sugar beet	0.02 (0.01*2)	Median residue*CF	0.02 (0.01*2)	Highest residue*CF
Sugar beet, leaves	0.26 (0.06*4.2)	Median residue*CF	2.86 (0.68*4.2)	Highest residue*CF
Rape seeds	0.02 (0.01*2)	Median residue*CF	0.02 (0.01*2)	Highest residue*CF
Rape seed, meal	0.04 (0.01*2*2)	Median residue*CF*PF(2)	0.04 (0.01*2*2)	Median residue*CF*PF(2)
Wheat, barley, grain	0.05 (0.01*5)	Median residue*CF	0.05 (0.01*5)	Median residue*CF
Wheat, bran	0.19 (0.01*5*3.8)	Median residue*CF*PF	0.19 (0.01*5*3.8)	Median residue*CF*PF
Wheat, barley, straw	0.37 (0.11*3.4)	Median residue*CF	1.77 (0.52*3.4)	Highest residue*CF
Maize, grain	0.02 (0.01*2)	Median residue*CF	0.02 (0.01*2)	Highest residue*CF
Maize, silage	0.02 (0.01*2*1)	Median residue*CF*PF(1)	0.02 (0.01*2*1)	Highest residue*CF*PF(1)

The results of the dietary burden calculation are summarized in the following table.

Table 3-5: Results of the dietary burden calculation

	Maximum dietary burden (mg/kg bw/d)	Median dietary burden (mg/kg bw/d)	Highest contributing commodity	Max dietary burden (mg/kg DM)[(a)]	Trigger exceeded (Y/N)
Risk assessment residue definition: chlorpyrifos + TCP + conjugates, expressed as chlorpyrifos					
Dairy ruminants	0.807	0.207	Grass (fresh)	22.20	Yes
Meat ruminants	0.951	0.244	Grass (fresh)	22.17	Yes
Poultry	0.035	0.004	Wheat grain	0.56	Yes
Pigs	0.182	0.038	Grass silage	4.56	Yes

(a): Dry matter feed

The calculated dietary burden indicated that the trigger value of 0.1 mg/kg dry matter (DM) was exceeded for the four relevant food-producing animal species. The data also indicated that the main contributing commodity for ruminants was fresh grass, which may represent 100 % of the total diet in dairy ruminants, for swine grass silage and for poultry wheat bran. Therefore further considerations regarding residues in livestock and the setting of MRLs in commodities of animal origin are necessary.

3.2.2. Nature of residues

The metabolism of chlorpyrifos in livestock (lactating goats and laying hens) was assessed in the DAR and its addendum prepared under Directive 91/414/EEC (Spain, 1999, 2003).

The overall pattern of absorption and elimination was similar among the species investigated and laboratory animals. Chlorpyrifos was rapidly absorbed and excretion occurred mainly via the urine.

In goats, 79 to 89 % of the total administered dose was recovered in the excreta as TCP and about 2 % was found in milk and tissues combined. Chlorpyrifos and TCP represented approximately 70 and 14 % of the recovered activity in extracts of milk, 76 and 21 % in fat, 2 and 84 % in liver and < 1 and 92 % in kidney, respectively. The residue in the milk reached a maximum on day 8 (0.047 mg/kg) and decreased slightly thereafter.

In hens, 88 to 95 % of the total administered dose was recovered in the excreta and consisted primarily of TCP. Chlorpyrifos and TCP represented approximately 88 and <1 % of the recovered activity in extracts of fat, 70 and 14 % in skin, 2 and 71 % in kidney, and 32 and 49 % in egg yolk, respectively. In liver extracts the parent compound represented <1 % and TCP 62 %; however two unidentifiable metabolites, which could anyway be converted to TCP upon basic hydrolysis, represented 10 % and 7 % of the TRR. Residues in muscle and egg white were not further characterised as not required (EC, 1997e).

To ensure that also the non-characterized metabolites found in the hen liver tissues, which may contain the phosphorus group, are taken into account, the peer review established the residue definition for monitoring as parent compound and for risk assessment as "*chlorpyrifos + TCP + conjugates, expressed as chlorpyrifos*" (Spain, 2003).

The octanol/water partition coefficient of chlorpyrifos (log P_{ow} = 4.7) indicates that chlorpyrifos is fat-soluble. The metabolism studies confirmed that the residues are mainly accumulating in fat and should therefore be classified as fat-soluble.

3.2.3. Magnitude of residues

Livestock feeding studies were carried out on beef cattle (dose levels: 0, 3, 10, 30 and 100 mg/kg in the diet for 30 consecutive days), dairy cows (dose levels: 0, 0.3, 1, 3, 10, 30 mg/kg in the diet for two weeks), swine (dose levels: 0, 1, 3 and 10 mg/kg in the diet for 30 consecutive days) and laying hens (dose levels: of 0, 0.3, 1, 3 and 10 mg/kg in the diet for 30 days) and assessed in the DAR (Spain, 1999). At the end of the treatment period, chlorpyrifos medicated feed was withdrawn and animals either sacrificed or fed basal rations for additional 14 – 30 days and then slaughtered. The samples of tissues, milk and eggs from treated animals were analysed to determine chlorpyrifos (LOQ of 0.01 mg/kg for all matrices) and TCP (LOQ of 0.05 mg/kg for muscle, liver, kidney, fat and eggs; of 0.01 mg/kg for milk with individual analytical methods.

Chlorpyrifos was found almost exclusively in the fat. Unlike the parent compound, TCP was found predominantly in the liver and kidney. The levels of chlorpyrifos in milk ranged from <0.01 mg/kg at dietary levels of 10 mg/kg or lower to 0.02 mg/kg at 30 mg/kg. Residues of chlorpyrifos in the cream were approximately ten times higher than in milk. No residues of chlorpyrifos or TCP were detected in the eggs. All residues in tissue samples rapidly declined to non-detectable after the withdrawal of the treated feed.

The results of the feeding studies in livestock and the estimated residues of chlorpyrifos alone and of the sum of chlorpyrifos and of TCP, expressed as chlorpyrifos equivalents, associated to the dietary burden based on all the intended uses of chlorpyrifos on potential feed items for which a MRL proposal is supported by valid studies are summarised in Table 3-6. It should be noted that a more sensitive method for TCP quantification in animal matrices other than milk may reveal a lower limit of undetectable residues in several products. Since both chlorpyrifos and TCP were not quantified in the most part of the samples, the CF derived from the sum of the LOQs of the individual residue components is likely to lead to an excessive overestimation of the values used to perform the risk assessment. Furthermore, EFSA considered more appropriate to estimate the median and highest residue values for bovine liver and kidney and for pig fat and liver by interpolation between the closest feeding levels from the feeding studies of the residue concentrations derived according to the residue definition for risk assessment.

Chlorpyrifos showed to be stable in matrices of animal origin for at least 24 months when stored frozen at approximately -19°C (Spain, 2003, 2010a, 2010b). TCP showed to be stable in beef muscle, liver, kidney and fat matrices for a period of 15 months and in milk and cream for 12 months, when stored deep frozen (EFSA, 2005, 2011). Although the maximum storage period for the sample form the feeding studies was not reported, the residue data were considered acceptable by Spain (1999, 2011a, 2011b).

Based on the results of the feeding studies carried out with chlorpyrifos and the sensitivity of the analytical assay for the monitoring of the residues of the active substance in edible tissues of animal origin (see Section 1.2), at the calculated median dietary burden no residues above the LOQ are expected to occur in the food of animal origin with the exception of fat tissues. The existing MRLs for chlorpyrifos in Regulation (EC) No 396/2005 are currently established at the LOQ of 0.01 mg/kg for milk and bird's eggs and the LOQ of 0.05 mg/kg for poultry tissues only.

EFSA proposes to set the MRLs for chlorpyrifos in swine and ruminant fat and meat (the pesticide is fat-soluble) as 0.05 mg/kg and 0.4 mg/kg, respectively. The current MRL values for milk and eggs are confirmed by the outcome of the dietary burden. On the remaining products of swine and ruminant origin other than milk the proposed MRL is 0.01* mg/kg. The lowering of the MRL at 0.05* to 0.01* in poultry edible tissue is also proposed based on the sensitivity of the analytical assay.

Since chlorpyrifos is fat soluble the MRL for meat, taking into account the wording of the footnote in Regulation (EC) No 600/2010[14] should be expressed on fat basis[15]. Thus, the same value as for (animal species) fat is proposed for meat.

[14] Commission Regulation (EC) No 600/2010 of 8 July 2010. OJ L 174, 09.07.2010, p. 18-39.

[15] Footnote 5 of Regulation (EC) No 600/2010 reads: "….Where a pesticide and/or metabolite (included in the residue definition is/are fat soluble (log P_{ow} greater or equal to 3) the MRL is expressed as mg/kg fat contained in the meat, preparations of meat, offal and animal fats. In case of foodstuffs with a fat content of 10 % or less by weight, the residue is related to the total weight of the boned foodstuff. In such cases, the maximum level is one-tenth of the value related to fat content, but must be no less than 0.01 mg/kg."

Table 3-6: Overview of the values derived from the livestock feeding studies

Commodity	Dietary burden		Results of the livestock feeding study						Median residue[ENF] (mg/kg) [(c)]	Highest residue[ENF] (mg/kg) [(d)]	MRL proposal (mg/kg)	CF for RA [(e)]
	Median (mg/kg bw/d)	Max. (mg/kg bw/d)	Dose Level (mg/kg bw/d) [mg/kg feed DM] [(a)]	No	Result for enf. RD		Result for RA RD[(b)]					
					Mean (mg/kg)	Max. (mg/kg)	Mean (mg/kg)	Max. (mg/kg)				
Enforcement residue definition: chlorpyrifos (F) **Risk assessment residue definition: chlorpyrifos + TCP + conjugates, expressed as chlorpyrifos**												
Ruminant muscle	0.24	0.95	0.13 [3]	3	<0.01	n.r.	<0.1	n.r.	<0.01	0.01	0.4 (F)	10
			0.43 [10]	3	<0.01	n.r.	<0.1	n.r.				
			1.29 [30]	3	0.01	n.r.	0.12	n.r.				
Ruminant fat	0.24	0.95	0.13 [3]	3	0.02	n.r.	0.11	n.r.	0.05	0.36	0.4	2.09
			0.43 [10]	3	0.11	n.r.	0.23	n.r.				
			1.29 [30]	3	0.52	n.r.	0.70	n.r.				
Ruminant liver	0.24	0.95	0.13 [3]	3	<0.01	n.r.	0.36	n.r.	<0.01	<0.01	0.01*	
			0.43 [10]	3	<0.01	n.r.	0.77	n.r.	Median residue[RA] 0.51[(f)]	Higher residue[RA] 1.94[(g)]		
			1.29 [30]	3	<0.01	n.r.	2.7	n.r.				
Ruminant kidney	0.24	0.95	0.13 [3]	3	<0.01	n.r.	0.20	n.r.	<0.01	<0.01	0.01*	
			0.43 [10]	3	<0.01	n.r.	0.70	n.r.	Median residue[RA] 0.38[(f)]	Higher residue[RA] 1.03[(g)]		
			1.29 [30]	3	<0.01	n.r.	1.25	n.r.				
Pig muscle	0.04	0.18	0.04 [1]	3	<0.01	n.r.	<0.1	n.r.	<0.01	0.01	0.05 (F)	10
			0.12 [3]	3	<0.01	n.r.	<0.1	n.r.				
			0.40 [10]	3	0.02	n.r.	0.11	n.r.				
Pig fat	0.04	0.18	0.04 [1]	3	<0.01	n.r.	<0.1	n.r.	<0.01	0.05	0.05	5.4

Commodity	Dietary burden		Results of the livestock feeding study						Median residue^{ENF} (mg/kg) (c)	Highest residue^{ENF} (mg/kg) (d)	MRL proposal (mg/kg)	CF for RA (e)
	Median (mg/kg bw/d)	Max. (mg/kg bw/d)	Dose Level (mg/kg bw/d) [mg/kg feed DM] (a)	No	Result for enf. RD		Result for RA RD(b)					
					Mean (mg/kg)	Max. (mg/kg)	Mean (mg/kg)	Max. (mg/kg)				
			0.12 [3]	3	0.02	n.r.	0.11	n.r.	Median residue^{RA} <0.1(f)	Higher residue^{RA} 0.14(g)		
			0.40 [10]	3	0.15	n.r.	0.26	n.r.				
Pig liver	0.04	0.18	0.04 [1]	3	<0.01	n.r.	<0.1	n.r.	<0.01	<0.01	0.01*	
			0.12 [3]	3	<0.01	n.r.	0.13	n.r.	Median residue^{RA} 0.1(f)	Higher residue^{RA} 0.19(g)		
			0.40 [10]	3	<0.01	n.r.	0.42	n.r.				
Pig kidney	0.04	0.18	0.04 [1]	3	<0.01	n.r.	<0.1	n.r.	<0.01	<0.01	0.01*	10
			0.12 [3]	3	<0.01	n.r.	<0.1	n.r.				
			0.40 [10]	3	<0.01	n.r.	0.24	n.r.				
Poultry muscle	0.004	0.04	0.00 [0.00]	24	<0.01	n.r.	<0.1	n.r.	<0.01	<0.01	0.01*	10
			0.02 [0.3]	24	<0.01	n.r.	<0.1	n.r.				
			0.06 [1]	24	<0.01	n.r.	<0.1	n.r.				
Poultry fat	0.004	0.04	0.00 [0.00]	24	<0.01	n.r.	<0.1	n.r.	<0.01	<0.01	0.01*	10
			0.02 [0.3]	24	<0.01	n.r.	<0.1	n.r.				
			0.06 [1]	24	<0.01	n.r.	<0.1	n.r.				
Poultry liver	0.004	0.04	0.00 [0.00]	24	<0.01	n.r.	<0.1	n.r.	<0.01	<0.01	0.01*	10
			0.02 [0.3]	24	<0.01	n.r.	<0.1	n.r.				
			0.06 [1]	24	<0.01	n.r.	<0.1	n.r.				
Poultry kidney	0.004	0.04	0.00 [0.00]	24	<0.01	n.r.	<0.1	n.r.	<0.01	<0.01	0.01*	10
			0.02 [0.3]	24	<0.01	n.r.	<0.1	n.r.				
			0.06 [1]	24	<0.01	n.r.	<0.1	n.r.				

Commodity	Dietary burden		Results of the livestock feeding study						Median residue^{ENF} (mg/kg) (c)	Highest residue^{ENF} (mg/kg) (d)	MRL proposal (mg/kg)	CF for RA (e)
	Median (mg/kg bw/d)	Max. (mg/kg bw/d)	Dose Level (mg/kg bw/d) [mg/kg feed DM] (a)	No	Result for enf. RD		Result for RA RD(b)					
					Mean (mg/kg)	Max. (mg/kg)	Mean (mg/kg)	Max. (mg/kg)				
Milk	0.21	0.81	0.11 [3]	3	<0.01	n.r.	<0.02	n.r.	<0.01	0.01	0.01*	2.0
			0.36 [10]	3	<0.01	n.r.	<0.02	n.r.				
			1.09 [30]	3	0.01	n.r.	0.02	n.r.				
Eggs	0.004	0.04	0.00 [0.00]	24	<0.01	n.r.	<0.1	n.r.	<0.01	<0.01	0.01*	10
			0.02 [0.3]	24	<0.01	n.r.	<0.1	n.r.				
			0.06 [1]	24	<0.01	n.r.	<0.1	n.r.				

LOQ = clorpyrifos: <0.01 mg/kg all matrices; TCP: <0.05 mg/kg for muscle, liver, kidney, fat, eggs; <0.01 mg/kg for milk. n.r.:= not reported in the DAR (Spain, 1999).

(a): Based on: beef: 350 kg bw animal consuming 15 kg feed DM/d; dairy cow: 550 kg bw animal consuming 20 kg feed DM/d; poultry: 1.9 kg bw animal consuming 0.12 kg feed DM; pig: 75 kg bw animal consuming 3 kg feed DM/d (EC, 1996).

(b): For risk assessment purpose, the amounts of TCP were converted into chlorpyrifos equivalents by using a conversion factor of 1.77, prior to be added to the chlorpyrifos residues.

(c): Median residue^{ENF} value according to the enforcement residue definition, derived by interpolation from the feeding study for the median dietary burden (FAO, 2009).

(d): Highest residue^{ENF} value (tissues, eggs) or mean residue value (milk) according to the enforcement residue definition, derived by interpolation of the maximum dietary burden between the relevant feeding groups of the study (FAO, 2009).

(e): Median conversion factor for enforcement to risk assessment of the individual conversion factors.

(f): Median residue^{RA} value according to the risk assessment residue definition, derived by interpolation from the feeding study for the median dietary burden (FAO, 2009).

(g): Higher residue^{RA} value according to the risk assessment residue definition, derived by interpolation from the feeding study for the maximum dietary burden (FAO, 2009).

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

(F): Fat-soluble. The MRL is expressed as mg/kg of fat contained in the whole product.

4. Consumer risk assessment

The consumer risk assessment was performed with revision 2 of the EFSA Pesticide Residues Intake Model (PRIMo). This exposure assessment model contains the relevant European food consumption data for different sub-groups of the EU population [16] (EFSA, 2007).

For the calculation of the chronic exposure, EFSA used the median residue derived from the residue trials leading to the most critical use on the crop under considerations and from the livestock feeding studies at the median dietary burden as corrected with the conversion factor (CF) for risk assessment. For the pig fat, pig and bovine liver and bovine kidney, the median residue values derived according to the risk assessment residue definition were used as input values (see Table 3-2 and Table 3.6). For the remaining commodities of plant and animal origin, no median value and conversion factor could be applied as not available, therefore the existing MRLs as established in Annexes II and IIIB of Regulation (EC) No 396/2005 were used as input values. The model assumptions for the long-term exposure assessment are considered to be rather conservative, assuming that all food items consumed have been treated with the active substance under consideration. In reality, it is not likely that all food consumed will contain residues at the MRL or at levels of the median residue values identified in supervised field trials. However, if this first tier exposure assessment, does not exceed the toxicological reference value for long-term exposure (i.e. the ADI), a consumer health risk can be excluded with a high probability.

The acute exposure assessment was performed only with regard to the commodities under consideration assuming the consumption of a large portion of the food items as reported in the national food surveys containing residues at the highest level as observed in the supervised field trials leading to the most critical use on the crop under considerations and from the livestock feeding studies at the maximum dietary burden as corrected with the conversion factor (CF) for risk assessment. For the pig fat, pig and bovine liver and bovine kidney, the highest residue values derived according to the risk assessment residue definition were used as input values (see Table 3-2 and Table 3.6). In addition, when required, a variability factor accounting for the inhomogeneous distribution on the individual items consumed was included in the calculation.

The input values for citrus fruits and for banana were refined using the derived peeling factors (see Table 3-4). For wine grapes assuming that all wine grapes is consumed as wine and because the consumption in the PRIMo is expressed as unprocessed wine grapes, the input value was refined using the processing factor and the conversion factor for wine (see Table 3-4) and recalculated to wine by using a yield factor of 0.7.

The input values used for the dietary exposure calculation are summarized in Table 4-1.

Table 4-1: Input values for the consumer dietary exposure assessment

Commodity	Chronic exposure assessment		Acute exposure assessment	
	Input value (mg/kg)	Comment	Input value (mg/kg)	Comment
Risk assessment residue definition: chlorpyrifos+TCP and its conjugates, expressed as chlorpyrifos				

[16] The calculation of the long-term exposure (chronic exposure) is based on the mean consumption data representative for 22 national diets collected from MS surveys plus 1 regional and 4 cluster diets from the WHO GEMS Food database; for the acute exposure assessment the most critical large portion consumption data from 19 national diets collected from MS surveys is used. The complete list of diets incorporated in EFSA PRIMo is given in its reference section (EFSA, 2007).

Commodity		Chronic exposure assessment		Acute exposure assessment	
		Input value (mg/kg)	**Comment**	**Input value (mg/kg)**	**Comment**
Citrus fruits		0.02 (0.4*1.4*0.03)	Median residue*CF*PF (peeling factor)	0.03 (0.83*1.4*0.03)	Highest residue*CF*PF (peeling factor)
Pome fruits		0.14 (0.13*1.1)	Median residue*CF (apple, pear, NEU)	0.91 (0.83*1.1)	Highest residue*CF (apple, pear, NEU)
Peaches		0.62 (0.44*1.4)	Median residue*CF (peach, SEU)	1.16 (0.83*1.4)	Highest residue*CF (peach, SEU)
Apricots		0.62 (0.44*1.4)	Median residue*CF (peach, SEU)	1.16 (0.83*1.4)	Highest residue*CF (peach, SEU)
Cherries		0.20 (0.12*1.7)	Median residue*CF (cherry, SEU)	1.28 (0.64*2)	Highest residue*CF (cherry, NEU)
Plums		0.10 (0.07*1.4)	Median residue*CF (plum, NEU)	0.39 (0.28*1.4)	Highest residue*CF (plum, NEU)
Table grapes	Sc 1[(a)] (CS)	0.29 (0.18*1.6)	Median residue*CF (grape, SEU)	1.55 (0.97*1.6)	Median residue*CF (grape, SEU)
	Sc 2[(a)] (EC/WG	0.09 (0.05*1.8)	Median residue*CF (table grape, EC/WG)	0.47 (0.26*1.8)	Median residue*CF (table grape, EC/WG)
Wine grapes		0.11 (0.39*0.02*2*0.7)	Median residue*PF*CF*YF[(b)] (wine grape, NEU)	0.26 (0.93*0.2*2*0.7)	Highest residue *PF*CF*YF[(b)] (wine grape, NEU)
Strawberries		0.04 (0.02*2.0)	Median residue*CF (strawberry, NEU)	0.22 (0.11*2.0)	Highest residue*CF (strawberry, NEU)
Raspberries		0.28 (0.23*1.2)	Median residue*CF (raspberry, NEU)	0.62 (0.52*1.2)	Highest residue*CF (raspberry, NEU)
Bananas		0.03 (1.12*1.3*0.02)	Median residue*CF*PF (banana, indoor)	0.04 (1.58*1.3*0.02)	Highest residue*CF*PF (banana, indoor)
Tomatoes		0.25 (0.18*1.4)	Median residue*CF (tomato, indoor)	0.46 (0.33*1.4)	Highest residue*CF (tomato, indoor)
Aubergines		0.25	Median residue*CF (tomatoes, indoor)	0.46	Highest residue*CF (tomato, indoor)
Pepper		0.24 (0.24*1.0)	Median residue*CF (pepper, indoor)	0.69 (0.69*1.2)	Highest residue*CF (pepper, indoor)
Sweet corns		0.02 (0.01*2)	Median residue*CF (maize)	0.02 (0.01*2)	Highest residue*CF (maize)
Broccoli		0.06 (0.03*2.1)	Median residue*CF (broccoli, NEU)	0.84 (0.42*2)	Highest residue*CF (broccoli, SEU)
Cauliflowers		0.04 (0.02*2)	Median residue*CF (cauliflower, NEU)	0.68 (0.34*2)	Highest residue*CF (cauliflower, NEU)
Head cabbage		0.02 (0.01*2)	Median residue*CF (cabbage, SEU)	1.38 (0.69*2)	Highest residue*CF (cabbage, NEU)
Brussels sprout		0.42 (0.35*1.2)	Median residue*CF (BX sprout, SEU)	0.52 (0.43*1.2)	Highest residue*CF (BX sprout, SEU)
Globe artichoke		0.17 (0.11*1.5)	Median residue*CF	0.24 (0.16*1.5)	Highest residue*CF

Commodity	Chronic exposure assessment		Acute exposure assessment	
	Input value (mg/kg)	**Comment**	**Input value (mg/kg)**	**Comment**
Rapeseeds	0.02 (0.01*2)	Median residue*CF	0.02 (0.01*2)	Highest residue*CF
Maize	0.02 (0.01*2)	Median residue*CF	0.02 (0.01*2)	Highest residue*CF
Barley, wheat	0.05 (0.01*5)	Median residue*CF (wheat, barley, SEU)	0.35 (0.07*5)	Highest residue*CF (wheat, barley, SEU)
Sugar beet	0.02 (0.01*2.0)	Median residue*CF	0.02 (0.01*2.0)	Highest residue*CF
Swine, meat	0.1 (0.01*10)	Median residue [(c)]*CF	0.1 (0.01*10)	Highest residue[(c)]*CF
Swine, fat	0.1	Median residue[RA]	0.14	Highest residue[RA]
Cattle, sheep, goats, meat	0.1 (mm:0.01*10*0.8) (fat:0.01*0.2)	Median residue [(c)]*CF	0.23 (mm:0.01*10*0.8) (fat: 0.75*0.2)	Highest residue[(c)]*CF
Cattle, sheep, goats, fat	0.1 (0.05*2.09)	Median residue[ENF]*CF	0.75 (0.36*2.09)	Highest residue[ENF]*CF
Swine, liver	0.1	Median residue[RA]	Acute risk assessment was undertaken only with regard to the products for which a MRL proposal is requested.	
Cattle, sheep, goats, liver	0.51	Median residue[RA]		
Cattle, sheep, goats, kidney	0.38	Median residue[RA]		
Swine, kidney poultry, meat, fat, liver, kidney, eggs	0.1 (0.01*10)	Median residue[ENF]*CF		
Milk	0.02 (0.01*2)	Median residue[ENF]*CF		
Other commodities of plant and animal origin	MRL	See Appendix C		

(a): Sc 1 = scenario 1 considers the CS formulation application use; Sc 2= scenario 2 considers the EC/WG formulation application use.

(b): Consumption figures in the EFSA PRIMo are expressed as wine grapes. Since it is assumed that all wine grapes are consumed as wine, the consumption is recalculated to wine using a yeld factor (1 kg of wine grapes is needed to produce 0.7 kg of wine) to perform the refined intake calculation for wine grapes.

(c): Median and higher residue for meat calculated according to the latest JMPR recommendations (FAO, 2009) considering 80 % of the residue derived for muscle and 20 % of the residue derived for fat.

The estimated exposure was then compared with the toxicological reference values derived for chlorpyrifos (see Table 2-1). The results of the intake calculation are presented in Appendix B to this reasoned opinion.

No long-term consumer intake concerns were identified for any of the European diets incorporated in the EFSA PRIMo. The total calculated intake values ranged from 8 to 50.4 % of the ADI. Among the crops under consideration, the higher contributors to the theoretical maximum daily intake (TMDI) were apples (17 % of the ADI, DE child diet) and tomatoes (7.7 % of the ADI, WHO Cluster diet B).

A potential acute consumer risk was identified in relation to the residues expected on table grapes (101.5 % of the ARfD) treated with the capsule suspension (CS) according to the supported critical GAP. As no additional refinements for table grapes are possible, EFSA assessed the safety of the MRL derived for the alternative less critical use of the emulsifiable concentrate (EC) and dispersible granule (WG) formulations (Scenario 2). For the alternative GAP on table grapes and for the remaining proposed uses no acute intake concerns were identified. The estimated highest intake was 89.1 % of the ARfD.

The long-term and short-term intake calculations are presented in Appendix B.

It is important to highlight that the conclusions reached in this opinion and the risk assessment are valid only if Member States confirm that no more critical GAP than that proposed by the EMS is still authorised for mandarins, head cabbage; globe artichokes, barley and sugar beets, which requires maintaining the existing MRLs. A new consumer risk assessment is needed if the assumption is not valid.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The toxicological profile of chlorpyrifos was assessed in the framework of the peer review under Directive 91/414/EEC. The data were sufficient to derive an ADI of 0.01 mg/kg bw/day and an ARfD of 0.1 mg/kg/bw.

The metabolism of chlorpyrifos in primary crops after foliar application was investigated during the peer review under the Directive 91/414/EEC. Studies with the structurally related compound chlorpyrifos-methyl were also used to reveal the metabolic profile of the active substance. The peer review established the residue definition for enforcement as parent compound and for risk assessment as "*chlorpyrifos + 3,5,6-trichloropyridinol (TCP) + conjugates, expressed as chlorpyrifos*". The results of two new metabolism studies on peas and radish assessed in the framework of these applications are consistent with the previous findings. It is noted that 3,5,6-trichloropyridinol (TCP) is a metabolite that is also formed after the use of chlorpyrifos-methyl and triclopyr.

Several supervised residue trials on the crops under consideration with chlorpyrifos formulated as emulsifiable concentrate (EC), dispersible granule (WG) and capsule suspension (CS) were provided. Based on the results from the use leading to the more critical residues among the uses sufficiently supported by data, the following modifications of the existing MRLs are proposed: 0.01* mg/kg for sweet corn, maize, rape seeds, sugar beets; 0.1 mg/kg for barley, wheat; 0.4 mg/kg for globe artichokes; 0.5 mg/kg for plums, cauliflowers; 0.6 mg/kg for tomatoes, aubergines, broccoli; 0.8 mg/kg for raspberries, head cabbage; 1 mg/kg for cherries, Brussels sprouts; 1.5 mg/kg for citrus and pome fruits, peppers; 2 mg/kg for apricots, peaches, table and wine grapes and 4 mg/kg for bananas. The MRLs are already fixed at a level corresponding to the intended use of chlorpyrifos on strawberries and no modification is proposed. Furthermore, assuming that the residue definitions for enforcement and risk assessment established for the other commodities apply to feed items as well and in case of a future introduction of the category in Regulation (EC) No. 396/2005, EFSA derived the following MRL proposals for feed items: 1.0 mg/kg on wheat, barley straw, 1.5 mg/kg on sugar beet leaves and 3.0 mg/kg on grass forage (fresh). As regards to the use on beans (with pods), dry beans and olives the data are not adequate to support the MRL proposal.

Validated analytical methods are available to enforce the proposed MRLs for chlorpyrifos, however for enforcing the MRLs on the oil-based commodities additional data regarding repeatability to complete the validation of the method of analysis according to EU guidelines should be submitted.

Studies investigating the nature of chlorpyrifos residues in processed commodities were assessed in the peer review and showed that the compound progressively degrades to TCP under the processing conditions representative for pasteurization, boiling/cooking and sterilization. Several processing studies were provided and the data were sufficient to derive the following processing factors, which are recommended to be included in Annex VI of Regulation (EC) No 396/2005:

- Citrus, peeled: < 0.03
- Banana, peeled: 0.02
- Grape, wine: <0.2
- Grapes, dry pomace: 8.74
- Tomato, juice: <0.04
- Tomato, puree: <0.06
- Tomato, canned: <0.04
- Barley, beer: <0.1
- Barley, brewing malt: 0.36
- Wheat, bran: 3.38
- Wheat, white flour: 0.38
- Wheat, white bread: 0.34
- Wheat, wholemeal flour: 1.31
- Wheat, wholemeal bread: 0.72

The occurrence of chlorpyrifos residues in rotational crops was assessed in the peer review. Based on the available information on the nature and magnitude of residues in succeeding crops, it was

concluded that significant residue levels of chlorpyrifos and its soil metabolites are unlikely to occur in rotational crops provided that the compound is used according to the proposed use patterns.

The calculated livestock dietary burden exceeded the trigger value of 0.1 mg/kg (dry matter) for the four relevant food-producing animal species. Based on the metabolism of chlorpyrifos in livestock, the peer review established the enforcement residue definition as parent compound and the risk assessment residue definition as "*chlorpyrifos + 3,5,6-trichloropyridinol (TCP) + conjugates, expressed as chlorpyrifos*". A validated analytical method is available to enforce the MRL in animal commodities. The results of livestock feeding studies showed that, at the calculated maximum dietary burden, residues of chlorpyrifos exceeding the LOQ of 0.01 mg/kg may be observed in bovine and swine fat and muscle only. The following MRLs are proposed: 0.05 mg/kg for swine fat and meat and 0.4 mg/kg for ruminant fat and meat. The existing MRLs on milk and eggs are confirmed by the outcome of the dietary burden, while on the remaining products of swine and ruminant origin the proposed MRL is 0.01* mg/kg. The lowering of the MRL at 0.05* to 0.01* mg/kg in poultry edible tissues is also proposed based on the sensitivity of the analytical assay. A validated analytical method is available to enforce the proposed MRLs for chlorpyrifos in animal commodities.

The consumer risk assessment was performed with revision 2 of the EFSA Pesticide Residues Intake Model (PRIMo). For the calculation of the acute and the chronic exposure, EFSA used the median residue and the highest residue values derived from the residue trials leading to the most critical use on the crop under considerations and from the livestock feeding studies as corrected with the conversion factor (CF) for risk assessment. For the products of animal origin the median residue and the highest residue values derived according to the risk assessment residue definition were also used as input values. In addition, the peeling factor for citrus and bananas and the yield factor for unprocessed wine grapes were included in the calculations. The estimated exposures were then compared with the toxicological reference values for chlorpyrifos.

No long-term consumer intake concerns were identified for any of the European diets incorporated in the EFSA PRIMo. The total calculated intake values ranged from 8 to 50.4 % of the ADI. Among the crops under consideration, the higher contributors to the theoretical maximum daily intake (TMDI) were apples (17 % of the ADI, DE child diet) and tomatoes (7.7 % of the ADI, WHO Cluster diet B).

A potential acute consumer risk was identified in relation to the residues expected on table grapes (101.5 % of the ARfD) treated with the capsule suspension (CS) according to the supported critical GAP. As no additional refinements for table grapes are possible, EFSA assessed the safety of the MRL derived for the alternative less critical use of the emulsifiable concentrate (EC) and dispersible granule (WG) formulations. For the alternative GAP on table grapes and for the remaining proposed uses no acute intake concerns were identified. The estimated highest intake was 89.1 % of the ARfD.

Consequently, EFSA proposes to amend the current MRLs as shown in the table reported in the recommendation section. It is important to highlight that the conclusions reached in this opinion and the risk assessment are valid only if Member States confirm that no more critical GAP than that proposed by the EMS is still authorised for mandarins, head cabbage, globe artichokes, barley and sugar beets, which requires maintaining the existing MRLs. A new consumer risk assessment is needed if the assumption is not valid.

RECOMMENDATIONS

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
Enforcement residue definition: chlorpyrifos (F)				
110010	Grapefruit (Shaddocks, pomelos, sweeties, tangelo (except mineola), ugli and other hybrids)	0.3	1.5	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on mandarins and oranges.
110020	Oranges (Bergamot, bitter orange, chinotto and other hybrids)	0.3	1.5	
110030	Lemons (Citron, lemon)	0.2	1.5	
110040	Limes	0.3	1.5	
110990	Others citrus fruits	0.3	1.5	
110050	Mandarins	2.0	1.5	Before lowering the MRL on mandarins, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
130000	Apples	0.5	1.5	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on apples and pears.
130020	Pears (Oriental pears)	0.5	1.5	
130030	Quinces	0.5	1.5	
130040	Medlar	0.5	1.5	
130050	Loquat	0.5	1.5	
130990	Others pome fruits	0.5	1.5	
140010	Apricots	0.05	2.0	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from data on peaches.
140020	Cherries (sweet cherries, sour cherries)	0.3	1.0	The MRL proposals are sufficiently supported by data and no risk for consumers was identified for the intended use.
140030	Peaches (Nectarines and similar hybrids)	0.2	2.0	
140040	Plums (Damson, greengage, mirabelle, sloe	0.2	0.5	
151010	Table grapes	0.5	2.0	The MRL proposal is sufficiently supported by data and no consumer risk was identified for the intended use of the EC/WG formulations. Although sufficiently supported by data no final proposal could be derived for the more critical use of the CS formulation as a potential short-term consumer risk could not be excluded.
151020	Wine grapes	0.5	2.0	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use.

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
152000	Strawberries	0.2	0.2	No change to the existing MRL is required for the intended use. The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use.
153030	Raspberries (Wineberries)	0.5	0.8	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use.
163020	Bananas (Dwarf banana, plantain, apple banana)	3.0	4.0	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended indoor use.
231010	Tomatoes (Cherry tomatoes**,** tree tomato, *Physalis*, gojiberry, wolfberry (*Lycium barbarum and L. chinense*)	0.5	0.6	The MRL proposals are sufficiently supported by data and no risk for consumers was identified for the intended uses. The MRL proposal on aubergines was extrapolated from data on tomatoes.
231030	Aubergines (egg plants) (Pepino)	0.5	0.6	
231020	Peppers (Chilli peppers)	0.5	1.5	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended uses.
234000	Sweet corn	0.05*	0.01*	The MRL proposal was extrapolated from data on immature maize and no risk for consumers was identified for the intended uses.
241010	Broccoli (Calabrese, Chinese broccoli, Broccoli raab)	0.05*	0.6	The MRL proposals are sufficiently supported by data and no risk for consumers was identified for the intended uses.
241020	Cauliflower	0.05*	0.5	
242010	Brussels sprouts	0.05*	1.0	
242020	Head cabbage	1	0.8	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. Before lowering the MRL on head cabbages, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
260010	Beans (with pods) (Green bean (French beans, snap beans), scarlet runner bean, slicing bean, yardlong beans)	0.05*	0.05*	Residue data are not sufficient to derive a MRL proposal.
270050	Globe artichokes	1	0.4	The MRL proposal is sufficiently supported by data if chlorpyrifos is applied according to the proposed GAP up to pre-flowering. No risk for consumers was identified for the modified intended use. Before lowering the MRL, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
				MRL.
300010	Beans (Broad beans, navy beans, flageolets, jack beans, lima beans, field beans, cowpeas)	0.05*	0.05*	Residue data are not sufficient to derive a MRL proposal.
401060	Rape seed (Bird rapeseed, turnip rape)	0.05*	0.01*	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended uses.
402010	Olives for oil production	0.05*	0.05*	Residue data are not sufficient to derive a MRL proposal.
500010	Barley	0.2	0.1	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on barley and wheat. Before lowering the MRL, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
500030	Maize	0.05*	0.01*	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use
500090	Wheat (Spelt, triticale)	0.05*	0.1	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended use. The proposed MRL was derived from combined data on barley and wheat.
900010	Sugar beet (root)	0.2	0.01*	The MRL proposal is sufficiently supported by data and no risk for consumers was identified for the intended uses. Before lowering the MRL, it has to be clarified if a more critical GAP than that reported by the EMS is still authorised, which requires maintaining the existing MRL.
1011010	Swine, meat	-	0.05	The MRL proposals are sufficiently supported by data and no risk for consumers was identified. No change to the existing MRLs is required on milk and bird's eggs products.
1011020	Swine, fat of lean meat	-	0.05	
1011030 1011040 1011050 1011990	Swine, liver, kidney, edible offal, others	-	0.01*	
1012010 1013010 1014010	Bovine, sheep, goat, meat	-	0.4	
1012020 1013020 1014020	Bovine, sheep, goat, fat	-	0.4	
1012030 1013030 1014030	Bovine, sheep, goat, Liver	-	0.01*	

Code number[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Justification for the proposal
1012040 1013040 1014040	Bovine, sheep, goat, kidney	-	0.01*	
1012050 1013050 1014050	Bovine, sheep, goat, edible offal	-	0.01*	
1012990 1013990 1014990	Bovine, sheep, goat, others	-	0.01*	
1016000	(f) Poultry -chicken, geese, duck, turkey and Guinea fowl-, ostrich, pigeon	0.05*	0.01*	
1020000	(ii) Milk and cream, not concentrated, nor containing added sugar or sweetening matter, butter and other fats derived from milk, cheese and curd	0.01*	0.01*	
1030000	(iii) Birds' eggs, fresh preserved or cooked Shelled eggs and egg yolks fresh, dried, cooked by steaming or boiling in water, moulded, frozen or otherwise preserved whether or not containing added sugar or sweetening matter	0.01*	0.01*	
Enforcement residue definition: chlorpyrifos[(b)]				
	Wheat, barley straw	-	1.0	In view of a future introduction of a category of crops or parts of crops exclusively used for animal feed. The MRL proposals are sufficiently supported by data and no risk for consumers was identified.
	Sugar beet, leaves	-	1.5	
	Grass forage (fresh)	-	3.0	

(a): According to Annex I of Regulation (EC) No 396/2005.
(b): If the new category of crops or parts of crops exclusively used for animal feed will be introduced in Annex I of Regulation (EC) No 396/2005, separate residue definitions for feed items can be discussed.
(*): Indicates that the MRL is set at the limit of analytical quantification.
(F): Fat-soluble.

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Appendix A. GOOD AGRICULTURAL PRACTICES (GAPS)

(GAPs not assessed in the framework of this evaluation are shaded in grey)

Crop and/or situation (a)	Member State or Country or EU zone	F G or I (b)	Pest or group of pests controlled (c)	Formulation type (d - f)	Formulation conc. of a.s. (i)	Application method kind (f - h)	Application growth stage & season (j)	Application number min max (k)	Application interval min max	Application rate per treatment kg as/hL min max	Application rate per treatment water L/ha min max	Application rate per treatment kg a.s./ha min max	PHI (days) (l)	Remarks (m)
Citrus fruit	South	F	Scale insects, Whitefly	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89	2	60 days	0.096	1500-2500	2.4	21	No applications during flowering (BBCH 60-69)
Pome fruit	North/ Central	F	Aphids, Codling moth, other Lepidoptera	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 87 (spring/ summer)	1	-	0.096	500-1000	0.96	21	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14 days	0.05	1000	0.5	21	
	South	F	Aphids, Codling moth, other Lepidoptera	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 87 (spring/ summer)	1	-	0.096	500-1000	0.96	21	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	1	-	0.096	1000	0.96	28	
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14 days	0.05	1000	0.5	21	
Apricot, peach, nectarine	South	F	Aphids, Codling moth, Lepidoptera	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 87 (spring/ summer)	1	-	0.072	1000-1500	1.08	21	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	1	-	0.096	1000	0.96	28	
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14 days	0.05	1000	0.5	21	
Cherry	North/ Central	F	Aphids, Codling moth, Lepidoptera	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 87 (spring/ summer)	1	-	0.096	750-1000	0.96	21	No applications during flowering (BBCH 60-69)

Crop and/or situation (a)	Member State or Country or EU zone	F G or I (b)	Pest or group of pests controlled (c)	Formulation type (d - f)	Formulation conc. of a.s. (i)	Application method kind (f - h)	Application growth stage & season (j)	Application number min max (k)	Application interval min max	Application rate per treatment kg as/hL min max	Application rate per treatment water L/ha min max	Application rate per treatment kg a.s./ha min max	PHI (days) (l)	Remarks (m)
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14 days	0.05	1000	0.5	30	
	South	F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	1	-	0.096	1000	0.96	45	
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14 days	0.05	1000	0.5	30	
Plum	North /Central	F	Aphids, Codling moth, Lepidoptera	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 87 (spring/ summer)	1	-	0.096	750-1000	0.96	21	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14	0.05	1000	0.5	21	
	South	F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	1	-	0.096	1000	0.96	35	
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14	0.05	1000	0.5	21	
Table grapes	South	F	Grape berry moth	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89 (spring/ summer)	1	-	0.072	900	0.65	21	No applications during flowering (BBCH 60-69
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (d)	2	14 days	0.05-0.072	500-720	0.36	60	
Wine grapes	North /Central	F	Grape berry moth	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89 (spring/ summer)	2	14 days	0.072	500	0.36	21	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14 days	0.05-0.072	500-720	0.36	21	

Crop and/or situation (a)	Member State or Country or EU zone	F G or I (b)	Pest or group of pests controlled (c)	Formulation type (d - f)	Formulation conc. of a.s. (i)	Application method kind (f - h)	Application growth stage & season (j)	Application number min max (k)	Application interval min max	Application rate per treatment kg as/hL min max	Application rate per treatment water L/ha min max	Application rate per treatment kg a.s./ha min max	PHI (days) (l)	Remarks (m)
	South	F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	1	-	0.072-0.144	500-1000	0.72	35	
		F	Grape berry moth	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89 (spring/ summer)	2	14 days	0.072	500	0.36	21	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FAS)	See (n)	2	14 days	0.05-0.072	500-720	0.36	21	
Strawberry	North /Central	F	Aphids, weevils	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 95 (spring/ summer)	1	-	-	750-1000	0.72	15	No applications during flowering (BBCH 60-69)
	South	F	Aphids, weevils	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 95 (spring/ summer)	1	-	-	750-1000	0.72	15	No applications during flowering (BBCH 60-69)
Raspberry	North /Central	F	Aphids, weevils	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 95 (spring/ summer)	1	-	-	750-1000	0.48	7	No applications during flowering (BBCH 60-69)
Banana	South	G	Thrips, scale insects	EC	480 g/L	Foliar spray		1	-	0.096	2500	2.4	21	
Tomatoes, aubergines	North /Central	F	Aphids, thrips, lepidoptera (*Heliothis*, *Agrotis*)	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89 (spring/ summer)	1	-	0.072	500-1000	0.72	5	No applications during flowering (BBCH 60-69)
	South	F	Aphids, thrips, lepidoptera (*Heliothis*, *Agrotis*)	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89 (spring/ summer)	1	-	0.072	500-1000	0.72	5	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FBS, HL, KS)	See (n)	1	-	0.10	500	0.5	5	

Crop and/or situation (a)	Member State or Country or EU zone	F G or I (b)	Pest or group of pests controlled (c)	Formulation type (d - f)	Formulation conc. of a.s. (i)	Application method kind (f - h)	Application growth stage & season (j)	Application number min max (k)	Application interval min max	Application rate per treatment kg as/hL min max	Application rate per treatment water L/ha min max	Application rate per treatment kg a.s./ha min max	PHI (days) (l)	Remarks (m)
	North /Central/ South	G	Sucking and biting	CS	250 g/L	Foliar (FBS, HL, KS)	See (n)	1	-	0.05	1000	0.5	5	
Peppers	South	F	Aphids, thrips, lepidoptera (*Heliothis*, *Agrotis*)	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89 (spring/ summer)	1	-	0.072	500-1000	0.72	5	No applications during flowering (BBCH 60-69)
		F	Sucking and biting	CS	250 g/L	Foliar (FBS, HL, KS)	See (n)	1	-	0.10	500	0.5	5	
	North /Central/ South	G	Sucking and biting	CS	250 g/L	Foliar (FBS, HL, KS)	See (n)	1	-	0.05	1000	0.5	5	
Sweet corn	North /Central	F	Stalk borers	CS	250 g/L	Foliar (FBS)	See (n)	2	60 days	0.25-0.375	200-300	0.75	28	
	South	F	Stalk borers	CS	250 g/L	Foliar (FBS)	See (n)	2	60 days	0.25-0.375	200-300	0.75	28	
Cauliflower, Broccoli; Head cabbage	North /Central	F	Aphids, lepidoptera, root flies	EC WG CS	480 g/L 750 g/kg 200 g/L	Foliar	BBCH 49	1	-	-	200-800	0.96	21	
		F	Aphids, lepidoptera, root flies	EC WG CS	480 g/L 750 g/kg 200 g/L	Field drench	BBCH 19	1	-	-	-	0.96	21	Rate: 0.2 % solution in water at 100 ml per plant
		F	Sucking and biting	CS	250 g/L	Foliar (FBS)	See (n)	1	-	0.192-0.48	200-500	0.96	21	
	South	F	Aphids, lepidoptera, root flies	EC WG CS	480 g/L 750 g/kg 200 g/L	Foliar	BBCH 49	1	-	-	200-800	0.96	21	

Crop and/or situation (a)	Member State or Country or EU zone	F G or I (b)	Pest or group of pests controlled (c)	Formulation type (d - f)	Formulation conc. of a.s. (i)	Application method kind (f - h)	Application growth stage & season (j)	Application number min max (k)	Application interval min max	Application rate per treatment kg as/hL min max	Application rate per treatment water L/ha min max	Application rate per treatment kg a.s./ha min max	PHI (days) (l)	Remarks (m)
		F	Aphids, lepidoptera, root flies	EC WG CS	480 g/L 750 g/kg 200 g/L	Field drench	BBCH 19	1	-	-	-	0.96	21	Rate: 0.2 % solution in water at 100 ml per plant
		F	Sucking and biting	CS	250 g/L	Foliar (FBS)	See (n)	1	-	0.192-0.48	200-500	0.96	21	
Brussels sprouts	North /Central	F	Aphids, lepidoptera, root flies	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 49	1	-	-	200-500	0.96	21	
		F	Sucking and biting	CS	250 g/L	Foliar (FBS)	See (n)	1	-	0.192-0.48	200-500	0.96	21	
	South	F	Sucking and biting	CS	250 g/L	Foliar (FBS)	See (n)	1	-	0.192-0.48	200-500	0.96	21	
Fresh beans with pods	South	F	Sucking and biting	CS	250 g/L	Foliar (FBS)	See (n)	1	-	0.10-0.25	200-500	0.50	21	
Dry beans	South	F	Sucking and biting	CS	250 g/L	Foliar (FBS)	See (n)	1	-	0.10-0.25	200-500	0.50	21	
Globe artichoke	South	F	Plume moth (PLALCA), Artichoke aphid (DACTTO)	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 89 (see remark)	1	-	-	500-1000	0.72	5	Residue data support the use only if it is restricted up to BBCH 51 or pre-flowering.
Rapeseed	North /Central	F	Weevils (CEUTSP), Pollen beetle (MELISP)	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 59 (spring/ summer)	1	-	-	300-500	0.48	n/a	

Crop and/or situation (a)	Member State or Country or EU zone	F G or I (b)	Pest or group of pests controlled (c)	Formulation type (d - f)	Formulation conc. of a.s. (i)	Application method kind (f - h)	Application growth stage & season (j)	Application number min max (k)	Application interval min max	Application rate per treatment kg as/hL min max	Application rate per treatment water L/ha min max	Application rate per treatment kg a.s./ha min max	PHI (days) (l)	Remarks (m)
		F	Sucking and biting	CS	250 g/L	Foliar (FBS)	BBCH 59	2	7 days	0.0625-0.125	200-400	0.25	n/a	
	South	F	Sucking and biting	CS	250 g/L	Foliar (FBS)	BBCH 59	2	7 days	0.0625-0.125	200-400	0.25	n/a	
Olives	South	F	Stalk borers	CS	250 g/L	Foliar (FAS)	Pre-flowering	2	20 days	0.048	1000	0.48	n/a	
Wheat, Barley	North /Central	F	Ground beetle (ZABUTE), *Lema* spp.	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 59 (spring/ summer)	2	60 days	-	200-400	0.72	n/a	
		F	Sucking and biting	CS	250 g/L	Foliar (FBS)	BBCH 59	2	60 days	0.18-0.72	100-400	0.72	n/a	
	South	F	Ground beetle (ZABUTE), *Lema* spp.	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 59 (spring/ summer)	2	60 days	-	200-400	0.72	n/a	
		F	Sucking and biting	CS	250 g/L	Foliar (FBS)	BBCH 59	2	60 days	0.18-0.72	100-400	0.72	n/a	
Maize	North /Central	F	Stalk borers	CS	250 g/L	Foliar (FBS)	See (n)	2	60 days	0.25-0.375	200-300	0.75	28	
		F	Aphids, *Diabrotica* spp.	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 59 (spring/ summer)	2	60 days	-	200-400	0.72	60	
	South	F	Stalk borers	CS	250 g/L	Foliar (FBS)	See (n)	2	60 days	0.25-0.375	200-300	0.75	28	
		F	Aphids, *Diabrotica* spp.	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 59 (spring/ summer)	2	60 days	-	200-400	0.72	60	

Crop and/or situation (a)	Member State or Country or EU zone	F G or I (b)	Pest or group of pests controlled (c)	Formulation		Application				Application rate per treatment			PHI (days) (l)	Remarks (m)
				type (d - f)	conc. of a.s. (i)	method kind (f - h)	growth stage & season (j)	number min max (k)	interval min max	kg as/hL min max	water L/ha min max	kg a.s./ha min max		
Sugar beet	North /Central	F	Aphids	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 49 (spring/ summer)	1	-	-	300-500	0.96	60	
	South	F	Aphids	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 49 (spring/ summer)	1	-	-	300-500	0.96	60	
Pasture	North /Central	F	Tipula spp.	EC WG CS	480 g/L 750 g/kg 200 g/L	Broadcast foliar	BBCH 30 (spring/ summer)	2	60 days	-	300-400	0.72	21	

Remarks:
(a) For crops, EU or other classifications, e.g. Codex, should be used; where relevant, the use situation should be described (e.g. fumigation of a structure)
(b) Outdoor or field use (F), glasshouse application (G) or indoor application (I)
(c) e.g. biting and suckling insects, soil born insects, foliar fungi, weeds
(d) e.g. wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
(e) GCPF Technical Monograph No 2, 4th Ed., 1999 or other codes, e.g. OECD/CIPAC, should be used
(f) All abbreviations used must be explained
(g) Method, e.g. high volume spraying, low volume spraying, spreading, dusting, drench
(h) Kind, e.g. overall, broadcast, aerial spraying, row, individual plant, between the plants - type of equipment used must be indicated
(i) g/kg or g/l
(j) Growth stage at last treatment (Growth stages of mono-and dicotyledonous plants. BBCH Monograph, 2nd Ed., 2001), including where relevant, information on season at time of application
(k) The minimum and maximum number of application possible under practical conditions of use must be provided
(l) PHI - minimum pre-harvest interval
(m) Remarks may include: Extent of use/economic importance/restrictions (i.e. feeding, grazing)
(n) Chlorpyrifos is applied at the first signs of pest infestation from early spring through the summer at a wide range of growth stages up until the latest timing specified.

FAS = Foliar air blast sprayer directing spray upwards and sideways, FBS = Field boom crop sprayer directing spray downwards, HL = hand lance, KS = knapsack sprayer

Appendix B. PESTICIDE RESIDUES INTAKE MODEL (PRIMO)

chlorpyrifos

Status of the active substance:	**included**	Code no.	
LOQ (mg/kg bw):	0.01	proposed LOQ:	
Toxicological end points			
ADI (mg/kg bw/day):	**0.01**	ARfD (mg/kg bw):	**0.1**
Source of ADI:	**EC**	Source of ARfD:	**EC**
Year of evaluation:	**2005**	Year of evaluation:	**2005**

The risk assessment has been performed on the basis of the MRLs collected from Member States in April 2006. For each pesticide/commodity the highest national MRL was identified (proposed temporary MRL = pTMRL).
The pTMRLs have been submitted to EFSA in September 2006.

Chronic risk assessment - refined calculations

	TMDI (range) in % of ADI minimum - maximum	
	8	50
No of diets exceeding ADI:	---	

Highest calculated TMDI values in % of ADI	MS Diet	Highest contributor to MS diet (in % of ADI)	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	pTMRLs at LOQ (in % of ADI)
50.4	DE child	16.9	Apples	5.4	Kiwi	3.7	Table grapes	
44.3	NL child	8.9	Apples	5.9	Milk and cream,	4.1	Kiwi	
42.0	WHO Cluster diet B	7.7	Tomatoes	4.3	Wheat	2.6	Peaches	
35.8	IE adult	5.3	Kiwi	3.5	Peaches	1.8	Sweet potatoes	
33.0	FR toddler	7.9	Milk and cream,	3.7	Apples	3.6	Leek	
25.5	UK Infant	7.7	Milk and cream,	2.2	Apples	2.0	Sugar beet (root)	
25.1	UK Toddler	4.6	Sugar beet (root)	4.1	Milk and cream,	2.4	Apples	
24.4	DK child	3.3	Apples	2.8	Wheat	2.5	Milk and cream,	
22.5	FR infant	5.1	Milk and cream,	3.5	Apples	2.6	Carrots	
22.2	ES child	2.5	Milk and cream,	2.5	Tomatoes	2.2	Wheat	
22.2	WHO cluster diet E	2.0	Wheat	1.9	Potatoes	1.8	Wine grapes	
21.8	SE general population 90th percentile	2.7	Kiwi	2.5	Milk and cream,	2.1	Potatoes	
21.1	WHO regional European diet	2.8	Tomatoes	2.0	Potatoes	1.5	Wheat	
20.3	WHO cluster diet D	3.3	Wheat	2.5	Tomatoes	2.0	Potatoes	
18.5	PT General population	2.7	Wine grapes	2.7	Potatoes	2.2	Tomatoes	
18.1	WHO Cluster diet F	1.8	Wheat	1.7	Potatoes	1.7	Tomatoes	
17.4	NL general	1.7	Apples	1.4	Potatoes	1.3	Milk and cream,	
16.9	ES adult	2.2	Kiwi	2.0	Tomatoes	1.3	Peaches	
16.4	FR all population	4.4	Wine grapes	1.6	Wheat	1.1	Tomatoes	
16.3	IT kids/toddler	3.6	Tomatoes	3.3	Wheat	2.2	Peaches	
13.7	IT adult	2.9	Tomatoes	2.3	Peaches	2.1	Wheat	
12.0	DK adult	1.5	Wine grapes	1.1	Apples	1.1	Milk and cream,	
11.5	PL general population	2.9	Apples	2.2	Tomatoes	1.7	Potatoes	
11.4	LT adult	2.6	Apples	1.6	Potatoes	1.6	Tomatoes	
10.9	UK vegetarian	1.6	Tomatoes	1.0	Wheat	0.9	Wine grapes	
9.6	UK Adult	1.2	Wine grapes	1.1	Tomatoes	0.8	Wheat	
8.4	FI adult	1.1	Milk and cream,	1.1	Tomatoes	0.8	Currants (red, black and white)	

Conclusion:
The estimated Theoretical Maximum Daily Intakes (TMDI), based on pTMRLs were below the ADI.
A long-term intake of residues of chlorpyrifos is unlikely to present a public health concern.

SCENARIO 1

Acute risk assessment /children - refined calculations						Acute risk assessment / adults / general population - refined calculations					
The acute risk assessment is based on the ARfD.											
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 variabilty factor of 3.											
Threshold MRL is the calculated residue level which would leads to an exposure equivalent to 100 % of the ARfD.											
Unprocessed commodities	**No of commodities for which ARfD/ADI is exceeded (IESTI 1):**		**1**	**No of commodities for which ARfD/ADI is exceeded (IESTI 2):**		**1**	**No of commodities for which ARfD/ADI is exceeded (IESTI 1):**		**---**	**No of commodities for which ARfD/ADI is exceeded (IESTI 2):**		**---**
	IESTI 1	***)**	****)**	**IESTI 2**	***)**	****)**	**IESTI 1**	***)**	****)**	**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)
	101.5	Table grapes	1.55 / 1.52	101.5	Table grapes	1.55 / 1.52	49.2	Table grapes	1.55 / -	49.2	Table grapes	1.55 / -
	89.1	Apples	0.91 / -	65.7	Apples	0.91 / -	43.8	Head cabbage	1.38 / -	26.3	Head cabbage	1.38 / -
	82.9	Pears	0.91 / -	59.6	Pears	0.91 / -	21.6	Cauliflower	0.68 / -	21.6	Cauliflower	0.68 / -
	72.6	Head cabbage	1.38 / -	50.5	Peaches	1.16 / -	20.4	Apples	0.91 / -	17.9	Broccoli	0.84 / -
	68.8	Peaches	1.16 / -	44.9	Cauliflower	0.68 / -	20.3	Peaches	1.16 / -	17.0	Apples	0.91 / -
	48.9	Broccoli	0.84 / -	43.6	Head cabbage	1.38 / -	19.5	Pears	0.91 / -	15.7	Peaches	1.16 / -
	44.9	Cauliflower	0.68 / -	34.9	Broccoli	0.84 / -	17.9	Broccoli	0.84 / -	15.0	Pears	0.91 / -
	43.5	Peppers	0.69 / -	31.0	Peppers	0.69 / -	11.4	Aubergines (egg plants)	0.46 / -	11.4	Aubergines (egg plants)	0.46 / -
	35.9	Apricots	1.16 / -	28.7	Apricots	1.16 / -	11.3	Peppers	0.69 / -	8.1	Peppers	0.69 / -
	26.7	Tomatoes	0.46 / -	19.4	Tomatoes	0.46 / -	8.9	Apricots	1.16 / -	7.4	Apricots	1.16 / -
	15.7	Cherries	1.28 / -	15.7	Cherries	1.28 / -	7.2	Quinces	0.91 / -	6.2	Wine grapes	0.2604 / -
	13.3	Quinces	0.91 / -	11.5	Aubergines (egg	0.46 / -	7.0	Tomatoes	0.46 / -	5.7	Quinces	0.91 / -
	12.8	Plums	0.39 / -	10.4	Plums	0.39 / -	6.2	Wine grapes	0.2604 / -	5.7	Tomatoes	0.46 / -
	11.5	Aubergines (egg	0.46 / -	10.4	Quinces	0.91 / -	5.4	Medlar	0.91 / -	5.4	Cherries	1.28 / -
	11.0	Medlar	0.91 / -	8.4	Medlar	0.91 / -	5.4	Cherries	1.28 / -	4.1	Medlar	0.91 / -
	5.1	Wheat	0.35 / -	5.1	Wheat	0.35 / -	3.7	Plums	0.39 / -	3.0	Plums	0.39 / -
	4.8	Globe artichokes	0.24 / -	4.6	Brussels sprouts	0.52 / -	2.7	Wheat	0.35 / -	2.7	Wheat	0.35 / -
	4.6	Brussels sprouts	0.52 / -	3.5	Raspberries	0.62 / -	2.6	Brussels sprouts	0.52 / -	2.6	Brussels sprouts	0.52 / -
	4.0	Oranges	0.03 / -	3.4	Globe artichokes	0.24 / -	2.5	Globe artichokes	0.24 / -	2.5	Barley	0.35 / -
	3.5	Raspberries	0.62 / -	3.4	Strawberries	0.22 / -	2.5	Barley	0.35 / -	2.5	Raspberries	0.62 / -
	3.4	Strawberries	0.22 / -	2.9	Bovine: Meat	0.23 / -	2.5	Raspberries	0.62 / -	1.8	Globe artichokes	0.24 / -
	3.3	Bananas	0.04 / -	2.9	Oranges	0.03 / -	1.4	Bovine: Meat	0.23 / -	1.4	Bovine: Meat	0.23 / -
	2.9	Bovine: Meat	0.23 / -	2.7	Grapefruit	0.03 / -	1.2	Strawberries	0.22 / -	1.2	Strawberries	0.22 / -
	2.7	Grapefruit	0.03 / -	2.4	Bananas	0.04 / -	1.1	Sheep: Meat	0.23 / -	1.1	Sheep: Meat	0.23 / -
	2.4	Sheep: Meat	0.23 / -	2.4	Sheep: Meat	0.23 / -	0.8	Oranges	0.03 / -	0.6	Oranges	0.03 / -
	2.0	Wine grapes	0.2604 / -	2.0	Wine grapes	#DIV/0!	0.6	Grapefruit	0.03 / -	0.5	Sugar beet (root)	0.02 / -
	1.7	Mandarins	0.03 / -	1.6	Bovine: Fat	0.75 / -	0.5	Bananas	0.04 / -	0.5	Bovine: Fat	0.75 / -
	1.6	Bovine: Fat	0.75 / -	1.3	Sugar beet (root)	0.02 / -	0.5	Sugar beet (root)	0.02 / -	0.5	Swine: Meat	0.1 / -
	1.5	Sweet corn	0.02 / -	1.3	Mandarins	0.03 / -	0.5	Bovine: Fat	0.75 / -	0.4	Grapefruit	0.03 / -
	1.3	Sugar beet (root)	0.02 / -	1.0	Sweet corn	0.02 / -	0.5	Swine: Meat	0.1 / -	0.4	Bananas	0.04 / -
	1.0	Lemons	0.03 / -	0.8	Swine: Meat	0.1 / -	0.4	Sweet corn	0.02 / -	0.4	Goat: Meat	0.23 / -
	0.8	Swine: Meat	0.1 / -	0.8	Lemons	0.03 / -	0.4	Mandarins	0.03 / -	0.3	Mandarins	0.03 / -
	0.6	Barley	0.35 / -	0.6	Barley	0.35 / -	0.4	Goat: Meat	0.23 / -	0.3	Sweet corn	0.02 / -
	0.6	Limes	0.03 / -	0.4	Limes	0.03 / -	0.2	Lemons	0.03 / -	0.2	Swine: Fat free of lean meat	0.14 / -
	0.2	Swine: Fat free of lean	0.14 / -	0.2	Swine: Fat free of	0.14 / -	0.2	Swine: Fat free of	0.14 / -	0.2	Lemons	0.03 / -
	0.1	Maize	0.02 / -	0.1	Maize	0.02 / -	0.2	Limes	0.03 / -	0.1	Limes	0.03 / -
	0.0	Rape seed	0.02 / -	0.0	Rape seed	0.02 / -	0.0	Maize	0.02 / -	0.0	Maize	0.02 / -
	0.0	Other citrus fruit	0.03 / -	0.0	Other citrus fruit	0.03 / -						

Conclusion:

For chlorpyrifos IESTI 1 and IESTI 2 were calculated for food commodities for which pTMRLs were submitted and for which consumption data are available.
The estimated short term intake (IESTI 1) exceeded the ARfD/ADI for 1 commodities.
Also the IESTI 2 calculation, using less conservative variability factors, resulted in exceedances of the ARfD/ADI for 1 commodities.
For processed commodities, no exceedance of the ARfD/ADI was identified.

SCENARIO 2

Acute risk assessment /children - refined calculations						Acute risk assessment / adults / general population - refined calculations					

The acute risk assessment is based on the ARfD.

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 variabilty factor of 3.

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

Unprocessed commodities

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):**		---
IESTI 1	*)	**)	**IESTI 2**	*)	**)	**IESTI 1**	*)	**)	**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)
89.1	Apples	0.91 / -	65.7	Apples	0.91 / -	43.8	Head cabbage	1.38 / -	26.3	Head cabbage	1.38 / -
82.9	Pears	0.91 / -	59.6	Pears	0.91 / -	21.6	Cauliflower	0.68 / -	21.6	Cauliflower	0.68 / -
72.6	Head cabbage	1.38 / -	50.5	Peaches	1.16 / -	20.4	Apples	0.91 / -	17.9	Broccoli	0.84 / -
68.8	Peaches	1.16 / -	44.9	Cauliflower	0.68 / -	20.3	Peaches	1.16 / -	17.0	Apples	0.91 / -
48.9	Broccoli	0.84 / -	43.6	Head cabbage	1.38 / -	19.5	Pears	0.91 / -	15.7	Peaches	1.16 / -
44.9	Cauliflower	0.68 / -	34.9	Broccoli	0.84 / -	17.9	Broccoli	0.84 / -	15.0	Pears	0.91 / -
43.5	Peppers	0.69 / -	31.0	Peppers	0.69 / -	14.9	Table grapes	0.47 / -	14.9	Table grapes	0.47 / -
35.9	Apricots	1.16 / -	30.8	Table grapes	0.47 / -	11.4	Aubergines (egg plants)	0.46 / -	11.4	Aubergines (egg plants)	0.46 / -
30.8	Table grapes	0.47 / -	28.7	Apricots	1.16 / -	11.3	Peppers	0.69 / -	8.1	Peppers	0.69 / -
26.7	Tomatoes	0.46 / -	19.4	Tomatoes	0.46 / -	8.9	Apricots	1.16 / -	7.4	Apricots	1.16 / -
15.7	Cherries	1.28 / -	15.7	Cherries	1.28 / -	7.2	Quinces	0.91 / -	6.2	Wine grapes	0.2604 / -
13.3	Quinces	0.91 / -	11.5	Aubergines (egg	0.46 / -	7.0	Tomatoes	0.46 / -	5.7	Quinces	0.91 / -
12.8	Plums	0.39 / -	10.4	Plums	0.39 / -	6.2	Wine grapes	0.2604 / -	5.7	Tomatoes	0.46 / -
11.5	Aubergines (egg	0.46 / -	10.4	Quinces	0.91 / -	5.4	Medlar	0.91 / -	5.4	Cherries	1.28 / -
11.0	Medlar	0.91 / -	8.4	Medlar	0.91 / -	5.4	Cherries	1.28 / -	4.1	Medlar	0.91 / -
5.1	Wheat	0.35 / -	5.1	Wheat	0.35 / -	3.7	Plums	0.39 / -	3.0	Plums	0.39 / -
4.8	Globe artichokes	0.24 / -	4.6	Brussels sprouts	0.52 / -	2.7	Wheat	0.35 / -	2.7	Wheat	0.35 / -
4.6	Brussels sprouts	0.52 / -	3.5	Raspberries	0.62 / -	2.6	Brussels sprouts	0.52 / -	2.6	Brussels sprouts	0.52 / -
4.0	Oranges	0.03 / -	3.4	Globe artichokes	0.24 / -	2.5	Globe artichokes	0.24 / -	2.5	Barley	0.35 / -
3.5	Raspberries	0.62 / -	3.4	Strawberries	0.22 / -	2.5	Barley	0.35 / -	2.5	Raspberries	0.62 / -
3.4	Strawberries	0.22 / -	2.9	Bovine: Meat	0.23 / -	2.5	Raspberries	0.62 / -	1.8	Globe artichokes	0.24 / -
3.3	Bananas	0.04 / -	2.9	Oranges	0.03 / -	1.4	Bovine: Meat	0.23 / -	1.4	Bovine: Meat	0.23 / -
2.9	Bovine: Meat	0.23 / -	2.7	Grapefruit	0.03 / -	1.2	Strawberries	0.22 / -	1.2	Strawberries	0.22 / -
2.7	Grapefruit	0.03 / -	2.4	Bananas	0.04 / -	1.1	Sheep: Meat	0.23 / -	1.1	Sheep: Meat	0.23 / -
2.4	Sheep: Meat	0.23 / -	2.4	Sheep: Meat	0.23 / -	0.8	Oranges	0.03 / -	0.6	Oranges	0.03 / -
2.0	Wine grapes	0.2604 / -	2.0	Wine grapes	#DIV/0!	0.6	Grapefruit	0.03 / -	0.5	Sugar beet (root)	0.02 / -
1.7	Mandarins	0.03 / -	1.6	Bovine: Fat	0.75 / -	0.5	Bananas	0.04 / -	0.5	Bovine: Fat	0.75 / -
1.6	Bovine: Fat	0.75 / -	1.3	Sugar beet (root)	0.02 / -	0.5	Sugar beet (root)	0.02 / -	0.5	Swine: Meat	0.1 / -
1.5	Sweet corn	0.02 / -	1.3	Mandarins	0.03 / -	0.5	Bovine: Fat	0.75 / -	0.4	Grapefruit	0.03 / -
1.3	Sugar beet (root)	0.02 / -	1.0	Sweet corn	0.02 / -	0.5	Swine: Meat	0.1 / -	0.4	Bananas	0.04 / -
1.0	Lemons	0.03 / -	0.8	Swine: Meat	0.1 / -	0.4	Sweet corn	0.02 / -	0.4	Goat: Meat	0.23 / -
0.8	Swine: Meat	0.1 / -	0.8	Lemons	0.03 / -	0.4	Mandarins	0.03 / -	0.3	Mandarins	0.03 / -
0.6	Barley	0.35 / -	0.6	Barley	0.35 / -	0.4	Goat: Meat	0.23 / -	0.3	Sweet corn	0.02 / -
0.6	Limes	0.03 / -	0.4	Limes	0.03 / -	0.2	Lemons	0.03 / -	0.2	Swine: Fat free of lean meat	0.14 / -
0.2	Swine: Fat free of lean	0.14 / -	0.2	Swine: Fat free of	0.14 / -	0.2	Swine: Fat free of	0.14 / -	0.2	Lemons	0.03 / -
0.1	Maize	0.02 / -	0.1	Maize	0.02 / -	0.2	Limes	0.03 / -	0.1	Limes	0.03 / -
0.0	Rape seed	0.02 / -	0.0	Rape seed	0.02 / -	0.0	Maize	0.02 / -	0.0	Maize	0.02 / -
0.0	Other citrus fruit	0.03 / -	0.0	Other citrus fruit	0.03 / -						

Conclusion:

For chlorpyrifos IESTI 1 and IESTI 2 were calculated for food commodities for which pTMRLs were submitted and for which consumption data are available.
No exceedance of the ARfD/ADI was identified for any unprocessed commodity.

Appendix C. EXISTING EU MAXIMUM RESIDUE LIMITS (MRLS)

Pesticides - Web Version - EU MRLs (File created on 01/07/2011 10:02)

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
100000	1. FRUIT FRESH OR FROZEN; NUTS	
110000	(i) Citrus fruit	
110010	Grapefruit (Shaddocks, pomelos, sweeties, tangelo, ugli and other hybrids)	0,3
110020	Oranges (Bergamot, bitter orange, chinotto and other hybrids)	0,3
110030	Lemons (Citron, lemon)	0,2
110040	Limes	0,3
110050	Mandarins (Clementine, tangerine and other hybrids)	2
110990	Others	0,3
120000	(ii) Tree nuts (shelled or unshelled)	0,05*
120010	Almonds	0,05*
120020	Brazil nuts	0,05*
120030	Cashew nuts	0,05*
120040	Chestnuts	0,05*
120050	Coconuts	0,05*
120060	Hazelnuts (Filbert)	0,05*
120070	Macadamia	0,05*
120080	Pecans	0,05*
120090	Pine nuts	0,05*
120100	Pistachios	0,05*
120110	Walnuts	0,05*
120990	Others	0,05*
130000	(iii) Pome fruit	0,5
130010	Apples (Crab apple)	0,5
130020	Pears (Oriental pear)	0,5
130030	Quinces	0,5
130040	Medlar	0,5
130050	Loquat	0,5
130990	Others	0,5
140000	(iv) Stone fruit	
140010	Apricots	0,05
140020	Cherries (sweet cherries, sour cherries)	0,3
140030	Peaches (Nectarines and similar hybrids)	0,2
140040	Plums (Damson, greengage, mirabelle)	0,2
140990	Others	0,05*
150000	(v) Berries & small fruit	
151000	(a) Table and wine grapes	0,5
151010	Table grapes	0,5
151020	Wine grapes	0,5
152000	(b) Strawberries	0,2
153000	(c) Cane fruit	
153010	Blackberries	0,5
153020	Dewberries (Loganberries, Boysenberries, and cloudberries)	0,05*
153030	Raspberries (Wineberries)	0,5
153990	Others	0,05*
154000	(d) Other small fruit & berries	
154010	Blueberries (Bilberries cowberries (red bilberries))	0,05*
154020	Cranberries	0,05*
154030	Currants (red, black and white)	1
154040	Gooseberries (Including hybrids with other ribes species)	1
154050	Rose hips	0,05*
154060	Mulberries (arbutus berry)	0,05*
154070	Azarole (mediteranean medlar)	0,05*
154080	Elderberries (Black chokeberry (appleberry), mountain ash, azarole, buckthorn (sea sallowthorn), hawthorn, service berries, and other treeberries)	0,05*
154990	Others	0,05*
160000	(vi) Miscellaneous fruit	
161000	(a) Edible peel	0,05*
161010	Dates	0,05*
161020	Figs	0,05*
161030	Table olives	0,05*
161040	Kumquats (Marumi kumquats, nagami kumquats)	0,05*
161050	Carambola (Bilimbi)	0,05*
161060	Persimmon	0,05*
161070	Jambolan (java plum) (Java apple (water apple), pomerac, rose apple, Brazilean cherry (grumichama), Surinam cherry)	0,05*
161990	Others	0,05*
162000	(b) Inedible peel, small	
162010	Kiwi	2
162020	Lychee (Litchi) (Pulasan, rambutan (hairy litchi))	0,05*
162030	Passion fruit	0,05*
162040	Prickly pear (cactus fruit)	0,05*
162050	Star apple	0,05*
162060	American persimmon (Virginia kaki) (Black sapote, white sapote, green sapote, canistel (yellow sapote), and mammey sapote)	0,05*
162990	Others	0,05*
163000	(c) Inedible peel, large	
163010	Avocados	0,05*
163020	Bananas (Dwarf banana, plantain, apple banana)	3
163030	Mangoes	0,05*
163040	Papaya	0,05*
163050	Pomegranate	0,05*
163060	Cherimoya (Custard apple, sugar apple (sweetsop) , llama and other medium sized Annonaceae)	0,05*
163070	Guava	0,05*
163080	Pineapples	0,05*
163090	Bread fruit (Jackfruit)	0,05*
163100	Durian	0,05*
163110	Soursop (guanabana)	0,05*
163990	Others	0,05*
200000	2. VEGETABLES FRESH OR FROZEN	
210000	(i) Root and tuber vegetables	
211000	(a) Potatoes	0,05*
212000	(b) Tropical root and tuber vegetables	0,05*
212010	Cassava (Dasheen, eddoe (Japanese taro), tannia)	0,05*
212020	Sweet potatoes	0,05*
212030	Yams (Potato bean (yam bean), Mexican yam bean)	0,05*
212040	Arrowroot	0,05*
212990	Others	0,05*
213000	(c) Other root and tuber vegetables except sugar beet	
213010	Beetroot	0,05*
213020	Carrots	0,1
213030	Celeriac	0,05*
213040	Horseradish	0,05*
213050	Jerusalem artichokes	0,05*
213060	Parsnips	0,05*
213070	Parsley root	0,05*
213080	Radishes (Black radish, Japanese radish, small radish and similar varieties)	0,2
213090	Salsify (Scorzonera, Spanish salsify (Spanish oysterplant))	0,05*
213100	Swedes	0,05*
213110	Turnips	0,05*
213990	Others	0,05*
220000	(ii) Bulb vegetables	
220010	Garlic	0,05*
220020	Onions (Silverskin onions)	0,2
220030	Shallots	0,05*
220040	Spring onions (Welsh onion and similar varieties)	0,05*
220990	Others	0,05*
230000	(iii) Fruiting vegetables	
231000	(a) Solanacea	0,5
231010	Tomatoes (Cherry tomatoes,)	0,5
231020	Peppers (Chilli peppers)	0,5
231030	Aubergines (egg plants) (Pepino)	0,5
231040	Okra, lady's fingers	0,5
231990	Others	0,5
232000	(b) Cucurbits - edible peel	0,05*
232010	Cucumbers	0,05*
232020	Gherkins	0,05*
232030	Courgettes (Summer squash, marrow (patisson))	0,05*
232990	Others	0,05*
233000	(c) Cucurbits-inedible peel	0,05*
233010	Melons (Kiwano)	0,05*
233020	Pumpkins (Winter squash)	0,05*
233030	Watermelons	0,05*
233990	Others	0,05*
234000	(d) Sweet corn	0,05*
239000	(e) Other fruiting vegetables	0,05*
240000	(iv) Brassica vegetables	

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
241000	(a) Flowering brassica	0,05*
241010	Broccoli (Calabrese, Chinese broccoli, Broccoli raab)	0,05*
241020	Cauliflower	0,05*
241990	Others	0,05*
242000	(b) Head brassica	
242010	Brussels sprouts	0,05*
242020	Head cabbage (Pointed head cabbage, red cabbage, savoy cabbage, white cabbage)	1
242990	Others	0,05*
243000	(c) Leafy brassica	
243010	Chinese cabbage (Indian (Chinese) mustard, pak choi, Chinese flat cabbage (tai goo choi), peking cabbage (pe-tsai), cow cabbage)	0,5
243020	Kale (Borecole (curly kale), collards)	0,05*
243990	Others	0,05*
244000	(d) Kohlrabi	0,05*
250000	(v) Leaf vegetables & fresh herbs	0,05*
251000	(a) Lettuce and other salad plants including Brassicacea	0,05*
251010	Lamb´s lettuce (Italian comsalad)	0,05*
251020	Lettuce (Head lettuce, lollo rosso (cutting lettuce), iceberg lettuce, romaine (cos) lettuce)	0,05*
251030	Scarole (broad-leaf endive) (Wild chicory, red-leaved chicory, radicchio, curld leave endive, sugar loaf)	0,05*
251040	Cress	0,05*
251050	Land cress	0,05*
251060	Rocket, Rucola (Wild rocket)	0,05*
251070	Red mustard	0,05*
251080	Leaves and sprouts of Brassica spp (Mizuna)	0,05*
251990	Others	0,05*
252000	(b) Spinach & similar (leaves)	0,05*
252010	Spinach (New Zealand spinach, turnip greens (turnip tops))	0,05*
252020	Purslane (Winter purslane (miner's lettuce), garden purslane, common purslane, sorrel, glassworth)	0,05*

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
252030	Beet leaves (chard) (Leaves of beetroot)	0,05*
252990	Others	0,05*
253000	(c) Vine leaves (grape leaves)	0,05*
254000	(d) Water cress	0,05*
255000	(e) Witloof	0,05*
256000	(f) Herbs	0,05*
256010	Chervil	0,05*
256020	Chives	0,05*
256030	Celery leaves (fennel leaves , Coriander leaves, dill leaves, Caraway leaves, lovage, angelica, sweet cisely and other Apiacea)	0,05*
256040	Parsley	0,05*
256050	Sage (Winter savory, summer savory,)	0,05*
256060	Rosemary	0,05*
256070	Thyme (marjoram, oregano)	0,05*
256080	Basil (Balm leaves, mint, peppermint)	0,05*
256090	Bay leaves (laurel)	0,05*
256100	Tarragon (Hyssop)	0,05*
256990	Others	0,05*
260000	(vi) Legume vegetables (fresh)	0,05*
260010	Beans (with pods) (Green bean (french beans, snap beans), scarlet runner bean, slicing bean, yardlong beans)	0,05*
260020	Beans (without pods) (Broad beans, Flageolets, jack bean, lima bean, cowpea)	0,05*
260030	Peas (with pods) (Mangetout (sugar peas))	0,05*
260040	Peas (without pods) (Garden pea, green pea, chickpea)	0,05*
260050	Lentils	0,05*
260990	Others	0,05*
270000	(vii) Stem vegetables (fresh)	
270010	Asparagus	0,05*
270020	Cardoons	0,05*
270030	Celery	0,05*
270040	Fennel	0,05*
270050	Globe artichokes	1
270060	Leek	0,5
270070	Rhubarb	0,05*
270080	Bamboo shoots	0,05*
270090	Palm hearts	0,05*
270990	Others	0,05*

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
280000	(viii) Fungi	0,05*
280010	Cultivated (Common mushroom, Oyster mushroom, Shi-take)	0,05*
280020	Wild (Chanterelle, Truffle, Morel ,)	0,05*
280990	Others	0,05*
290000	(ix) Sea weeds	
300000	3. PULSES, DRY	0,05*
300010	Beans (Broad beans, navy beans, flageolets, jack beans, lima beans, field beans, cowpeas)	0,05*
300020	Lentils	0,05*
300030	Peas (Chickpeas, field peas, chickling vetch)	0,05*
300040	Lupins	0,05*
300990	Others	0,05*
400000	4. OILSEEDS AND OILFRUITS	0,05*
401000	(i) Oilseeds	0,05*
401010	Linseed	0,05*
401020	Peanuts	0,05*
401030	Poppy seed	0,05*
401040	Sesame seed	0,05*
401050	Sunflower seed	0,05*
401060	Rape seed (Bird rapeseed, turnip rape)	0,05*
401070	Soya bean	0,05*
401080	Mustard seed	0,05*
401090	Cotton seed	0,05*
401100	Pumpkin seeds	0,05*
401110	Safflower	0,05*
401120	Borage	0,05*
401130	Gold of pleasure	0,05*
401140	Hempseed	0,05*
401150	Castor bean	0,05*
401990	Others	0,05*
402000	(ii) Oilfruits	0,05*
402010	Olives for oil production	0,05*
402020	Palm nuts (palmoil kernels)	0,05*
402030	Palmfruit	0,05*
402040	Kapok	0,05*
402990	Others	0,05*
500000	5. CEREALS	
500010	Barley	0,2
500020	Buckwheat	0,05*
500030	Maize	0,05*

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
500040	Millet (Foxtail millet, teff)	0,05*
500050	Oats	0,05*
500060	Rice	0,05*
500070	Rye	0,05*
500080	Sorghum	0,05*
500090	Wheat (Spelt Triticale)	0,05*
500990	Others	0,05*
600000	6. TEA, COFFEE, HERBAL INFUSIONS AND COCOA	
610000	(i) Tea (dried leaves and stalks, fermented or otherwise of Camellia sinensis)	0,1*
620000	(ii) Coffee beans	0,2
630000	(iii) Herbal infusions (dried)	
631000	(a) Flowers	0,5
631010	Camomille flowers	0,5
631020	Hybiscus flowers	0,5
631030	Rose petals	0,5
631040	Jasmine flowers	0,5
631050	Lime (linden)	0,5
631990	Others	0,5
632000	(b) Leaves	0,5
632010	Strawberry leaves	0,5
632020	Rooibos leaves	0,5
632030	Maté	0,5
632990	Others	0,5
633000	(c) Roots	0,5
633010	Valerian root	0,5
633020	Ginseng root	0,5
633990	Others	0,5
639000	(d) Other herbal infusions	0,1*
640000	(iv) Cocoa (fermented beans)	0,1*
650000	(v) Carob (st johns bread)	0,1*
700000	7. HOPS (dried) , including hop pellets and unconcentrated powder	0,1*
800000	8. SPICES	
810000	(i) Seeds	5
810010	Anise	5
810020	Black caraway	5
810030	Celery seed (Lovage seed)	5
810040	Coriander seed	5
810050	Cumin seed	5
810060	Dill seed	5
810070	Fennel seed	5
810080	Fenugreek	5
810090	Nutmeg	5
810990	Others	5

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
820000	(ii) Fruits and berries	1
820010	Allspice	1
820020	Anise pepper (Japan pepper)	1
820030	Caraway	1
820040	Cardamom	1
820050	Juniper berries	1
820060	Pepper, black and white (Long pepper, pink pepper)	1
820070	Vanilla pods	1
820080	Tamarind	1
820990	Others	1
830000	(iii) Bark	0,1*
830010	Cinnamon (Cassia)	0,1*
830990	Others	0,1*
840000	(iv) Roots or rhizome	1
840010	Liquorice	1
840020	Ginger	1
840030	Turmeric (Curcuma)	1
840040	Horseradish	1
840990	Others	1
850000	(v) Buds	0,1*
850010	Cloves	0,1*
850020	Capers	0,1*
850990	Others	0,1*
860000	(vi) Flower stigma	0,1*
860010	Saffron	0,1*
860990	Others	0,1*
870000	(vii) Aril	0,1*
870010	Mace	0,1*
870990	Others	0,1*
900000	9. SUGAR PLANTS	
900010	Sugar beet (root)	0,2
900020	Sugar cane	0,05*

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
900030	Chicory roots	0,05*
900990	Others	0,05*
1000000	10. PRODUCTS OF ANIMAL ORIGIN- TERRESTRIAL ANIMALS	
1010000	(i) Meat, preparations of meat, offals, blood, animal fats fresh chilled or frozen, salted, in brine, dried or smoked or processed as flours or meals other processed products such as sausages and food preparations based on these	
1011000	(a) Swine	
1011010	Meat	
1011020	Fat free of lean meat	
1011030	Liver	
1011040	Kidney	
1011050	Edible offal	
1011990	Others	
1012000	(b) Bovine	
1012010	Meat	
1012020	Fat	
1012030	Liver	
1012040	Kidney	
1012050	Edible offal	
1012990	Others	
1013000	(c) Sheep	
1013010	Meat	
1013020	Fat	
1013030	Liver	
1013040	Kidney	
1013050	Edible offal	
1013990	Others	

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
1014000	(d) Goat	
1014010	Meat	
1014020	Fat	
1014030	Liver	
1014040	Kidney	
1014050	Edible offal	
1014990	Others	
1015000	(e) Horses, asses, mules or hinnies	
1015010	Meat	
1015020	Fat	
1015030	Liver	
1015040	Kidney	
1015050	Edible offal	
1015990	Others	
1016000	(f) Poultry -chicken, geese, duck, turkey and Guinea fowl-, ostrich, pigeon	0,05*
1016010	Meat	0,05*
1016020	Fat	0,05*
1016030	Liver	0,05*
1016040	Kidney	0,05*
1016050	Edible offal	0,05*
1016990	Others	0,05*
1017000	(g) Other farm animals (Rabbit, Kangaroo)	
1017010	Meat	
1017020	Fat	
1017030	Liver	
1017040	Kidney	
1017050	Edible offal	
1017990	Others	
1020000	(ii) Milk and cream, not	0,01*

Code number	Groups and examples of individual products to which the MRLs apply	Chlorpyrifos (F)
	concentrated, nor containing added sugar or sweetening matter, butter and other fats derived from milk, cheese and curd	
1020010	Cattle	0,01*
1020020	Sheep	0,01*
1020030	Goat	0,01*
1020040	Horse	0,01*
1020990	Others	0,01*
1030000	(iii) Birds' eggs, fresh preserved or cooked Shelled eggs and egg yolks fresh, dried, cooked by steaming or boiling in water, moulded, frozen or otherwise preserved whether or not containing added sugar or sweetening matter	0,01*
1030010	Chicken	0,01*
1030020	Duck	0,01*
1030030	Goose	0,01*
1030040	Quail	0,01*
1030990	Others	0,01*
1040000	(iv) Honey (Royal jelly, pollen)	
1050000	(v) Amphibians and reptiles (Frog legs, crocodiles)	
1060000	(vi) Snails	
1070000	(vii) Other terrestrial animal products	

(*) Indicates lower limit of analytical determination
(F) = Fat soluble.

ABBREVIATIONS

ADI	acceptable daily intake
ARfD	acute reference dose
a.s.	active substance
BBCH	growth stages of mono- and dicotyledonous plants
bw	body weight
ca.	circa, approximately
CAS	Chemical Abstract Service
CEN	European Committee for Standardization (Comité Européen de Normalisation, *French*)
CF	conversion factor for enforcement residue definition to risk assessment residue definition
CHP	chlorpyrifos
CS	capsule suspension
CXL	Codex Maximum Residue Limit (Codex MRL)
d	day
DALA	days after last application
DAR	Draft Assessment Report
DAT	days after treatment
DM	dry matter
DT_{90}	period required for 90 % dissipation (define method of estimation)
dw	dry weight
EC	European Community
EC	emulsifiable concentrate
EDI	estimated daily intake
EFSA	European Food Safety Authority
EMS	evaluating Member State
eq	residue expressed as a.s. equivalent
EU	European Union
EURLs	EU Reference Laboratories (former CRLs)
FAO	Food and Agriculture Organisation of the United Nations
GAP	good agricultural practice
GC	gas chromatography
GCPF	Global Crop Protection Federation (former GIFAP)

GLP	Good Laboratory Practice
ha	hectare
hL	hectolitre
HPLC	high performance liquid chromatography
i.e.	that is (id est, *Latin*)
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
JMPR	Joint FAO/WHO Meeting on Pesticide Residues
kg	kilogram
L	litre
LOD	limit of detection
LOQ	limit of quantification (determination)
MRL	maximum residue limit
MS	Member States
NEU	northern European Union
OECD	Organization for Economic Co-operation and Development
OECD MRL	statistical calculation of the MRL by using the method developed by OECD in 2011
PF	processing factor
PHI	pre-harvest interval
P_{ow}	partition coefficient between n-octanol and water
PRIMo	(EFSA) Pesticide Residues Intake Model
QuEChERS	Quick, Easy, Cheap, Effective, Rugged, and Safe (method)
R_{ber}	statistical calculation of the MRL by using a non-parametric method
R_{max}	statistical calculation of the MRL by using a parametric method
RAC	raw agricultural commodity
RD	residue definition
RMS	rapporteur Member State
SEU	Southern European Union
TMDI	theoretical maximum daily intake
TRR	total radioactive residue
WG	water dispersible granule
WHO	World Health Organisation
wk	week
yr	year