European Food Safety Authority

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## CONCLUSION ON PESTICIDE PEER REVIEW

# Conclusion on the peer review of the pesticide risk assessment of confirmatory data submitted for the active substance methiocarb[1]

**European Food Safety Authority**[2]

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## ABSTRACT

The conclusions of the European Food Safety Authority (EFSA) following the peer review of the initial risk assessment carried out by the competent authority of the rapporteur Member State the United Kingdom, for the pesticide active substance methiocarb are reported. The context of the peer review was that requested by the European Commission following the submission and evaluation of confirmatory data on the risk assessment for birds. The conclusions were reached on the basis of the evaluation of the representative use of methiocarb as a molluscicide on oilseed rape. The reliable endpoints concluded as being appropriate for use in regulatory risk assessment, derived from the available studies and literature in the dossier peer reviewed, are presented. Concerns were identified.



## KEY WORDS

Methiocarb, peer review, risk assessment, pesticide, repellent, insecticide, molluscicide

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## SUMMARY

Methiocarb was included in Annex I to Directive 91/414/EEC on 1 October 2007 by Commission Directive 2007/5/EC, and has been deemed to be approved under Regulation (EC) No 1107/2009, in accordance with Commission Implementing Regulation (EU) No 540/2011, as amended by Commission Implementing Regulation (EU) No 541/2011. It was a specific provision of the approval that the notifier was required to submit to the European Commission further studies to confirm the risk assessment for birds, mammals and non-target arthropods, as well as further studies to confirm the toxicological assessment of metabolites potentially present in crops, within two years from the approval.

In accordance with the specific provision, the notifier, Bayer CropScience, submitted an updated dossier in September 2009, which was evaluated by the designated RMS, the United Kingdom, in the form of an Addendum to the Draft Assessment Report. In compliance with Guidance Document SANCO 5634/2009 rev.3, the RMS distributed the Addendum to Member States and the EFSA for comment on 5 April 2011. The RMS collated all comments in the format of a Reporting Table, which was submitted to the Standing Committee on the Food Chain and Animal Health (SCFCAH) in June 2011.

Following consideration of the comments received, and the further discussions in the SCFCAH, the Commission requested the EFSA to organise a peer review of the RMS's evaluation of the confirmatory data on the risk assessment for birds and to deliver its conclusions.

The experts at the Pesticides Peer Review Experts' Meeting on ecotoxicology (PPR 91) in April 2012 concluded that a high risk is identified for granivorous birds, earthworm-eating birds and predatory birds on the basis of the refined risk assessments.

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## BACKGROUND

Methiocarb was included in Annex I to Directive 91/414/EEC on 1 October 2007 by Commission Directive 2007/5/EC[3], and has been deemed to be approved under Regulation (EC) No 1107/2009[4], in accordance with Commission Implementing Regulation (EU) No 540/2011[5], as amended by Commission Implementing Regulation (EU) No 541/2011[6]. EFSA previously finalised a Conclusion on this active substance on 12 May 2006 in the EFSA Scientific Report (2006) 79 (EFSA, 2006).

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Following consideration of the comments received, and the further discussions in the SCFCAH, the Commission requested the EFSA to organise a peer review of the RMS's evaluation of the confirmatory data on the risk assessment for birds and to deliver its conclusions.

The Addendum and the Reporting Table were discussed at the Pesticides Peer Review Experts' Meeting on ecotoxicology (PPR 91) in April 2012. Details of the issues discussed, together with the outcome of these discussions were recorded in the meeting report.

A final consultation on the conclusions arising from the peer review took place with Member States via a written procedure in May 2012.

The conclusions laid down in this report were reached on the basis of the peer review of the RMS's evaluation of the confirmatory data submitted with respect to the risk assessment for birds for methiocarb. A key supporting document to this conclusion is the Peer Review Report, which is a compilation of the documentation developed to evaluate and address all issues raised in the peer review, from the compilation of comments in the Reporting Table to the conclusion. The Peer Review Report (EFSA, 2012) comprises the following documents, in which all views expressed during the course of the peer review, including minority views, can be found:

- the Reporting Table,
- the report of the scientific consultation with Member State experts,
- the comments received on the draft EFSA Conclusion.

[3] Commission Directive 2007/5/EC of 7 February 2007 amending Council Directive 91/414/EEC to include captan, folpet, formetanate and methiocarb as active substances. OJ No L 35, 8.2.2007, p. 11.
[4] Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. OJ No L 309, 24.11.2009, p. 1-50.
[5] Commission Implementing Regulation (EU) No 540/2011 of 25 May 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances. OJ L 153, 11.6.2011, p.1-186.
[6] Commission Implementing Regulation (EU) No 541/2011 of 1 June 2011 amending Implementing Regulation (EU) No 540/2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances. OJ L 153, 11.6.2011, p.187-188.

Given the importance of the Addendum and the Peer Review Report, these documents are considered respectively as background documents A and B to this conclusion.

## THE ACTIVE SUBSTANCE AND THE FORMULATED PRODUCT

Methiocarb is the ISO common name for 4-methylthio-3,5-xylyl methylcarbamate (IUPAC).

The representative formulated product for the evaluation was 'Mesurol RB4', a bait ready for use (RB) formulation containing 40g/kg methiocarb.

The representative use assessed is in oilseed rape crops to control slugs and snails by spreading 1 – 2 times per year at application rates of up to 0.12kg active substance/hectare.

## CONCLUSIONS OF THE EVALUATION

### Risk assessment for granivorous birds

To refine the risk assessment for granivorous birds, generic monitoring studies and field trials investigating effects were provided. The generic monitoring studies were carried out in Germany on oilseed rape and winter cereal fields to select the focal species and ecological parameters (PT and PD values). The study conducted in oilseed rape was considered appropriate to select focal species not only for the granivorous bird risk assessment, but also for the insectivorous/omnivorous and earthworm-eating bird risk assessments. As regards granivorous birds, the notifier proposed yellowhammer (*Emberiza citrinella),* linnet (*Carduelis cannabina*) and chaffinch (*Fringilla coelebs*), as focal species. The experts at the PPR 91 meeting, agreed that other species like tree sparrow (*Passer montanus*) should be considered. However, it was also noted that focal species from this study are only suitable for autumn sown seeds. In addition, the experts considered the study might be of limited representativeness for other landscapes across Europe. It was in fact noted that some species, well known to be focal species for earthworm-eating birds in oilseed rape fields, such as robin (*Erithacus rubecula*), were observed to be of low abundance in the study. The study conducted in winter wheat was considered not appropriate to derive focal species for oilseed rape use, because the attractiveness of the wheat seed may influence the attractiveness of the field. However, since yellowhammer, skylark (*Alauda arvensis*) and chaffinch were observed in this study on oilseed rape fields, which were included in the investigations as an alternative habitat, the study was considered to be of limited support for the oilseed rape monitoring study.

Three field trials investigating effects were provided: one was carried out in planted cabbage and pre-harvest potato fields in France; a second in maize, sunflowers and sugar beet in France; and a third in artichoke in Spain. The aim of these studies was mainly to detect bird mortalities in fields treated with methiocarb.

The experts noted that in the study carried out in France on potato and cabbage fields applications were made in July-August, and therefore its representativeness for the assessed use was uncertain. No bird carcasses were found in the cabbage field while a robin carcass was located in the potato fields. Residue analysis indicated that the robin had been exposed to methiocarb. Moribund beetles were reported next to the carcass of the robin. These were analysed and it was noted to have 149 mg/kg residues of methiocarb. The experts considered that the conditions of the study may not have allowed all effects to be detected. Overall, the usefulness of such a study to address the risk assessment for birds was questioned due to the numerous uncertainties which might have influenced the detection of effects.

As regards the studies in maize, sunflowers, sugar beet and artichoke, the experts noted several deficiencies in the protocols which raised uncertainties in relation to the outcome. In addition, the studies were not considered appropriate for the representative use.

On the basis of available studies in the DAR (United Kingdom, 2005), it was noted that in some circumstances the birds avoided the pellets. However, when there was sufficient feeding pressure some birds did consume sufficient pellets to result in mortality. The RMS noted that for a small granivorous bird less than 1 pellet was sufficient to reach a $LD_{50}/10$ while for a larger bird (1kg) 1.4 pellet was sufficient to reach a $LD_{50}/10$. Overall, the experts concluded that, based on the current evidence, a high risk to small granivorous is identified.

**Risk assessment for earthworm-eating birds (Body burden modelling)**

To refine the risk assessment for earthworm-eating birds, a body burden modelling was carried out, taking into account a "worst-case" and a "best-case" scenario. In particular, the following estimations were performed:

- the rate of dose ingestion;
- the rate of metabolism/elimination;
- the time to reach the $LD_{50}/10$;
- the time to reach the avoidance threshold;
- the time to reach the calculated daily energy requirement;
- the net acute dose at avoidance of feeding.

The above estimations require the definition of a number of input parameters and the assessment of the related uncertainty. The following input parameters were discussed during the PPR 91 meeting:

- Focal species parameters (focal species choice, body weight and food intake rate, toxicity endpoints, feeding rate);
- Metabolism/elimination;
- Residue concentration in food;
- Avoidance threshold dose (AVT) and avoidance delay time (AVD).

*Focal species parameters*

The experts agreed to the proposed focal species blackbird (*Turdus merula*) and song-thrush (*Turdus philomelos*). In addition, although the robin was not particularly abundant or prevalent in the field monitoring study in oilseed rape, it was agreed that the robin should be also considered as a key focal species for earthworm-eating birds.

As regards the body weight and the food intake rate, the experts agreed with the RMS proposals (i.e 113 g for blackbird and 67.75 g for song-thrush). The notifier's proposals could not be fully validated based on the available data.

The feeding rate (FPM) was estimated for blackbird only, based on literature data, assuming a consumption of 1 to 2 earthworms/min and an individual earthworm weight of 100 mg and 600 mg, for the "best-case" and "worst-case", respectively. The experts noted that 1 to 2 earthworms per minute did not seem worst-case. In addition, the RMS pointed out that the variability in feeding rates between species of earthworm-eating birds is still unknown. Therefore, although the RMS did propose using these FPM values in the modelling, the uncertainty surrounding these estimates required further consideration when interpreting the modelling results. As regards the toxicity endpoints, the RMS used the lowest $LD_{50}$ and the geometric mean of the available $LD_{50}$ for the "worst-case" and "best-case", respectively. The experts noted that the $HD_5$, as suggested by the notifier, could also be appropriate for the "best-case". However, the available information was considered not sufficient to support the $HD_5$ approach without an uncertainty factor. Therefore, the RMS's proposal for "worst-case" and "best-case" was agreed, although concerns were raised regarding the reliability of the dataset used to calculate the geometric mean.

*Metabolism/elimination.*

A metabolism study on hen was available in the DAR but pharmacokinetic parameters were not determined. In accordance with the PPR Panel Opinion on pirimicarb (EFSA, 2005), to estimate the metabolic rate (*k*), the RMS used the NOEL of 4.95 mg a.s./kg bw per day from the long-term reproduction study on Bobwhite quail (*Colinus virginianus*) and the LOEL of 1.42 mg a.s./kg bw from the acute oral study on Japanese quail (*Coturnix japonica*). The experts noted a difference in dosing regimes between the studies (i.e. gavage and dietary). In addition, as also indicated in the PPR Panel Opinion, a high level of uncertainty is associated with the metabolic rate based on NOEL and LOEL values, due to the spacing of doses and the timing of observations in the studies. As an alternative approach, the experts agreed to consider the use of the available mammal metabolism data, which indicated slower metabolism than that assumed in the modelling. However, the extrapolation from rat metabolism/elimination data to wild bird species is also uncertain Therefore, it was proposed to use the lowest *k* value estimated using these methods, as a "worst-case", and the highest *k* value estimated, as the "best-case".

*Residue concentration in food.*

To estimate the dose ingestion rate, FPM and the residue in earthworms were used. Residue data for methiocarb in earthworms were available in the DAR. It was agreed to use the 90$^{th}$ percentile and median data for the "worst-case" and "best-case", respectively. However, to understand the range of the "risk", the RMS provided in the corrigendum from May 2012 (United Kingdom, 2012) also modelling calculations with the highest peak concentration in the "worst case" assessment.

*Avoidance threshold dose (AVT) and avoidance delay time (AVD).*

To estimate the avoidance dose it is necessary to know the avoidance threshold dose (AVT), i.e. the dose which causes cessation in food consumption due to toxic effects of the active substance, and the avoidance delay time (AVD), i.e. the time lag between the bird consuming the contaminated food and the onset of reduced feeding. It was agreed to estimate the AVT from the NOEL divided by 10 for sub-lethal effects, i.e. assuming birds will stop feeding when symptoms occur to ensure that it is in proportion to the $LD_{50}$/10 or geomean/10. The AVD was assumed to be 60 min and 120 min for the "worst-case" and "best-case", respectively, based on the study on Japanese quail, where all birds exhibited a toxic response within 1 or 2 hours.

Overall body burden modelling conclusion

Using both "best-case" and "worst case" assumptions it was noted that the rate of dose ingestion exceeds the rate of metabolism/elimination and the time to reach the $LD_{50}$/10 is less than the time to reach the calculated daily energy requirement. The net acute dose at the point at which cessation of feeding occurs, i.e. after the avoidance threshold dose has been reached and the avoidance delay time has elapsed, is greater than 100 % of the $LD_{50}$/10 using "best-case" and "worst-case" assumptions. It was therefore concluded that neither the "best-case" nor the "worst-case" assumptions resulted in a low risk to earthworm-eating birds. In addition, it was recognised that there is considerable uncertainty associated with some of the parameters used in the modelling and the uncertainty analysis was not provided.

**Risk assessment for predatory birds (Probabilistic approach)**

For the confirmatory data assessment, a probalistic risk assessment was provided to estimate the risk of mortality in predatory birds after the application of methiocarb. Monte Carlo simulations were performed to simulate the exposure of predatory birds and the resulting mortality based on toxicity data. Whenever possible, distributions were used in the simulations. The input parameters were discussed during the PPR 91 meeting.

*Toxicity data.*

Dose-response curves were used for the simulation of effects. These dose-response curves were derived from species sensitivity distribution (SSD) based on the $LD_{50}$ data available in the DAR and laboratory data for the slope estimation of the curves. The experts questioned whether the data used for the SSD were appropriate. Since the original study summaries were not available, it was not possible to conclude on their suitability for use in a probabilistic risk assessment. In addition, the experts noted that only limited data were used to calculate the slope of the dose response. Overall, this was considered an important source of uncertainty in the probabilistic risk assessment.

*Focal species and ecological parameters (PT, PD).*

The notifier proposed the barn owl (*Tyto alba*) and the little owl (*Athene noctua*) as key focal species. The experts considered that the choice of focal species was reasonable for an owl risk assessment, but that this assessment was not necessarily representative for all predatory birds. In particular, a potential remaining concern with scavenging birds was highlighted. As regards the ecological parameters, the experts noted that it is not usual to use PT and PD for an acute assessment. However, for a probabilistic risk assessment for owls with a large home range it would be unrealistic to assume 100% feeding within the treated crop. Furthermore, the risk assessment was conducted over a 21 day period and therefore the use of ecological parameters could be considered reasonable. A distribution of PT values was used in the assessment, which would reduce the uncertainty of using PT in an acute assessment. However, the PT values proposed by the notifier were not supported by robust data, especially given the low number of mammals required to reach the $LD_{50}/10$. As regards the PDs, for the barn owl, the experts agreed with 100% small mammals. For little owl, the proportion of insects and mammals in the diet was very variable based on literature data from a range of Member States and landscapes. Since a distribution of PD values was used in the probabilistic assessment, some uncertainties due to the variability of the data might be considered. However, concerns were raised regarding the relevance of the different proportions that a little owl will take in the treated area. It was also noted that the diet is likely to be affected by the time of year and the availability of voles. Therefore, the experts considered that further information would be needed in order to use the PD data for a probabilistic assessment.

*Residue in food items (small mammals, invertebrates).*

The notifier used results from a single residue study on small live mammals, which was conducted at a higher application rate. The notifier proportionately reduced the residues to take into account the proposed application rate. The experts noted that it is important to take account of other residues data in dead mammals as the predatory owl may take the small mammal up to the point of death. Furthermore, the small mammal may become more vulnerable prior to death. The experts highlighted that owls do not have a preference for dead mammals; however, the issue could be relevant for other scavenging predatory birds. It was questioned whether the residues data referred to the whole mammal or just to stomach and intestines. It was noted from the available data that when residues were measured in the whole mammal carcass the levels were greater than those measured in the stomach and intestine alone. Therefore the experts agreed to use the available residue data by selecting worst case $90^{th}$ percentile.

As regards the residue in invertebrates, the notifier proposed to use earthworm residues from a single study (single application only) for all invertebrates. The experts agreed that all of the available information regarding residues in invertebrates, such as the higher residues in carabid beetles and slugs, should be considered. Furthermore, the experts were concerned with regard to the use of a distribution of residues over time rather than a distribution of residues in invertebrates on the day of peak residues.

Overall conclusion on the probabilistic approach

Whilst there was disagreement and uncertainty over the conservatism of the input parameters and the underlying model had not itself been evaluated, the results were presented for discussion. When it was assumed that only a fraction of the total arable area within the habitat of the owls is treated with methiocarb, the simulated risk of mortality for local population scale was 0.20% - 0.65% over 21 days for the barn owl. For the little owl it was 0.36 - 1.24%. When it was assumed that the total arable land area within the habitat of the owls was treated with methiocarb, the risk of mortality was 11.6% in the barn owl and 21.1% in the little owl (i.e. the risk of mortality over 21 days). The experts discussed the difference in outcomes and noted a large difference between the two simulations. Furthermore, the experts noted that the input parameters (as discussed above) were not considered to be worst case and therefore using more appropriate input parameters would result in a higher risk of mortality. Despite concerns highlighted with the input parameters, it was noted that the results of the probabilistic exercise do not, in any case, allow a high risk for owls (or for other predatory birds) to be excluded.

As a general point in relation to the risk assessment for predatory birds, the experts noted that the mortality of an individual is likely to have more of an impact on the population than other farmland birds. Therefore, it was questioned whether a probabilistic approach in isolation is suitable for a risk assessment for predatory birds. Further consideration of the predicted impact on populations would also be required.

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# APPENDICES

## APPENDIX A – LIST OF END POINTS FOR THE ACTIVE SUBSTANCE AND THE REPRESENTATIVE FORMULATION

**List of representative uses evaluated (methiocarb)**

| **Crop and/or situation** (a) | **Member State or Country** | **Product name** | **F, G, or I** (b) | **Pests or Group of pests controlled** (c) | **Formulation** | | **Application** | | | | **Application rate per treatment** | | | **PHI** (days) (l) | **Remarks:** (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Type (d-f) | Conc. of as (i) | method kind (f-h) | Growth stage & season (j) | number min max (k) | interval between applications (min) | kg product/ ha min max | water l/ha min max | kg as/ha min max | | |
| **Rape** (BRSNN) | Northern Europe Southern Europe. | Mesurol RB 4 | F | slugs, snails | RB | 40g/kg (4%) | Sprea-ding | at infestation not later than BBCH 30-32 | 1 - 2 | | 3.0 kg product/ ha | | 0.12 kg as/ha | | |

| | | | | |
|---|---|---|---|---|
| **Remarks:** | (a) | For crops, the EU and Codex classifications (both) should be used; where relevant, the use situation should be described (*e.g.* fumigation of a structure) | (h) | Kind, *e.g.* overall, broadcast, aerial spraying, row, individual plant, between the plants - type of equipment used must be indicated |
| | (b) | Outdoor or field use (F), glasshouse application (G) or indoor application (I) | (i) | g/kg or g/l |
| | (c) | *e.g.* biting and suckling insects, soil born insects, foliar fungi, weeds | (j) | Growth stage at last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including where relevant, information on season at time of application |
| | (d) | *e.g.* wettable powder (WP), emulsifiable concentrate (EC), granule (GR), water soluble concentrate (SL) | (k) | The minimum and maximum number of application possible under practical conditions of use must be provided |
| | (e) | GCPF Codes - GIFAP Technical Monograph No 2, 1989 | (l) | PHI - minimum pre-harvest interval |
| | (f) | Method, *e.g.* high volume spraying, low volume spraying, spreading, dusting, drench | (m) | Remarks may include: Extent of use/economic importance/restrictions |
| | (g) | All abbreviations used must be explained | | |

**Effects on non-target Species**

**Effects on terrestrial vertebrates (Annex IIA, point 8.1, Annex IIIA, points 10.1 and 10.3)**

| | |
|---|---|
| Acute toxicity to birds ‡ | $LD_{50:}$ 5 mg a.s./Kg bw (Japanese quail) |
| Dietary toxicity to birds ‡ | 1071 mg a.s./kg feed (ppm)[#] (mallard duck) |
| Reproductive toxicity to birds ‡ | NOEC: 50 mg a.s./kg feed (bobwhite quail)<br>(4.51 mg a.s./kg bw as daily dose) |

[#] It was not possible to convert the 5-day dietary $LC_{50}$ value into a daily dose figure.

**Toxicity/exposure ratios for terrestrial vertebrates (Annex IIIA, points 10.1 and 10.3)**

The following are theoretical worst case Tier I calculations for completeness only – the assessment of risk relies largely upon the use of higher tier acceptance/repellency and field studies.

| Application rate<br><br>(kg as/ha) | Crop | Category (food type) | Time-scale | Worst case TER | Annex VI Trigger |
|---|---|---|---|---|---|
| 2 x 0.120 | oilseed rape | slug pellets | acute | $3.3 \times 10^{-4}$ | 10 |
| 2 x 0.120 | oilseed rape | earthworms (& slugs) | acute | 0.073 (slugs <0.073) | 10 |
| 2 x 0.120 | oilseed rape | small mammals | acute | 0.54 | 10 |
| 2 x 0.120 | oilseed rape | slug pellets | short-term | 0.027 | 10 |
| 2 x 0.120 | oilseed rape | earthworms (& slugs) | short-term | 3.87 (slugs <3.87) | 10 |
| 2 x 0.120 | oilseed rape | earthworms (& slugs) | long-term | 0.085 (slugs <0.085) | 5 |

## ABBREVIATIONS

| | |
|---|---|
| ADI | acceptable daily intake |
| AOEL | acceptable operator exposure level |
| ARfD | acute reference dose |
| a.s. | active substance |
| AVD | avoidance delay time |
| AVT | avoidance threshold dose |
| bw | body weight |
| CA | Chemical Abstracts |
| CAS | Chemical Abstracts Service |
| CIPAC | Collaborative International Pesticides Analytical Council Limited |
| d | day |
| DAR | draft assessment report |
| DM | dry matter |
| $DT_{50}$ | period required for 50 percent degradation / dissipation |
| $DT_{90}$ | period required for 90 percent degradation / dissipation |
| ε | decadic molar extinction coefficient |
| $EC_{50}$ | effective concentration, median |
| EEC | European Economic Community |
| EINECS | European Inventory of Existing Commercial Chemical Substances |
| ELINCS | European List of New Chemical Substances |
| EMDI | estimated maximum daily intake |
| EU | European Union |
| FAO | Food and Agriculture Organisation of the United Nations |
| FPM | feeding rate per minute |
| FOCUS | Forum for the Co-ordination of Pesticide Fate Models and their Use |
| g | gram |
| GAP | good agricultural practice |
| GCPF | Global Crop Protection Federation (formerly known as GIFAP) |
| GS | growth stage |
| $HD_5$ | fifth percentile of the distribution of $LD_{50}$s between species |
| h | hour(s) |
| ha | hectare |
| hL | hectolitre |
| HPLC | high performance liquid chromatography<br>or high pressure liquid chromatography |
| ISO | International Organisation for Standardisation |
| IUPAC | International Union of Pure and Applied Chemistry |
| *k* | metabolic rate |
| kg | kilogram |
| $K_{oc}$ | organic carbon adsorption coefficient |
| L | litre |
| LC | liquid chromatography |
| LC-MS | liquid chromatography-mass spectrometry |
| LC-MS-MS | liquid chromatography with tandem mass spectrometry |
| $LC_{50}$ | lethal concentration, median |
| $LD_{50}$ | lethal dose, median |
| LOAEL | lowest observable adverse effect level |
| LOD | limit of detection |
| LOEL | lowest observed effect level |
| LOQ | limit of quantification (determination) |
| µg | microgram |
| mN | milli-Newton |
| MAF | multiple application factor |

| | |
|---|---|
| Min | minute |
| MRL | maximum residue limit or level |
| MS | mass spectrometry |
| NESTI | national estimated Short Term Intake |
| NIR | Near-Infrared-(Spectroscopy) |
| nm | nanometer |
| NOAEL | no observed adverse effect level |
| NOEL | no observed effect level |
| PD | proportion of food type in diet |
| PEC | predicted environmental concentration |
| $PEC_A$ | predicted environmental concentration in air |
| $PEC_S$ | predicted environmental concentration in soil |
| $PEC_{SW}$ | predicted environmental concentration in surface water |
| $PEC_{GW}$ | predicted environmental concentration in ground water |
| PHI | pre-harvest interval |
| $pK_a$ | negative logarithm (to the base 10) of the dissociation constant |
| PPE | personal protective equipment |
| ppm | parts per million ($10^{-6}$) |
| PPP | plant protection product |
| PT | proportion of diet obtained in the treated area |
| $r^2$ | coefficient of determination |
| RMS | rapporteur Member State |
| RUD | residue per unit dose |
| SCFCAH | Standing Committee on the Food Chain and Animal Health |
| SL | Soluble concentrate |
| SSD | species sensitivity distribution |
| STMR | supervised trials median residue |
| TER | toxicity exposure ratio |
| TMDI | theoretical maximum daily intake |
| TWA | time weighted average |
| UV | ultraviolet |
| WHO | World Health Organisation |
| WG | water dispersible granule |
| yr | year |