Conclusion regarding the peer review of the pesticide risk assessment of the active substance

tolclofos-methyl

finalised: 22 June 2005

(revision of 30 January 2006 with minor editorial changes on p.42)

SUMMARY

Tolclofos-methyl is one of the 52 substances of the second stage of the review programme covered by Commission Regulation (EC) No 451/2000[1], as amended by Commission Regulation (EC) No 1490/2002[2]. This Regulation requires the European Food Safety Authority (EFSA) to organise a peer review of the initial evaluation, i.e. the draft assessment report (DAR), provided by the designated rapporteur Member State and to provide within one year a conclusion on the risk assessment to the EU-Commission.

Sweden being the designated rapporteur Member State submitted the DAR on tolclofos-methyl in accordance with the provisions of Article 8(1) of the amended Regulation (EC) No 451/2000, which was received by the EFSA on 3 November 2003. Following a quality check on the DAR, the peer review was initiated on 24 November 2003 by dispatching the DAR for consultation of the Member States and the sole applicant Sumitomo. Subsequently, the comments received on the DAR were examined by the rapporteur Member State and the need for additional data was agreed in an evaluation meeting in 25 May 2004. Remaining issues as well as further data made available by the notifier upon request were evaluated in a series of scientific meetings with Member State experts in September and October 2004.

A final discussion of the outcome of the consultation of experts took place with representatives from the Member States on 18 May 2005 leading to the conclusions as laid down in this report.

The conclusion was reached on the basis of the evaluation of the representative uses as fungicide as proposed by the notifier which comprises tuber (seed) treatment for potatoes and soil application for lettuce to control Rhizoctonia infections. The application rate is up to 0.25 kg tolclofos-methyl per tonne and 2 kg tolclofos-methyl per hectare, respectively. Tolclofos-methyl can be used only as fungicide. The representative formulated product for the evaluation was “Tolclofos-methyl 50 WP” ("Rizolex 50 WP"), a wettable powder (WP). However, two more formulations are mentioned in the DAR, a FS (flowable concentrate for seed treatment) and a DS (powder for dry seed treatment) formulation.

[1] OJ No L 53, 29.02.2000, p. 25
[2] OJ No L 224, 21.08.2002, p. 25

Adequate methods are available to monitor all compounds given in the respective residue definition. Multi-residue methods like the Dutch MM1 or the German S19 are applicable for the determinations of the residues in food. The German S19 method was also validated for soil. For the other matrices only single methods are available to determine residues of tolclofos-methyl.

Sufficient test methods and data relating to physical, chemical and technical properties are available. Also adequate analytical methods are available for the determination of tolclofos-methyl in the technical material and in the representative formulation. At the moment no acceptable analytical method for the determination of most of the impurities in the technical material is available.
However, enough data are available to ensure that quality control measurements of the representative plant protection product are possible.

Tolclofos-methyl is rapidly metabolised. It has low acute toxicity but shows sensitising properties and is proposed to be classified with the risk phrase R43 “May cause sensitisation by skin contact”.
Following repeated oral administration of high doses of tolclofos-methyl, no evidence for cumulative toxicity was seen. Tolclofos-methyl does not possess any concern for genotoxicity.
Tolclofos-methyl did not exhibit evidence of cumulative toxicity in chronic toxicity studies, and it demonstrated no carcinogenic potential. There were no direct effects on reproduction or developmental parameters. The acceptable daily intake (ADI) is 0.064 mg/kg bw/day, based on the NOAEL of 6.4 mg/kg bw/day from the 2 year toxicity study in mice. The acceptable operator exposure level (AOEL) is 0.2 mg/kg bw/day**,** and no ARfD was allocated. The estimated and measured operator exposures are below the AOEL without PPE.

After tuber treatment of potatoes and foliar application to lettuce unchanged tolclofos-methyl represents the major part of the total residue in these crops and no metabolites of toxicological concern were formed. Because the available metabolism study on potatoes shows deficiencies, a new study was required. Subject to confirmation by that study, tolclofos-methyl as the residue of concern was analysed in a range of supervised residue trials on potatoes, resulting in a highest residue of 0.2 mg/kg from trials under critical GAP conditions. From indoor lettuce trials a difference of residue levels in summer lettuce compared to that in winter lettuce became evident. Further residue data are required to conclude on the residue situation in summer lettuce.
If potatoes with tolclofos-methyl residues are fed to livestock, with the data currently available it is not possible to exclude, that residues above 0.01 mg/kg could occur in edible animal products. Investigations in livestock animals are triggered by the residues levels in potential feeding items according to current guidelines and the available animal metabolism studies show various deficiencies. Thus, the provision of further data on metabolism in livestock is proposed.
The chronic dietary exposure assessment for consumers based on the currently available information leads to estimated intakes less than 3% of the proposed ADI for all considered consumer subgroups.

However, this assessment is provisional and needs to be reviewed upon receipt of the outstanding data. An ARfD was not allocated, thus there is no acute risk for consumers arising from tolclofos-methyl residues in food.

Tolclofos-methyl degrades in soil to form DM-TM and ph-CH_3. Only DM-TM was detected at levels above 10 % AR. Non-extractable residues were formed at a maximum of 49 to 64 % AR and CO_2 was formed at a maximum of 27 to 43% AR. Photolysis will not significantly contribute to the overall degradation of tolclofos-methyl in soil. Tolclofos-methyl is low to moderate persistent in aerobic soil. and metabolite DM-TM was found to be very low persistent.
Batch adsorption/desorption studies indicate a low potential for mobility in soil for tolclofos-methyl.
Tolclofos-methyl does not hydrolyse under environmental conditions and degradation in water may be slightly enhanced by irradiation. Tolclofos-methyl is not readily biodegradable. In the water/sediment systems, tolclofos-methyl is relatively rapidly partitioned to sediment were it degrades mainly thought biotic processes. However, up to 30 % AR of tolclofos-methyl was volatilized. The metabolite DM-TM was detected in significant quantities in both water and sediment. Unextractable residues in sediment occurred at maximums of 26 to 35 % AR. Tolclofos-methyl and its breakdown products are unlikely to persist in natural aquatic environments for long time periods.
For the use on lettuce in glasshouses, PECsw were estimated assuming 0.1% emission for illustrative purposes (Dutch national model).
Possible surface water contamination from seed potato treatment was addressed with FOCUS surface water calculations. In all applicable scenarios PECsw for tolclofos-methyl are below 0.001 µg / L for the use as seed treatment.
Neither tolclofos-methyl nor DM-TM is expected to exceed the 0.1 µg / L trigger in ground water for the representative uses proposed.
The compound may partition from soil, moist surfaces and water to air. However, estimated half-life in air is 5.30 h not giving rise to long range transport concerns. For short term transport, the relatively low rate proposed for the representative uses limits the potential concern.

The risk to terrestrial vertebrates, aquatic organisms, bees, non-target arthropods, soil macro-organisms including earthworms, soil micro-organisms, other fauna and flora and biological methods for sewage treatment is low with respect to tolclofos-methyl and the metabolite DM-TM as far as investigated.

Key words: tolclofos-methyl, peer review, risk assessment, pesticide, fungicide

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BACKGROUND

Commission Regulation (EC) No 451/2000 laying down the detailed rules for the implementation of the second and third stages of the work program referred to in Article 8(2) of Council Directive 91/414/EEC, as amended by Commission Regulation (EC) No 1490/2002, regulates for the European Food Safety Authority (EFSA) the procedure of evaluation of the draft assessment reports provided by the designated rapporteur Member State. Tolclofos-methyl is one of the 52 substances of the second stage covered by the amended Regulation (EC) No 451/2000 designating Sweden as rapporteur Member State.

In accordance with the provisions of Article 8(1) of the amended Regulation (EC) No 451/2000, Sweden submitted the report of its initial evaluation of the dossier on tolclofos-methyl, hereafter referred to as the draft assessment report, to the EFSA on 3 November 2003. Following an administrative evaluation, the EFSA communicated to the rapporteur Member State some few comments regarding the format and/or recommendations for editorial revisions. In accordance with Article 8(5) of the amended Regulation (EC) No 451/2000 the draft assessment report was distributed for consultation on 24 November 2004 to the Member States and the main data submitter Sumitomo as identified by the rapporteur Member State.

The comments received on the draft assessment report were evaluated and addressed by the rapporteur Member State. Based on this evaluation, representatives from Member States identified and agreed in an evaluation meeting on 25 May 2004 on data requirements to be addressed by the notifier as well as issues for further detailed discussion at expert level. A representative of the notifier was attending this meeting.

Taking into account the information received from the notifier addressing the request for further data, a scientific discussion of the identified data requirements and/or issues took place in expert meetings organised on behalf of the EFSA by the EPCO-Team at the Federal Office for Consumer Protection and Food Safety (BVL) in Braunschweig in September and October 2004. The reports of these meetings have been made available to the Member States electronically.

A final discussion of the outcome of the consultation of experts took place with representatives from Member States on 18 May 2005 leading to the conclusions as laid down in this report.

During the peer review of the draft assessment report and the consultation of technical experts no critical issues were identified for consultation of the Scientific Panel on Plant Health, Plant Protection Products and their Residues (PPR).

In accordance with Article 8(7) of the amended Regulation (EC) No 451/2000, this conclusion summarises the results of the peer review on the active substance and the representative formulation

evaluated as finalised at the end of the examination period provided for by the same Article. A list of the relevant end points for the active substance as well as the formulation is provided in appendix 1.

The documentation developed during the peer review was compiled as a **peer review report** comprising of the documents summarising and addressing the comments received on the initial evaluation provided in the rapporteur Member State's draft assessment report:

- the comments received
- the resulting reporting table (rev. 1-2 of 1 July 2004)
- the consultation report

as well as the documents summarising the follow-up of the issues identified as finalised at the end of the commenting period:

- the reports of the scientific expert consultation
- the evaluation table (rev. 1-1 of 16 June 2005)

Given the importance of the draft assessment report including its addendum (compiled version of April 2005 containing all individually submitted addenda) and the peer review report with respect to the examination of the active substance, both documents are considered respectively as background documents A and B to this conclusion.

By the time of the presentation of this conclusion to the EU-Commission, the rapporteur Member State has made available amended parts of the draft assessment report (Volumes 1, 3 (B.2-B.5 and B7-B9) as rev. August 2004; Volumes 2, 3 (B.6) and 4 as rev. October 2004) which take into account mostly editorial changes. Since these revised documents still contain confidential information, the documents cannot be made publicly available. However, the information given can basically be found in the original draft assessment report together with the peer review report which both is publicly available.

THE ACTIVE SUBSTANCE AND THE FORMULATED PRODUCT

Tolclofos-methyl is the ISO common name for *O*-2,6-dichloro-*p*-tolyl *O,O*-dimethyl phosphorothioate (IUPAC).

Tolclofos-methyl belongs to the class of organophosphorus fungicides such as fosetyl and pyrazophos. The mode of action of tolclofos-methyl has not been well clarified in the end.

The representative formulated product for the evaluation was "Tolclofos-methyl 50 WP" ("Rizolex 50 WP"), a wettable powder (WP). It should be noted that two other preparations are mentioned in the DAR, a FS (flowable concentrate for seed treatment) and a DS (powder for dry seed treatment) preparation, but only for the WP a data package on physical, chemical and technical properties was presented in the DAR. The properties of the two other preparations were given in an addendum to the

DAR (August 2004). It should be noted that in some parts of the DAR they are also mentioned as SC and DP formulation, respectively.

The evaluated representative uses as fungicide comprise tuber (seed) treatment for potatoes and soil application for lettuce to control *Rhizoctonia* infections. The application rate is up to 0.25 kg tolclofos-methyl per tonne and 2 kg tolclofos-methyl per hectare, respectively. Tolclofos-methyl can be used only as fungicide.

SPECIFIC CONCLUSIONS OF THE EVALUATION

1. Identity, physical/chemical/technical properties and methods of analysis

The minimum purity of tolclofos-methyl as manufactured should not be less than 960 g/kg. At the moment no FAO specification exists. The technical material contains no relevant impurities.
However, since no validated analytical method for the determination of most of the impurities is available, the specification with respect to the maximum values of the impurities should be regarded as provisional at the moment.
Beside this, the assessment of the data package revealed no particular area of concern.
However, the data on the physical, chemical and technical properties of the FS (flowable concentrate for seed treatment) and the DS (powder for dry seed treatment) preparation which were stated in an addendum to the DAR (August 2004) have not been peer reviewed. Being aware that respective data will not give essential new aspects, it should also be noted that for these two preparations no data with respect to the Annex point IIIA 4 were given. Also the data for the Annex points IIIA 3 were mainly given for the WP formulation only.

The main data regarding the identity of tolclofos-methyl and its physical and chemical properties are given in appendix 1.

Sufficient test methods and data relating to physical, chemical and technical properties are available. Also adequate analytical methods are available for the determination of tolclofos-methyl in the technical material and in the representative formulation. At the moment no acceptable analytical method for the determination of most of the impurities in the technical material is available.
However, enough data are available to ensure that quality control measurements of the representative plant protection product are possible.

Adequate methods are available to monitor all compounds given in the respective residue definition, i.e. tolclofos-methyl in food of plant origin, soil, water and air.
The methodology used is GC with FPD or MS detection. Multi-residue methods like the Dutch MM1 or the German S19 are applicable for the determinations of the residues in food. The German S19 method was also validated for soil.

An analytical method for food of animal origin is not required due to the fact that no residue definition is proposed (see 3.2).

The discussion in the expert meeting on identity, physical and chemical properties and analytical methods certain properties of the preparation, some confirmatory issues on the enforcement methods and the acceptability of the analytical method for the determination of impurities in the technical material have been discussed.

Additional submitted studies, regarding the physical, chemical and technical properties of the FS and DS formulation, shelf life data for the WP, characteristics of the soil used for the validation of the enforcement method, the used absorption material in the air method, the starting material and validation data for the method for the determination of impurities in the technical material have been included in an addendum or in the revised DAR.

2. Mammalian toxicology

2.1. Absorption, Distribution, Excretion and Metabolism (Toxicokinetics)

Tolclofos-methyl was rapidly metabolised in both rats and mice and it was readily excreted (mainly via urine). The oral absorption was estimated to be >80%. It was widely distributed with a small distribution into tissues. There was no evidence of accumulation.

2.2. Acute toxicity

Tolclofos-methyl has low acute toxicity when administered orally, dermally or via inhalation (Rat LD_{50} oral and dermal > 5000 mg/kg bw, mouse LD_{50} oral ca. 3500 mg/kg bw, rat LC_{50} inhalation > 3.32 mg/L). It is neither a skin nor eye irritant. It is not a skin sensitizer by Buehler test, but a skin sensitizer by Maximization test and should be labelled with the risk phrase **R43 "May cause sensitisation by skin contact"**.

2.3. Short term toxicity

Following repeated oral administration of high doses of tolclofos-methyl, no evidence for cumulative toxicity was seen in rats, mice or dogs.

Reduced body weight development was seen in all three species and reduced food intakes were noted at the highest dose levels, except for food intake in mice. Increased plasma alkaline phosphatase activity and increased liver weights were recorded in dogs and rats. Reduced cholinesterase levels were seen in several studies and in all species.

The dog was considered to be the most sensitive species with a NOAEL of 600 ppm (21 mg/kg bw/day) in the 6-month study and 400 ppm (11 mg/kg bw/day) in the 12-month study, based on decreased body weight gain, increased liver weights and increased alkaline phosphatase activity.

2.4. GENOTOXICITY

The mutagenic potential of tolclofos-methyl was studied *in vitro* in bacteria and mammalian cells and *in vivo* in somatic cells and in germ cells. Overall, the results of the studies show that tolclofos-methyl does not raise any concern for genotoxicity.

2.5. LONG TERM TOXICITY

Tolclofos-methyl did not exhibit evidence of cumulative toxicity in chronic toxicity studies in rats or mice.

In mice, a decrease in cholinesterase activity mainly in the serum was seen in the two high dose groups and some variations in organ weights were noted (increased weights of kidneys, pituitary, and decrease in thymus weight), in the high dose group, but no change was detected in gross pathological findings at necropsy or in histopathological examinations.

No distinct compound-related organ or tissue changes were observed in rats.

Tolclofos-methyl demonstrated no carcinogenic potential up to the highest dose level tested in the rat and mouse. The carcinogenicity data on tolclofos-methyl suggests that it does not present a concern for carcinogenicity.

The relevant NOAEL was 6.4 mg/kg bw/day based on effects on cholinesterase in the mouse.

2.6. REPRODUCTIVE TOXICITY

A three-generation rat reproduction study conducted with tolclofos-methyl did not reveal evidence of reproductive toxicity up to the highest dose level tested. The relevant parental, offspring and reproductive NOAEL in the multigeneration study was 1000 ppm (70.6-98.5 mg/kg bw/day) (highest dose tested). There was no major mortality incidences induced by tolclofos-methyl.

Teratogenicity studies in rats and rabbits indicated no embryotoxic or teratogenic effects. The NOAEL for developmental toxicity was ≥1000 mg/kg bw/day (guideline limit dose). Maternal NOAEL is 300 mg/kg bw/day based on the death of a dam, abortions and decreased body weight gain and food consumption.

2.7. NEUROTOXICITY

Tolclofos-methyl showed no acute delayed neurotoxicity in a study with leghorn hens. The NOEL was determined to be 8000 mg/kg bw/day (highest technically possible dosage). No further neurotoxicity studies were performed, as there were no indications of neurotoxicity from the standard studies.

2.8. FURTHER STUDIES

An acute toxicity study with subcutaneous and intraperitoneal administration revealed toxic signs from 2000 mg/kg bw and up in mice when administered subcutaneously and the LD_{50} was > 5000 mg/kg bw. By the intraperitoneal route, tolclofos-methyl showed toxicity at 650 mg/kg bw in mice

and from 2000 mg/kg bw in rats; the LD_{50} values were about 5000 mg/kg bw and about 1200 mg/kg bw in rats and mice, respectively.

2.9. MEDICAL DATA

There was no evidence of adverse effects on workers exposed to tolclofos-methyl during handling and packaging.

2.10. ACCEPTABLE DAILY INTAKE (ADI), ACCEPTABLE OPERATOR EXPOSURE LEVEL (AOEL) AND ACUTE REFERENCE DOSE (ARFD)

ADI

The ADI was based on the NOAEL of 6.4 mg/kg bw/day obtained in the 2 year toxicity study in mice. By applying a safety factor of 100 the **ADI for tolclofos-methyl of 0.064 mg/kg bw/day** was derived.

AOEL

The AOEL was based on the NOAEL of 21 mg/kg bw/day from the 6-month toxicity study in dogs. By applying a safety factor of 100 the **AOEL for tolclofos-methyl of 0.2 mg/kg bw/day** could be derived. The expert meeting (EPCO 14, Oct 2004) discussed the possibility of setting additional AOELs to cover periods with possible longer exposure patterns. However, the meeting agreed on setting one AOEL and that the AOEL based on the NOAEL from the 6-month study in dogs should be adequate to cover uses with potentially longer exposure (e.g. lettuce).

ARfD

Taking into account the low acute toxicity of tolclofos-methyl, establishment of an ARfD was not deemed to be necessary.

2.11. DERMAL ABSORPTION

Dermal absorption of Tolclofos-methyl 50 SC was 0.02% during mixing/loading and 0.5% during application were estimated by using an *in vivo* study in the rat and by using comparative rat versus human *in vitro* studies.

2.12. EXPOSURE TO OPERATORS, WORKERS AND BYSTANDERS

Operator exposure

The outcome of the risk assessment was that estimated (UK POEM and German model) and/or measured (field study) exposures to tolclofos-methyl (WP/SC formulation containing 50% or DP dust formulation containing 10% tolclofos-methyl) are below the AOEL without PPE is for the proposed uses potato furrow spraying and dusting, and indoor lettuce use (automated and hand-held). The maximum application rate is 0.25 kg/ton for seed treatment and 2 kg/ha for spraying.

The roller table use in potatoes with the DP formulation (containing 10% tolclofos-methyl) was discussed at the EPCO expert meeting on toxicology (EPCO 14) in Oct. 2004 and it was agreed on that it has to be ratified at Member State level, since the study was considered to be of limited quality.

Estimated and measured operator exposure to tolclofos-methyl (SC = soluble concentrate, WP= wettable powder, DP= dustable powder) and % of AOEL (0.2 mg/kg bw/day).

Estimation	Crop/application method (formulation)	Result (% of AOEL)	
		no PPE	with PPE
UK POEM	Potatoes (SC) in-furrow spray	0.04 %	0.002 %
	Lettuce (WP) automatic sprayer hand-held sprayer	22 % 22 %	22 % 16 %
German model	Potatoes (SC) in-furrow spray	0.02 %	0.011 %
	Lettuce (WP) automatic sprayer hand-held sprayer	2 % 19 %	2 % 16 %
Field study	Potatoes (DP) planter hopper	Data not available	14 %

Worker exposure

The methods of applying tolclofos-methyl 50WP preclude subsequent worker exposure. Tolclofos-methyl 50WP is applied to soil in which lettuce will be sown in glasshouses and is then immediately incorporated into the soil. Tolclofos-methyl 50SC is applied in-furrow to seed potatoes at the time of planting. These application methods do not result in pesticide residues on foliage. Therefore, it is not necessary to estimate re-entry exposures for workers contacting foliage. Tolclofos-methyl dust formulations are always applied to seed potatoes in the hopper or in dusting machinery. The product is not applied to potatoes that are subsequently stored, which would result in potential exposures to workers transferring treated seed potatoes from storage to planters.

Additional studies to measure re-entry exposures to workers were not considered to be necessary.

Bystander exposure

It is most likely that bystanders would be exposed to a much lower extent than the operator. Bystander exposure has not been measured because no appreciable exposure is anticipated for most methods of application to lettuce and potatoes.

3. Residues

3.1. NATURE AND MAGNITUDE OF RESIDUES IN PLANT

3.1.1. PRIMARY CROPS

The metabolism of tolclofos-methyl has been studied in potatoes and lettuce using material uniformly radiolabelled in the phenyl ring. The application method was seed treatment and foliar application for potatoes and lettuce, respectively.

After seed treatment of potatoes the majority of tolclofos-methyl applied remained unchanged and associated to parent tubers. Limited translocation of ^{14}C-residues to roots, shoots, and daughter tubers was observed. The total residue level in daughter tubers was found to be low (<0.05 mg/kg) and analysis showed that five polar degradation products were present at levels of ≤ 0.013 mg/kg. However, it is noted that only a dosage rate 50% lower than the proposed Good Agricultural Practice (GAP) for southern Europe on early potatoes was investigated. Furthermore, 33% of TRR from daughter tubers was unextracted and not further analysed. Therefore an additional metabolism study in potato performed at a dosage rate of critical GAP in southern Europe on early potatoes is required.

Subject to confirmation by the outstanding metabolism study the currently proposed residue definition for risk assessment and monitoring purposes in potatoes is tolclofos-methyl.

Following foliar application of tolclofos-methyl to lettuce seedlings in the greenhouse at the recommended application rate, a total residue (TRR) of 0.23 mg/kg was present in mature plants at harvest. The level of unchanged tolclofos-methyl was major, amounting to 0.08 mg/kg or 37 % of TRR, respectively. Two major metabolites of polar nature (22% and 14% TRR; respectively) were isolated and identified as sugar conjugates of 2,6-dichloro-4-methylphenol (ph-CH_3) and hydroxmethyl-tolclofos-methyl (TM-CH_2OH); the remaining residue was below 0.05 mg/kg and mainly composed of an alkaline-extracted fraction and some unknown minor metabolites. The free forms of the identified metabolites are known as rat metabolites and therefore they are considered of no particular toxicological concern. Moreover, concentrations of all metabolites are expected to be well below the level of parent tolclofos-methyl following application on lettuce according to GAP. For these reasons, tolclofos-methyl is considered the only relevant residue in lettuce for risk assessment and monitoring purposes.

Due to the fact, that the investigation of the metabolic behaviour of tolclofos-methyl is limited to lettuce and seed potatoes, a final residue definition for plants in general can not be proposed.

The magnitude of tolclofos-methyl residues was investigated in a range of supervised residue trials on early and ware potatoes, mainly in northern EU). All trails were in accordance with the critical GAP; tolclofos-methyl was the only residue analysed. It is noted, that some earlier residue trials (years 1980 to 1993) were not performed in compliance with GLP, but were considered as scientifically valid by the RMS. For southern EU in total only four, more recent trials (2001) were presented. However, the RMS concluded that the residue level in those trials did not differ from that observed in the more recent northern EU trials (2000), which showed residues at or below the Limit of Quantification (LOQ) of 0.01 mg/kg. In contrast, the majority of the earlier northern EU trials showed residues above the LOQ, amounting up to 0.2 mg/kg. It is assumed that this phenomenon originates in a

sampling under more practical conditions by which the originally treated and, at the time of harvest, exhausted parent tuber might have contaminated the daughter tubers. To reflect practical conditions those trials were included in the assessment.

Residues of tolclofos-methyl do not contribute to an intake greater than 10% of the ADI, and therefore processing studies are normally not required. However, studies on the effects of peeling of potatoes on residues in peel and peeled potatoes have been submitted and indicate that residues present in non-peeled potatoes are reduced by peeling to the Limit of Quantification (LOQ), i.e. 0.01 mg/kg.

8 supervised residue trials were performed on lettuce grown in glasshouse. Four trials each were carried out in winter and summer lettuce, respectively. Residue data obtained from these trails resulted in two data sets with a PHI of 28 days for summer lettuce and 56 days for winter lettuce, as the latter is reaching slower its harvestable size. Analysis of these residue data sets revealed that residues levels observed at the time of harvest in summer lettuce differ from that in winter lettuce, and the residue data set for summer lettuce was identified as the more critical one. The expert meeting on residues concluded that both data sets cannot be combined for risk assessment purposes and for proposing an MRL. Therefore the majority of experts proposed that further residue data (four trials) are required for the use on summer lettuce with a PHI of 28 days.

Moreover, it is noted that the independency of the four available trials in summer lettuce seems to be questionable. Two sets of trials consisting of one decline study and one at harvest trial each were generated whereas variety, test site, time, growing conditions (temperature, moisture etc.) were identically for the trials of one respective set. Samples were taken from two different plots of the test site, resulting in two residue values per set. However, the available data in summer lettuce may be used for a provisional risk assessment. The application was made at a more developed stage of the lettuce plant (BBCH 18-19) than intended in the GAP (BBCH 14), and therefore a grave underestimation of the risk to consumers by applying the currently available data is deemed to be not very likely.

3.1.2. SUCCEEDING AND ROTATIONAL CROPS

Studies on residues in succeeding crops are not required because tolclofos-methyl declines rapidly in soil and no significant residues of tolclofos-methyl or its metabolites remain in soil until sowing or planting time of possible succeeding crops (see 4.1.2). Even if, due to failure of a crop, plant materials are incorporated into soil, there are no residues in succeeding crops expected.

3.2. NATURE AND MAGNITUDE OF RESIDUES IN LIVESTOCK

After oral administration to goat and hen, tolclofos-methyl was rapidly metabolised and excreted. Metabolism proceeded mainly by oxidative desulfuration, oxidation of the 4-methyl-group, demethoxylation and cleavage of the phosphorus-oxygen-aryl bond, leading to a variety of metabolites in free and conjugated form. The established metabolic pattern is mainly based on analysis of hen excreta and goat urine. It was noted by the expert meeting on residues that only limited identification of metabolites in the edible animal matrices was carried out.

In the analyzed tissue samples, i.e. kidney and liver of both species and goat milk no parent tolclofos-methyl was detected, whereas 3,5-dichloro-4-hydroxybenzoic acid (ph-COOH, 9-21% TRR) was a major metabolite. In milk, also desulfurated tolclofos-methyl (TMO) accounted for a major part of the residue (42% TRR). Eggs, fat and muscle tissue haven't been analysed further, even if residues in goat and hen fat amounted to 1 mg/kg each in the respective studies. Considering that tolclofos-methyl is classified as fat-soluble (log Pow 4.6) it remains unclear whether or not unchanged tolclofos-methyl would have been identified in fat tissue. However, as the highest residues were found in liver and kidney an accumulation of residues in fat tissue is not assumed. Due to the limited identification of metabolites in the edible animal matrices a residue definition has not been proposed.
It is noted that both studies show various deficiencies. The recovery of the total administered radioactivity in goat was very low (less than 50%). The poultry metabolism showed that due to the very high dosing level a considerable amount of the administered tolclofos-methyl passed the GI tract unabsorbed, so that no linear correlation between dose and residue level in matrices can be assumed.
Based on the exaggerated dose rate in the metabolism studies compared to the expected exposure of livestock it was concluded by the experts that residues in animal products would be lower than 0.01 mg/kg, even if extrapolation from studies carried out at exaggerated doses may result in some uncertainty. It was assumed: first that the residue definition in potato will be confirmed by the outstanding metabolism study on potatoes, second that the highest residue in potatoes was at the level of the provisionally proposed MRL of 0.1 mg/kg, and, third that potato is not fed to livestock frequently. Therefore the meeting agreed that at present further studies were not required. However, the experts noted, that this should be reconsidered when the underlying assumptions change.
After the evaluation meeting the RMS confirmed, that in supervised residue trials according to critical GAP a highest residue of 0.2 mg/kg in potato was found. It is important to note that the entire residue is concentrated in the peel; the transfer factor from whole potato to peel was up to 6.6. Potato or potato peel may be used in livestock diet. Taking into account the weakness of the currently available data on livestock metabolism and the uncertainty relating to the exaggerated dose level used in these studies, EFSA considers it difficult to be confident that residues above 0.01 mg/kg in edible animal products would never occur. Therefore EFSA proposes that the following data should be submitted to support the use on potatoes: metabolism data in livestock investigating the nature and level of residues occurring in any edible animal tissue. If these metabolism data indicate that residue levels above LOQ could occur, a livestock feeding study would also be required.

3.3. CONSUMER RISK ASSESSMENT

The chronic dietary exposure assessment for consumers is based on data obtained from residue trials in potatoes and lettuce and on consumption data from the WHO/GEMS Food European diet, on consumption data of UK consumers and on the German diet of a 4-6 year old girl. All estimates lead to low TMDI values and the contribution to the proposed ADI of 0.064 mg/kg bw is at maximum 1.6 % for adults, 1.5 % for schoolchildren, 2.9 % for toddlers and 1.8 % of the ADI for infants. However, this assessment is provisional and needs to be reviewed upon receipt of the outstanding data.

An ARfD was not allocated for tolclofos-methyl (See 2.10), thus tolclofos-methyl residues on food do not pose an acute risk to consumers.

3.4. PROPOSED MRLS

Subject to confirmation of the residue definition for potatoes (tuber treatment) a provisional MRL of 0.1 mg/kg was proposed. The MRL proposal for lettuce is based on the critical data set, consisting of 2 sets of trials on summer lettuce. Subject to confirmation by four more trials on summer lettuce a provisional MRL of 1.0 mg/kg is proposed.
For food of animal origin MRLs are currently not proposed.

Codex MRLs are in place for tolclofos-methyl, amongst others on potatoes (0.2 mg/kg) and lettuce (2.0 mg/kg). JMPR has proposed these MRLs based on GAP different from that evaluated in the DAR. However, the Codex MRLs for potatoes and lettuce do not lead to any concern in terms of consumer safety.

4. Environmental fate and behaviour

Fate and behaviour risk assessment is based on the representative uses as described in the end points list table and under point 3.2 of the Annex B.3 of the DAR. For potatoes it means that only application on the tuber before planting (either in a planting hopper or a roller table) is covered by this risk assessment. In furrow spray at planting has therefore not been assessed.

4.1. FATE AND BEHAVIOUR IN SOIL

4.1.1. ROUTE OF DEGRADATION IN SOIL

Information on metabolism of tolclofos-methyl in soil under dark aerobic conditions is provided in two studies. One study with phenyl labelled tolclofos-methyl in four soils at 20°C and another study with phenyl labelled tolclofos-methyl in three soils at 10°C and in one soil at 15°C. The soils covered a range of pH values (5.3 – 8.1), clay contents (6.0 – 32 %) and organic carbon contents (1.4 – 4.5 %).
In the studies at 20°C two metabolites were detected, **DM-TM** (*O*-methyl *O*-hydrogen *O*-(2,6-dichloro-4-methylphenyl)phosphate, maximum 13% AR after 3 days) and ph-CH_3 (2,6-dichloro-4-methylphenol, maximum 8% AR after 3 days). Both were detected only sporadically and only occurred at significant quantities in one of the four soils and declined to <1% by day 30. In the other three soils the two metabolites did not exceed 4.1% of applied radioactivity. Other metabolites were detected but individually identified degradates did not exceed 6% of applied radioactivity. Non-extractable residues were formed at a maximum of 49 to 64 % (15 - 30 d, 20°C) and 45 to 57% (112 d, 10°C) of the applied radioactivity. CO_2 was formed at a maximum of 27 to 43% of applied radioactivity at study end.
At anaerobic conditions no metabolites were found in amounts >10 % of applied radioactivity.

A soil photolysis study is available where it has been demonstrated that photolysis will not significantly contribute to the overall degradation of tolclofos-methyl under environmental conditions.

4.1.2. PERSISTENCE OF THE ACTIVE SUBSTANCE AND THEIR METABOLITES, DEGRADATION OR REACTION PRODUCTS

Degradation rate of tolclofos-methyl was investigated with data from the studies performed with the phenyl labelled tolclofos-methyl in four soils at 20°C, in three soils at 10°C and in one soil at 15°C. DT_{50} values in the range of 3.1 – 5.4 days (mean = 3.95 days, r^2= 0.99 – 1.0) was obtained using a 2-phase exponential model. The RMS recalculated the DT_{50}s at 20°C using log-transformed data and first order kinetics, taking into account the time points from day zero until day 90 (or day 60 in the case of one soil). This resulted in DT_{50} values in the range of 10 – 17 days (mean = 15 days, r^2= 0.70 – 0.83).
At 10°C, the first order DT_{50} values were 23-30 days (mean 27 days, n=3). It is thus concluded that tolclofos-methyl is low to moderate persistence in aerobic soil.

At anaerobic conditions half life is only slightly longer than under aerobic conditions (first order DT_{50}= 31 d).

Degradation of the metabolite DM-TM was studied in three soils (1.2 to 3.2%oc, pH 5.3 to 8.0), and was found to be very low persistent with DT_{90} <3 days.

Worst case PEC values in soil was modelled based on the application rate in lettuce, an even distribution in the upper 5cm of soil and a soil density of 1.5 g/cm^3. The mean laboratory DT_{50} of 3.95 days (two-phase exponential model) was used to model the decline of the compound. For comparison, PEC values based on a worst case DT_{50} of 17 days (1st order kinetics) was provided by the RMS in the DAR. However, only initial PEC soil was used for the EU risk assessment.

4.1.3. MOBILITY IN SOIL OF THE ACTIVE SUBSTANCE AND THEIR METABOLITES, DEGRADATION OR REACTION PRODUCTS

The sorption of tolclofos-methyl was studied in a batch adsorption/desorption study with four soils with results indicating a low potential for mobility in soil (K_{oc} = 1649-6139). No relationship between the adsorption of tolclofos-methyl and the pH of the soil was observed.

The adsorption/desorption of DM-TM was investigated in a batch equilibrium experiment. K_{oc} values obtained were in the range 11 to 22, indicating a very high mobility potential.

4.2. FATE AND BEHAVIOUR IN WATER

4.2.1. SURFACE WATER AND SEDIMENT

Hydrolysis of tolclofos-methyl in water was determined at 50, 62 and 74°C at pH 4, 7 and 9. From the derived data DT_{50}s were estimated at 20 and 25°C using the Arrhenius equation, and found to be 126, 97 and 102 days for the respective pH at 20°C. Hence, it is concluded that tolclofos-methyl is not prone to hydrolysis under environmental conditions.

Degradation of tolclofos-methyl seems to be slightly enhanced by irradiation. However, in natural surface waters photolysis is concluded to be of little importance due to a rapid sorption to particles and portioning to sediment.

Tolclofos-methyl was not readily degraded in a ready biodegradability test.

The degradation of [^{14}C]-tolclofos-methyl was examined in two water/sediment systems over a 100 day time period. Degradation within the water/sediment systems proceeded via cleavage of the P-O methyl and P-O aryl linkages to form DM-TM and ph-CH_3 respectively, further breakdown then occurred to CO_2 and unextractable residues. Radioactivity in the water phase declined rapidly to 46 to 61% of applied radioactivity at the beginning of the study and then declined further to 1.3 - 4.3% of applied radioactivity at the study end. Corresponding residues in the sediment increased to 53 - 81% of applied radioactivity after 7 days and then declined to 26 to 29 % of applied radioactivity by the study end. Unextractable residues in sediment occurred at maximums of 26 to 35% of applied radioactivity on days 62 and 76. Carbon dioxide increased throughout the study to a maximum of 36 to 53% of applied radioactivity by the study end. However, a significant amount of tolclofos-methyl was detected as volatiles with over 30% of applied radioactivity detected at certain time points. The variation in the amount trapped appeared to be due to the variation in the rate of flow of air through the systems.

Tolclofos-methyl declined relatively rapidly in the water phase with a DT_{50} of 0.9 to 1.6 days, to non-detectable levels by the end of the study. Much of this decline was due to partitioning to sediment and residues of tolclofos-methyl within sediment were 35 to 48% of applied radioactivity at the beginning of the study rising to 49 to 73% of applied radioactivity after 3 to 7 days and then declining with a DT_{50} of 19 to 27 days, to 2.4 to 5.4% of applied radioactivity by the end of the incubation period. The metabolite DM-TM was the sole metabolite detected in significant quantities in both water and sediment, occurring at respective maximums of 11 and 13% of applied radioactivity. The metabolite degraded at a similar rate in both water and sediment with a DT_{50} of 27 to 43 days.

In conclusion, the route of degradation of tolclofos-methyl in the aquatic environment seems to be mainly biotic, while both hydrolytic and photolytic breakdown is slow and of minor importance. Tolclofos-methyl and its breakdown products are unlikely to persist in natural aquatic environments for long time periods.

For the use on lettuce in glasshouses PECsw was estimated based on the Dutch national model assuming 0.1% emission to an adjacent water body. This was discussed as a general point in the experts meeting on fate and behaviour (EPCO 12, 20-23 September 2004). The meeting agreed to the use of the 0.1% emission rate for illustrative purposes and to identify a safe use in this instance. However, the meeting noted that the 0.1% loss may not be a worse case for all substances and all types of glasshouse use at EU level. The meeting also noted that at present there are no scenarios available at EU level to assess losses from greenhouses. A note was added to the list of endpoints that the PECsw was derived based on the Dutch national model and that other MS may consider this at the national level.

At the EFSA evaluation meeting 26 May 2004, the issue of possible surface water contamination from seed potato treatment was raised. FOCUS surface water calculation were therefore undertaken, summarised in an addendum of August 2004, and discussed at the experts meeting (EPCO 12, 20-23 September 2004). In the experts meeting it was pointed out that the calculations should have been conducted with application set to a depth of 10 cm and not with even distribution in the top 10 cm. The calculations were therefore amended and presented in an updated addendum of October 2004. While the calculations were not peer reviewed by the fate and behaviour in the environment expert meeting, EFSA supports the assessment made by the RMS. The study was performed before the release of the EFSA opinion on application of FOCUS sw for non sprayed products but the approach followed is in line with the principles given in this opinion[3]. FOCUS sw Step 3 calculations show that in all applicable run-off and drainage scenarios PEC sw for tolclofos are equal or below 0.001 µg / L for the use as seed treatment.

4.2.2. POTENTIAL FOR GROUND WATER CONTAMINATION OF THE ACTIVE SUBSTANCE THEIR METABOLITES, DEGRADATION OR REACTION PRODUCTS

On the basis of FOCUS-PEARL model simulations neither tolclofos-methyl nor DM-TM are expected to exceed the 0.1 µg / L trigger in ground water.

4.3. FATE AND BEHAVIOUR IN AIR

The calculated dimensionless Henry's Law Coefficient for tolclofos-methyl is 1.79 x 10^{-4} and thus suggests that the compound may partition from soil, moist surfaces and water to air. This was also confirmed in the water/sediment study. However, a calculation according to the Atkinson method shows that the degradation half-life in air is 5.30 hours. Therefore, should tolclofos-methyl reach air, it is expected that the compound will not persist and will be rapidly degraded not giving rise to long range transport concerns. For short term transport, the relatively low rate proposed for the representative uses limits the potential concern. However, MS may need to assess potential short term transport for other uses with higher application rates.

[3] Opinion of the Scientific Panel on Plant health, Plant protection products and their Residues on a request from EFSA on the appropriateness of using the current FOCUS surface water scenarios for estimating exposure for risk assessment in aquatic ecotoxicology in the context of Council Directive 91/414/EEC (Question N° EFSA-Q-2004-55). *The EFSA Journal* (2004) 145, 1-31. (http://www.efsa.eu.int/science/ppr/ppr_opinions/772_en.html)

5. Ecotoxicology

5.1. RISK TO TERRESTRIAL VERTEBRATES

The representative uses for tolclofos-methyl are a soil application in lettuce in glass houses and as a tuber dressing for potatoes.

No exposure to birds and mammals is expected from a soil application in lettuce in glass houses and hence the risk to birds and mammals from this representative use is considered addressed.

No scenario is foreseen for an application as a tuber dressing of potatoes in the Guidance Document on Birds and Mammals (SANCO/4145/2000). Although no significant exposure to birds and mammals from this representative use is expected, exposure was calculated according to Hoerger and Kenaga (1978). For birds and mammals exposure via leafy foliage, small insects, large insects and fruits was assessed, all resulting in TER values above the appropriate Annex VI trigger value and hence the acute, short and long term risk to birds and the acute and long term risk to mammals can be considered as low for the representative use in potato.

Also the risk from secondary poisoning was assessed as the log Pow exceeds 3.

The scenario for fish eating birds and mammals was not considered relevant by the RMS as the representative use evaluated for tolclofos-methyl is in glasshouse or as a tuber dressing and no contamination of surface water via spray drift occurs. As contamination of surface water is possible via drainage and run-off of the use as a tuber dressing, the predicted environmental concentrations in surface water were calculated according to FOCUS (see point 4.2.1). Based on FOCUS step 3 calculations there will be no exposure of aquatic systems to tolclofos-methyl when used as a potato tuber dressing and hence the risk to fish eating birds and mammals from this representative use can be considered as low. As tolclofos-methyl can enter surface water via emission from glasshouses adjacent to water bodies a risk assessment for fish eating birds and mammals for this representative use is presented in the addendum by EFSA. The resulting long term TER values are above the respective trigger value indicating a low risk to fish eating birds and mammals from the representative use of tolclofos-methyl in lettuce in glass houses.

The risk for earthworm eating birds and mammals can be considered low for the representative uses evaluated.

5.2. RISK TO AQUATIC ORGANISMS

Oncorhynchus mykiss was the most sensitive species from all aquatic species tested with tolclofos-methyl. *Scenedesmus subspicatus* was the most sensitive species from all aquatic species tested with the 50 WP formulation.

The predicted environmental concentrations in surface water were calculated according to FOCUS for the representative use in potatoes. These values have been revised by the RMS after the EPCO 12 expert meeting on Fate and behaviour. EFSA agrees with these revised values (see point 4.2.1). Fate and behaviour risk assessment is based on the representative uses as described in the end points list table and under point 3.2 of the Annex B.3 of the DAR. For potatoes it means that

only application on the tuber before planting (either in a planting hopper or a roller table) is covered by this risk assessment. In furrow spray at planting has therefore not been assessed. Based on FOCUS step 3 calculations there will be no exposure of aquatic systems to tolclofos-methyl when used as a potato tuber dressing and hence the risk to aquatic organisms from this representative use can be considered as low.
The predicted environmental concentrations in surface water were calculated according to the Dutch national model (0.1% emission from glasshouse uses) for the representative use in lettuce. The resulting TER-values are all above the appropriate Annex VI trigger values and hence the risk to aquatic organisms can be considered as low for the representative use in lettuce.

A study on the long term effects to fish and *Daphnia magna* is available with tolclofos-methyl. The resulting TER-values indicate a low risk (Annex VI trigger not breached).

Tolclofos-methyl appears above 10% in the sediment and hence the risk to sediment dwelling organisms needs to be addressed. As the long term NOEC value for *Daphnia magna* of tolclofos-methyl exceeds 0.1 mg/L, no study with sediment dwelling organisms is considered necessary. But a study was made available and the resulting TER value (for the representative use in lettuce, no exposure situation in potatoes (see above)) indicates a low risk to sediment dwelling organisms from the active substance as the Annex VI trigger value is not breached.
Also the metabolite DM-TM appears above 10 % in the sediment. Neither a chronic study with Daphnia magna nor a study on sediment dwelling organisms with this metabolite is available. But DM-TM was observed in the test-media of the study with the parent compound at concentrations above the predicted environmental concentration in sediment. Therefore the risk to sediment dwelling organisms from the metabolite DM-TM is considered addressed by the study with the parent compound.

The metabolite DM-TM was also acutely tested on fish, Daphnia magna and algae. The metabolite is more than one order of magnitude less toxic to fish and Daphnia magna than the parent compound and of similar toxicity to algae. Based on the resulting TER-values the risk from the metabolite can be considered as low (Annex VI trigger not breached).

A study on bioconcentration in fish is provided as the Log Pow exceeds 3. The RMS considers the resulting BCF-value as only indicative as the study was not performed according to OECD Guideline 305. It was not considered necessary to repeat this study as, for both representative uses under assessment, the risk for contamination of the aquatic environment is considered to be low based on the low mobility and relatively rapid degradation of the active substance.

The active substance should be labelled with N, R50/53 based on the toxicity to fish and algae.

5.3. RISK TO BEES

An acute contact toxicity study with tolclofos-methyl is available. The resulting HQ value does not breach the appropriate Annex VI trigger value indicating a low risk to bees.

Exposure is considered to be low for the representative use as a tuber dressing in potatoes, as tolclofos-methyl is not translocated in plants, and exposure to bees is considered low for the representative use in lettuce as this is an application in glasshouses. Therefore no further studies are considered necessary.

5.4. RISK TO OTHER ARTHROPOD SPECIES

Toxicity to non-target arthropods was low in a laboratory study on the indicator species *Typhlodromus pyri* but the toxicity was high in a laboratory study on the indicator species *Aphidius rhopalosiphi*. Further testing indicated no adverse effects on *Aphidius rhopalosiphi* in an extended laboratory study and no adverse effects on the ground dwelling predators, *Poecilus cupreus* and *Aleochara bilineata* and the foliage dwelling species *Orius sauteri* and *Chrysoperla carnea*. No effects higher than the Escort II trigger value of 50 % were observed for any of the measured parameters at a dose rate of 2 kg a.s./ha (1000 ppm for the foliage dwelling species). Hence, the risk for harmful effects to populations of non-target arthropods can be regarded as low for the evaluated representative uses of tolclofos-methyl.

The tested formulation on non-target arthropods is a 25 WP formulation. The need for further studies with the lead formulations (a 500 FS, a 10% DP and a 50% WP formulation) was discussed at the EPCO 13 expert meeting on ecotoxicology. The meeting agreed that any potential difference between the tested formulation and the lead formulations would not change the risk assessment for non-target arthropods as the risk assessment is primarily driven by the active substance, there will be limited exposure to the formulations and more general exposure to the active substance as it disperses.

5.5. RISK TO EARTHWORMS

Studies on the acute toxicity to earthworms from tolclofos-methyl, a 25 SC and a 10% dust formulation are available. The endpoints were corrected for the high logPow. The TER-values resulting from the endpoints derived from these studies do not breach the Annex VI trigger value indicating a low acute risk to earthworms for the representative uses.

No studies with the lead formulations on earthworms are available. No further studies with the lead formulations were considered necessary by the EPCO 13 Expert Meeting on ecotoxicology as there were no substantive differences between the results of the three available studies on the acute toxicity to earthworms(see above).

No study with the major soil metabolite DM-TM is available. The RMS does not consider such a study necessary as the risk from this metabolite is considered to be addressed by the study with the parent compound. An argumentation concerning this issue is presented in the addendum of August 2004 which was accepted by the EPCO 13 Expert Meeting on ecotoxicology.

Due to its rapid transformation in soil (DT_{90} in soil < 100 days), no long term risk is expected from the compound and the major metabolite DM-TM.

5.6. RISK TO OTHER SOIL NON-TARGET MACRO-ORGANISMS

Tolclofos-methyl is not expected to be persistent in soil, additionally no adverse effects were observed on earthworms and soil micro-organisms.

The toxicity was high to the non target arthropod *A. rhopalosiphi*. EFSA agrees with the RMS that no studies on soil macro-organisms are necessary because of this as effects were lower than the Escort II trigger value of 50% at the highest in-field dose of the representative uses evaluated in an extended laboratory study for this species and no effects were seen on the second indicator species *Typhlodromus pyri.*

Therefore, no testing on other soil non-target macro-organisms is considered necessary for the compound and its major metabolite DM-TM.

5.7. RISK TO SOIL NON-TARGET MICRO-ORGANISMS

The effects of tolclofos-methyl were tested on soil microbial respiration and nitrogen transformation. No deviations of more than 25 % after 12 weeks were observed (i.e. no breaching of the Annex VI trigger value) and hence the risk to soil non-target micro-organisms is considered to be low.

No studies with the lead formulation are considered necessary as the DT_{90} < 100 days and effects on soil micro-organisms were less than 25% after 12 weeks in studies with the active substance.

No study with the major soil metabolite DM-TM is available. The RMS does not consider such a study necessary as the risk from this metabolite is considered to be addressed by the study with the parent compound. An argumentation concerning this issue is presented in the addendum of August 2004 which was accepted by the EPCO 13 Expert Meeting on ecotoxicology.

5.8. RISK TO OTHER NON-TARGET-ORGANISMS (FLORA AND FAUNA)

The insecticidal and herbicidal activity of tolclofos-methyl was evaluated against three species of insects and three species of plants. On the basis of the results obtained from these preliminary tests, no marked insecticidal or herbicidal activity can be expected.

5.9. RISK TO BIOLOGICAL METHODS OF SEWAGE TREATMENT

No effects were seen at the highest concentration tested (100 mg/L). The risk for biological methods of sewage treatment is considered to be low.

6. Residue definitions

Soil

Definitions for risk assessment: Tolclofos-methyl, DM-TM.

Definitions for monitoring: Tolclofos-methyl

Water

Ground water

Definitions for risk assessment: Tolclofos-methyl

Definitions for monitoring: Tolclofos-methyl

Surface water

Definitions for risk assessment: Tolclofos-methyl, DM-TM

Definitions for monitoring: Tolclofos-methyl

Air

Definitions for risk assessment: Tolclofos-methyl

Definitions for monitoring: Tolclofos-methyl

Food of plant origin

Definitions for risk assessment: tolclofos-methyl (restricted to leafy crops; seed treated root/tuber crops)

Definitions for monitoring: tolclofos-methyl (restricted to leafy crop; seed treated root/tuber crops)

Food of animal origin

Definitions for risk assessment: not proposed

Definitions for monitoring: not proposed

Overview of the risk assessment of compounds listed in residue definitions for the environmental compartments

Soil

Compound (name and/or code)	Persistence	Ecotoxicology
Tolclofos-methyl	Low to moderate persistent ($DT_{50lab\ 20°C}$ = 10 – 17 d)	See points 5.5, 5.6 and 5.7
DM-TM	Very low persistent ($DT_{90\ lab\ 20°C}$ < 3 d)	Risk to earthworms, other non-target macro-organisms and soil micro-organisms is considered to be low.

Ground water

Compound (name and/or code)	Mobility in soil	> 0.1 µg / L 1m depth for the representative uses (at least one FOCUS scenario or relevant lysimeter)	Pesticidal activity	Toxicological activity	Ecotoxicological activity
Tolclofos-methyl	Low (K_{oc} = 1649-6139 mL / g)	FOCUS: No scenarios above trigger 0.1 µg / L	Yes, to be assessed by Member States	Yes	See point 5.2.
DM-TM	Very high (K_{oc} = 11 – 22 mL /g)	FOCUS: No scenarios above trigger 0.1 µg / L	Not known.	No data available; no data required	The risk to aquatic organisms is considered low (trigger not breached) based on an acute toxicity study with fish and *Daphnia magna*, a toxicity study with algae and a toxicity study with *Chironimus riparius.*

Surface water and sediment

Compound (name and/or code)	**Ecotoxicology**
Tolclofos-methyl (water and sediment)	See point 5.2.
DM-TM (water and sediment)	The risk to aquatic organisms is considered low (trigger not breached) based on an acute toxicity study with fish and *Daphnia magna*, a toxicity study with algae and a toxicity study with *Chironimus riparius.* The risk is lower than the risk from the parent compound.

Air

Compound (name and/or code)	**Toxicology**
Tolclofos-methyl	Not toxic during acute inhalatory exposure, no studies on repeated exposure, see point 2.2 and 2.3

LIST OF STUDIES TO BE GENERATED,-STILL ONGOING OR AVAILABLE BUT NOT PEER REVIEWED

- An analytical method for impurities in the technical material (date of submission unknown, data requirement identified by the expert meeting on phys.-chem. properties and analytical methods in September 2004, EPCO 11)
- Data concerning the so-called "further information" must be submitted for the FS (flowable concentrate for seed treatment) and the DS (powder for dry seed treatment) preparation (date of submission unknown, data gap identified at the evaluation meeting in May 2004, but has not considered further since only the WP preparation was regarded as the representative formulation)
- Data on the physical, chemical and technical properties of the FS (flowable concentrate for seed treatment) and the DS (powder for dry seed treatment) preparation which are stated in an addendum to the DAR (August 2004) have not been peer reviewed.
- A metabolism study on potato (relevant for the use on potatoes; study has been submitted to the RMS but has not been evaluated; refer to point 3.1)
- Four confirmatory residue trials on lettuce (relevant for the representative use on lettuce; submission date proposed by the notifier: July 2005; refer to point 3.1)
- Further data on metabolism in livestock investigating nature and level of residues occurring in any edible animal tissue. If these metabolism data indicate that residue levels above LOQ could occur, a livestock feeding study would also be required. (relevant for the use on potatoes; refer to point 3.2)

CONCLUSIONS AND RECOMMENDATIONS

Overall conclusions

The conclusion was reached on the basis of the evaluation of the representative uses as fungicide as proposed by the notifier which comprises tuber (seed) treatment for potatoes and soil application for lettuce to control Rhizoctonia infections. The application rate is up to 0.25 kg tolclofos-methyl per tonne and 2 kg tolclofos-methyl per hectare, respectively. Tolclofos-methyl can be used only as fungicide.The representative formulated product for the evaluation was “Tolclofos-methyl 50 WP” ("Rizolex 50 WP"), a wettable powder (WP). However, two more formulations are mentioned in the DAR, a FS (flowable concentrate for seed treatment) and a DS (powder for dry seed treatment) formulation.

Adequate methods are available to monitor all compounds given in the respective residue definition. Multi-residue methods like the Dutch MM1 or the German S19 are applicable for the determinations of the residues in food. The German S19 method was also validated for soil. For the other matrices only single methods are available to determine residues of tolclofos-methyl.

Sufficient test methods and data relating to physical, chemical and technical properties are available. Also adequate analytical methods are available for the determination of tolclofos-methyl in the

technical material and in the representative formulation. At the moment no acceptable analytical method for the determination of most of the impurities in the technical material is available.
However, enough data are available to ensure that quality control measurements of the representative plant protection product are possible.

Tolclofos-methyl was rapidly metabolised in both rats and mice. The oral absorption was estimated to be >80%, and there was no evidence of accumulation. It displays low acute toxicity but is considered to be a skin sensitizer and should be labelled with the risk phrase **R43 "May cause sensitisation by skin contact"**.
Following repeated oral administration of high doses of tolclofos-methyl, no evidence for cumulative toxicity was seen in rats, mice or dog. Reduced body weight development and reduced cholinesterase levels were seen in all three species. The relevant NOAEL in the short-term studies was 21 mg/kg bw/day from the 6-month study and 11 mg/kg bw/day from the 12-month study in dog, based on decreased body weight gain, increased liver weights and increased alkaline phosphatase activity.
Tolclofos-methyl does not present any concern for genotoxicity.
Tolclofos-methyl did not exhibit evidence of cumulative toxicity in chronic toxicity studies in rats or mice, and it demonstrated no carcinogenic potential up to the highest dose level tested. A three-generation rat reproduction study conducted with tolclofos-methyl did not reveal evidence of reproductive toxicity up to the highest dose level tested. The NOAEL for reproductive toxicity was 70.6-98.5 mg/kg bw/day (highest dose tested).
Teratogenicity studies in rats and rabbits indicated no embryotoxic or teratogenic effects. The NOAEL for developmental toxicity was ≥1000 mg/kg bw/day.
Tolclofos-methyl showed no acute delayed neurotoxicity and no further neurotoxicity studies were performed, as there were no indications of neurotoxicity from the standard studies.
The proposed **ADI is 0.064 mg/kg bw/day,** based on the NOAEL of 6.4 mg/kg bw/day from the 2 year toxicity study in mice.
The proposed **AOEL is 0.2 mg/kg bw/day,** based on the NOAEL of 21 mg/kg bw/day from the 6-month toxicity study in dogs.
No ARfD was established.
The outcome of the risk assessment for tolclofos-methyl (WP/SC formulation containing 50% tolclofos-methyl or dust formulation containing 10% tolclofos-methyl) based on UK POEM and German model and field study estimates demonstrated the estimated exposures were below the AOEL without PPE for the proposed uses potato furrow spraying and dusting, and indoor lettuce use (automated and hand-held). Roller table use (formulation DP) needs to be ratified at Member State level, since the study was considered to be of limited quality (concluded at the expert meeting). The dermal absorption values are 0.02% during mixing/loading and 0.5% during application.

After tuber treatment of potatoes and foliar application to lettuce unchanged tolclofos-methyl represents the major part of the total residue in these crops and no metabolites of toxicological concern were formed. Because the available metabolism study on potatoes shows deficiencies, a new study was required. Subject to confirmation by that study, tolclofos-methyl as the residue of concern

was analysed in a range of supervised residue trials on potatoes, resulting in a highest residue of 0.2 mg/kg from trials under critical GAP conditions. From indoor lettuce trials a difference of residue levels in summer lettuce compared to that in winter lettuce became evident. Further residue data are required to conclude on the residue situation in summer lettuce.
If potatoes with tolclofos-methyl residues are fed to livestock, with the data currently available it is not possible to exclude, that residues above 0.01 mg/kg could occur in edible animal products. Investigations in livestock animals are triggered by the residues levels in potential feeding items according to current guidelines and the available animal metabolism studies show various deficiencies. Thus, the provision of further data on metabolism in livestock is proposed.
The chronic dietary exposure assessment for consumers based on the currently available information leads to estimated intakes less than 3% of the proposed ADI for all considered consumer subgroups. However, this assessment is provisional and needs to be reviewed upon receipt of the outstanding data. An ARfD was not allocated, thus there is no acute risk for consumers arising from tolclofos-methyl residues in food.

At 20°C in soil tolclofos-methyl yields two main metabolites, DM-TM and ph-CH_3. Both were detected only sporadically and only DM-TM > 10 % AR. Non-extractable residues were formed at a maximum of 49 to 64 % AR. CO_2 was formed at a maximum of 27 to 43% AR at study end.
Photolysis will not significantly contribute to the overall degradation of tolclofos-methyl under environmental conditions.
Tolclofos-methyl is low to moderate persistent in aerobic soil ($DT_{50\ 20°C}$ =10 – 17 d). At anaerobic conditions half life is only slightly longer than under aerobic conditions (DT_{50}= 31 d). Metabolite DM-TM was found to be very low persistent with DT_{90} <3 days.
PEC values in soil were modelled by the notifier using the mean laboratory DT_{50} of 3.95 days (two-phase exponential model). For comparison, PEC values based on a first order worst case (DT_{50} = 17 d) were provided by the RMS. However, only initial PEC soil was used for the EU risk assessment.
Batch adsorption/desorption studies indicates a low potential for mobility in soil for tolclofos-methyl and very high mobility potential for DM-TM.
Tolclofos-methyl is not prone to hydrolysis under environmental conditions and degradation seems to be slightly enhanced by irradiation. Tolclofos-methyl is not readily biodegradable.
Degradation within the water/sediment systems proceeded via cleavage of the P-O methyl and P-O aryl linkages to form DM-TM and ph-CH_3. Tolclofos-methyl declined relatively rapidly in the water phase (DT_{50} = 0.9 - 1.6 d) mainly due to partitioning to sediment. Residues of tolclofos-methyl within sediment rise to 49 to 73% AR after 3 to 7 days and then declining (DT_{50} = 19 - 27 d). The metabolite DM-TM was the sole metabolite detected in significant quantities in both water and sediment and degraded at a similar rate in both phases (DT_{50} = 27 - 43 d). Unextractable residues in sediment occurred at maximums of 26 to 35 % AR. Carbon dioxide increased throughout the study and up to 30 % AR of tolclofos-methyl was detected as volatiles. Degradation of tolclofos-methyl in the aquatic environment seems to be mainly biotic. Tolclofos-methyl and its breakdown products are unlikely to persist in natural aquatic environments for long time periods.

For the use on lettuce in glasshouses, PECsw were estimated based on the Dutch national model assuming 0.1% emission to an adjacent water body for illustrative purposes. The 0.1% loss may not be a worse case for all substances and all types of glasshouse use at EU level and MS may reconsider this at the national level.
Possible surface water contamination from seed potato treatment was addressed with FOCUS surface water calculations conducted with application set to a depth of 10 cm (updated Addendum October 2004). In all applicable run-off and drainage scenarios PEC sw for tolclofos-methyl are below 0.001 µg / L for the use as seed treatment.
Neither tolclofos-methyl nor DM-TM are expected to exceed the 0.1 µg / L trigger in ground water for the representative uses proposed.
The compound may partition from soil, moist surfaces and water to air. This was also confirmed in the water/sediment study. However, a calculation according to the Atkinson method shows that the degradation half-life in air is 5.30 h not giving rise to long range transport concerns. For short term transport, the relatively low rate proposed for the representative uses limits the potential concern. However, MS may need to assess potential short term transport for other uses with higher application rates.

The risk to terrestrial vertebrates, aquatic organisms, bees, non-target arthropods, soil macro-organisms including earthworms, soil micro-organisms, other fauna and flora and biological methods for sewage treatment is low with respect to tolclofos-methyl and the metabolite DM_TM as far as investigated.

Particular conditions proposed to be taken into account to manage the risk(s) identified

- Risk assessment is based on the specificities of seed treatment (tuber dressing before planting) and greenhouse use at maximum application rates of 0.625 and 2 kg a.s./ha respectively. It is noted that there are authorized uses in EU with application rates in the range of 10 - 40 kg a.s./ha For this kind of uses extensive reassessment may need to be performed.

Critical areas of concern

- Roller table use (formulation DP) needs to be ratified at Member State level, since the study was considered to be of limited quality (concluded at the EPCO expert meeting on toxicology in October 2004).
- For the use in potato the aquatic risk assessment is based on pre-planting treatment of tubers.
- Risk assessment for consumers is provisional unless confirmed after receipt and evaluation of the outstanding data to support the uses on potato and lettuce.

APPENDIX 1 – LIST OF ENDPOINTS FOR THE ACTIVE SUBSTANCE AND THE REPRESENTATIVE FORMULATION

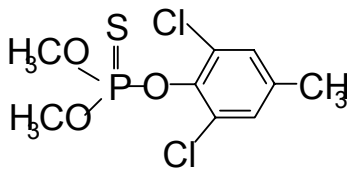
(Abbreviations used in this list are explained in appendix 2)

Appendix 1.1: Identity, Physical and Chemical Properties, Details of Uses, Further Information

Active substance (ISO Common Name) ‡	Tolclofos-methyl
Function (e.g. fungicide)	Fungicide

Rapporteur Member State	Sweden
Co-rapporteur Member State	---

Identity (Annex IIA, point 1)

Chemical name (IUPAC) ‡	O-2,6-dichloro-p-tolyl O,O-dimethyl phosphrothioate O-2,6-dichloro-4-methylphenyl O,O-dimethyl phosphrothioate
Chemical name (CA) ‡	O-(2,6-dichloro-4-methylphenyl) O,O-dimethyl phosphrothioate
CIPAC No ‡	479
CAS No ‡	57018-04-9
EEC No (EINECS or ELINCS) ‡	260-515-3 (EINECS)
FAO Specification (including year of publication)‡	none
Minimum purity of the active substance as manufactured (g/kg) ‡	960 g/kg
Identity of relevant impurities (of toxicological, environmental and/or other significance) in the active substance as manufactured (g/kg)	There are no relevant impurities
Molecular formula ‡	C9H11Cl2 O3PS
Molecular mass ‡	301.12
Structural formula ‡	

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Physical-chemical properties (Annex IIA, point 2)

Melting point (state purity) ‡	79 -79.5 °C (purity: 99.7%)
Boiling point (state purity) ‡	Boiling point of tolclofos-methyl cannot be determined because tolclofos-methyl decomposes at 120 – 220 °C prior to boiling.
Temperature of decomposition	120 – 220 °C (purity: 99.7%)
Appearance (state purity) ‡	Pure: White crystalline odourless solid (purity: 99.9%) Active substance as manufactured: White crystalline solid with faint characteristic odour (purity: 97.9%)
Relative density (state purity) ‡	1.516 at 20 °C (purity: 99.9%)
Surface tension	72.7 mN/m at 20 °C
Vapour pressure (in Pa, state temperature) ‡	8.77×10^{-4} Pa at 20 °C 1.82×10^{-3} Pa at 25 °C (by interpolation)
Henry's law constant (Pa m^3 mol^{-1}) ‡	0.37 Pa m^3 mol^{-1} at 20 °C
Solubility in water (g/l or mg/l, state temperature) ‡	In distilled water: 0.708 mg/L at 20 ± 0.5 °C
	pH 4 - 6: Not required (Solubility in the acidic range (pH 4 to 6) was not determined as the test material has no ionisable groups or dissociation constant.)
	pH 8 -10: Not required (Solubility in the alkaline range (pH 8 to 10) was not determined as the test material has no ionisable groups or dissociation constant.)
Solubility in organic solvents (in g/l or mg/l, state temperature) ‡	All results at 20 °C n-Hexane: 20 g/L Xylene: 343 g/L Chloroform: 678 g/L Methanol: 38 g/L Isopropyl alcohol: 24 g/L Acetone: 476 g/L Ethyl acetate: 372 g/L Acetonitrile: 283 g/L Ethyl cellosolve: 151 g/L Cyclohexanone: 510 g/L
Partition co-efficient (log P_{OW}) (state pH and temperature) ‡	pH (unbuffered): 4.56 ± 0.017 (The effect of pH was not determined as the test material has no ionisable groups or dissociation constant.)

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Hydrolytic stability (DT_{50}) (state pH and temperature) ‡	pH 4: 126 days at 20°C, 68 days at 25 °C, 97 hours at 50 °C, 32 hours at 62 °C, 9.6 hours at 74 °C
	pH 7: 97 days at 20°C, 50 days at 25 °C, 61 hours at 50°C, 17 hours at 62°C, 5.1 hours at 74°C
	pH 9: 102 days at 20 °C, 55 days at 25 °C, 76 hours at 50 °C, 24 hours at 62 °C, 7.3 hours at 74 °C
Dissociation constant ‡	Not applicable (Concerning the structure of the test material, it is not considered that the reaction of giving or receiving proton will occur in water solution containing tolclofos-methyl.)
UV/VIS absorption (max.) (if absorption > 290 nm state ε at wavelength) ‡	λ_{max}: 282 nm, ε: 594
Photostability (DT_{50}) (aqueous, sunlight, state pH)‡	38.3 days at 25±1 °C at pH 7 (The light intensity was equivalent to sunlight in November at latitude 40°N.)
Quantum yield of direct phototransformation in water at Σ > 290 nm ‡	3.0×10^{-5} mol $Einstein^{-1}$ at 313 nm in distilled water
Flammability ‡	Not highly flammable
Explosive properties ‡	Not to be potentially explosive based on the chemical structure and associated thermodynamic properties.

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

List of representative uses evaluated*

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 a.s. (i)	method kind (f-h)	growth stage & season (j)	number min max (k)	interval between applications (min)	kg as/hl min max	water l/ha min max	kg as/ha min max		
Potato	EU N	Rizolex 50 SC	F	Rhizoctonia	FS	500 g/l	Tuber dressing	BBCH 03	1-1	n.a.	n.a., seed treatment	2-3	0.375 (0.15 kg/ton)	80	[1] [2] [3]
		Rizolex	F	Rhizoctonia	DP	10%	Tuber dressing	BBCH 03	1-1	n.a.	n.a., ready for use	n.a., ready for use	0.375 (0.15 kg/ton)	80	[1] [3]
	EU S	Rizolex 50 SC	F	Rhizoctonia	FS	500 g/l	Tuber dressing	BBCH 03	1-1	n.a.	n.a., seed treatment	2-3	0.625 (0.25 kg/ton)	80	[1] [2] [3]
		Rizolex	F	Rhizoctonia	DP	10%	Tuber dressing	BBCH 03	1-1	n.a.	n.a., ready for use	n.a., ready for use	0.625 (0.25 kg/ton)	80	[1] [3]
Lettuce	EU N/S	Rizolex 50WP	G	Rhizoctonia	WP	50%	Soil application	BBCH 14	1-1	n.a.	0.08-0.2	1000-2500	2	28	Until 1week after planting [3]

[1] The risk assessment could not be concluded due to data gaps in section 1
[2] Fate and behaviour risk assessment and hence the risk to aquatic organisms was assessed for potatoes assuming only application on the tuber before planting (either in a planting hopper or a roller table). In furrow spray at planting has therefore not been assessed.
[3] The risk assessment is provisional due to data gaps in section 3

Remarks:	*	Uses for which the risk assessment can not be concluded are marked grey.	(h)	Kind, *e.g.* overall, broadcast, aerial spraying, row, individual plant, between the plants - type of equipment used must be indicated
	(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)	(i)	g/kg or g/L
			(j)	Growth stage at last treatment (BBCH Monograph, Growth Stages of Plants,

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

	(b)	Outdoor or field use (F), glasshouse application (G) or indoor application (I)		1997, Blackwell, ISBN 3-8263-3152-4), including where relevant, information on season at time of application
	(c)	*e.g.* biting and suckling insects, soil born insects, foliar fungi, weeds		
	(d)	*e.g.* wettable powder (WP), emulsifiable concentrate (EC), granule (GR)	(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		
	(f)	Method, *e.g.* high volume spraying, low volume spraying, spreading, dusting, drench	(l)	PHI - minimum pre-harvest interval
	(g)	All abbreviations used must be explained	(m)	Remarks may include: Extent of use/economic importance/restrictions

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.2: Methods of Analysis

Analytical methods for the active substance (Annex IIA, point 4.1)

Technical as (principle of method)	Gas chromatograph with flame-ionization detector
Impurities in technical as (principle of method)	Data required
Plant protection product (principle of method)	Gas chromatography

Analytical methods for residues (Annex IIA, point 4.2)

Food/feed of plant origin (principle of method and LOQ for methods for monitoring purposes)	Gas chromatography (GC) with flame photometric detector (FPD) or electron capture detector (EDC) (multi-method, German S19). LOQ = 0.01 mg/kg (potatoes, lettuce)
Food/feed of animal origin (principle of method and LOQ for methods for monitoring purposes)	Not required, no residue definition proposed
Soil (principle of method and LOQ)	GC with mass spectrometric (MS) detection. LOQ= 0.01mg/kg
Water (principle of method and LOQ)	GC/FDP, LOQ=0.1µg/L (surface water); Peak verification GC/MS
Air (principle of method and LOQ)	GC/FDP, LOQ=1.0µg/m³; Peak verification GC/MS
Body fluids and tissues (principle of method and LOQ)	Not required since the active substance is not classified as toxic or highly toxic.

Classification and proposed labelling (Annex IIA, point 10)

with regard to physical/chemical data	Not classified

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.3: Impact on Human and Animal Health

Absorption, distribution, excretion and metabolism in mammals (Annex IIA, point 5.1)

Rate and extent of absorption ‡	Rapid absorption (>80% based on urinary excretion of phenyl label) within 24 h
Distribution ‡	Widely distributed. Small distribution into tissues
Potential for accumulation ‡	No evidence for accumulation
Rate and extent of excretion ‡	Rapid and extensive within 48 h, 80-90% via the urine, and 10-20% via the faeces.
Metabolism in animals ‡	Metabolised via oxidative desulfuration of the P=S group to P=O, oxidation of 4-methyl group, and cleavage of P-O-aryl and P-O-methyl linkages. The major metabolite in both rats and mice was 3,5-dichloro-4-hydroxybenzoic acid. This metabolite was excreted as the glycine conjugate in mice and as the free form in rats.
Toxicologically significant compounds ‡ (animals, plants and environment)	Parent compound

Acute toxicity (Annex IIA, point 5.2)

Rat LD_{50} oral ‡	> 2000 mg/kg bw rat and mouse
Rat LD_{50} dermal ‡	> 5000 mg/kg
Rat LC_{50} inhalation ‡	> 3.32 mg/L
Skin irritation ‡	Non irritant
Eye irritation ‡	Non irritant
Skin sensitization ‡ (test method used and result)	Sensitizing (M&K)

Short term toxicity (Annex IIA, point 5.3)

Target / critical effect ‡	Decreased body weight gain and increased liver weights. Decreased cholinesterase activities (mouse), and increased plasma Alkaline phosphatase activity (dog, rat).
Lowest relevant oral NOAEL / NOEL ‡	6-month dog: 21 mg/kg bw/day 12-month dog: 11 mg/kg bw/day
Lowest relevant dermal NOAEL / NOEL ‡	21d rabbit: ≥1000 mg/kg bw/day
Lowest relevant inhalation NOAEL / NOEL ‡	No data – not required

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Genotoxicity ‡ (Annex IIA, point 5.4)

.....	No evidence for genotoxicity

Long term toxicity and carcinogenicity (Annex IIA, point 5.5)

Target/critical effect ‡	Effects on cholinesterase levels
Lowest relevant NOAEL / NOEL ‡	Mouse: 6.4 mg/kg bw/day
Carcinogenicity ‡	No carcinogenic potential up to 1000 ppm (the highest dose tested) in mouse and rat, equivalent to 134 mg/kg bw/day (mouse) and 42 mg/kg bw/day (rat)

Reproductive toxicity (Annex IIA, point 5.6)

Reproduction target / critical effect ‡	No specific effects
Lowest relevant reproductive NOAEL / NOEL ‡	1000 ppm (70.6-98.5 mg/kg bw/day) (highest dose tested) for parental, offspring and reproductive toxicity
Developmental target / critical effect ‡	No specific effects at guideline limit dose.
Lowest relevant developmental NOAEL / NOEL ‡	Developmental: ≥1000 mg/kg bw/day (limit dose), Maternal: 300 mg/kg bw/day

Neurotoxicity / Delayed neurotoxicity ‡ (Annex IIA, point 5.7)

.....	No evidence for delayed neurotoxicity. No further neurotoxicity studies were performed, as no indications of neurotoxicity from the standard studies.

Other toxicological studies ‡ (Annex IIA, point 5.8)

.....	Intraperitoneal administration LD_{50} 5000 mg/kg bw in mouse and 1200 mg/kg bw in rat

Medical data ‡ (Annex IIA, point 5.9)

.....	No evidence of adverse effects on workers exposed to tolclofos-methyl during handling and packaging

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Summary (Annex IIA, point 5.10)	Value	Study	Safety factor
ADI ‡	0.064 mg/kg bw/day	2 year, mouse	100
AOEL ‡	0.2 mg/kg bw/day	6-month, dog	100
ARfD ‡ (acute reference dose)	Not required		

Dermal absorption (Annex IIIA, point 7.3)

Rizolex 50% SC	0.02% during mixing/loading 0.5% during application *In vivo* study in the rat modified using comparative rat:human in vitro study.

Acceptable exposure scenarios (including method of calculation)

Operator	Estimated exposure according to UK POEM for Rizolex 50SC, based on seed treatment (0.25 kg/ton), or Rizolex 50WP (2 kg/ha) without PPE. For Rizolex DP with 10% tolclofos-methyl PPE was added (based on measurements in a field study) % of AOEL Potato (SC), in-furrow spray 0.04% Potato (DP), planter hopper 14% Lettuce (WP), hand held sprayer 22% Lettuce (WP), automatic sprayer 22%
Workers	The Rizolex 50WP is applied to soil in which lettuce will be sown in glasshouses and is then immediately incorporated into the soil. Rizolex 50SC is applied in-furrow to seed potatoes at the time of planting. These application methods do not result in pesticide residues on foliage.
Bystanders	It is most likely that bystanders would be exposed to a much lower extent than the operator.

Classification and proposed labelling (Annex IIA, point 10)

with regard to toxicological data	**Xi** Irritant **R43** May cause sensitisation by skin contact

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.4: Residues

Metabolism in plants (Annex IIA, point 6.1 and 6.7, Annex IIIA, point 8.1 and 8.6)

Plant groups covered	Potatoes (seed treatment) and Lettuce
Rotational crops	Not required.
Plant residue definition for monitoring	Tolclofos-methyl
Plant residue definition for risk assessment	As above
Conversion factor (monitoring to risk assessment)	None

Metabolism in livestock (Annex IIA, point 6.2 and 6.7, Annex IIIA, point 8.1 and 8.6)

Animals covered	Hen, goat
Animal residue definition for monitoring	Not proposed
Animal residue definition for risk assessment	Not proposed
Conversion factor (monitoring to risk assessment)	Not required
Metabolism in rat and ruminant similar (yes/no)	yes
Fat soluble residue: (yes/no)	yes

Residues in succeeding crops (Annex IIA, point 6.6, Annex IIIA, point 8.5)

.....	Not required: Not persistent in soil (DT_{90lab} <30 days).

Stability of residues (Annex IIA, point 6 introduction, Annex IIIA, point 8 introduction)

.....	Potato: Stable at –18 °C for up to 22 months Lettuce: Stable at –18 °C for up to 18 months

Residues from livestock feeding studies (Annex IIA, point 6.4, Annex IIIA, point 8.3)

Intakes by livestock ≥ 0.1 mg/kg diet/day:	Ruminant: yes	Poultry: yes	Pig: yes
	Feeding studies are currently not required for use on potato, but may be required subject to livestock metabolism data		

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Summary of critical residues data (Annex IIA, point 6.3, Annex IIIA, point 8.2)

Crop	Northern or Mediterranean Region	Trials results relevant to the critical GAP (a)	Recommendation/comments	MRL	STMR (b)
Early Potato	N	5x <0.01, 2x 0.01, 2 x 0.02, 0.04, <0.05, 0.05, 0.06, 2x 0.07, 0.1			
	S	2x <0.01, 2x 0.01	only 4 trials present, but residue levels do not differ much from residues in northern EU		
Ware potato	N	4x <0.002, 0.007, 4 x < 0.01, 2 x 0.01, <0.02, 2 x 0.02, 0.03, 0.04, 0.07, 0.08, 0.2			
Lettuce winter	N	0.06, 0.09, 0.1, 0.41	Glasshouse application		
summer	S	0.23, 0.24, 0.25, 0.39			

(a) Numbers of trials in which particular residue levels were reported *e.g.* 3 x <0.01, 1 x 0.01, 6 x 0.02, 1 x 0.04, 1 x 0.08, 2 x 0.1, 2 x 0.15, 1 x 0.17
(b) Supervised Trials Median Residue *i.e.* the median residue level estimated on the basis of supervised trials relating to the critical GAP

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Consumer risk assessment (Annex IIA, point 6.9, Annex IIIA, point 8.8)

ADI	0.064 mg/kg bw
TMDI (European Diet) (% ADI) *Provisional assessment*	1.21% for adults (WHO European diet) 0.99% (German model - 4-6 year old female child, 13.5 kg bw) 1.60% (UK model – adult, 70.1 kg bw)) 1.47% (UK model – child , 43.6 kg bw) 2.90% (UK model – toddler, 14.5 kg bw) 1.79% (UK model- infant, 8.7 kg bw)
NEDI (% ADI)	Not relevant
Factors included in NEDI	-
ARfD	None set
Acute exposure (% ARfD)	-

Processing factors (Annex IIA, point 6.5, Annex IIIA, point 8.4)

Crop/processed crop	Number of studies	Transfer factor	% Transference *
Potato	Not required. TMDI < 10% of ADI		
Lettuce	Not required. Eaten as raw, TMDI < 10% of ADI		

* Calculated on the basis of distribution in the different portions, parts or products as determined through balance studies

Proposed MRLs (Annex IIA, point 6.7, Annex IIIA, point 8.6)

Potato	Final MRL for potato cannot be proposed until results from the new metabolism study has been assessed. Provisional proposal by RMS: 0.1 mg/kg
Lettuce (glasshouse)	Final MRL for lettuce cannot be proposed as there is not sufficient trials data. Provisional proposal by RMS: 1 mg/kg

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.5: Fate and Behaviour in the Environment

Route of degradation (aerobic) in soil (Annex IIA, point 7.1.1.1.1)

Mineralization after 100 days ‡	10-15°C: 20-45% after 112 days (n=4) 20°C: 37-43% after 90 days (n=4)
Non-extractable residues after 100 days ‡	10-15°C: 45-58% after 112 days (n=4) 20°C: 45-56 % after 90 days (n= 4)
Relevant metabolites - name and/or code, % of applied ‡ (range and maximum)	10-15°C: None > 10% of applied 20°C: DM-TM – max. 13 % after 3 days in one soil (n=4)

Route of degradation in soil - Supplemental studies (Annex IIA, point 7.1.1.1.2)

Anaerobic degradation ‡	25ºC Mineralisation: 23 % after 364 days (n=1) Non-extractable residues: 8.7 % after 364 d (n=1) Metabolites: DM-TM: max.54 % at 92 days (water phase) DM-TM: max. 4.6 % at 62 days (soil)
Soil photolysis ‡	Mineralisation: 1 % after 30 d Non-extractable residues: 3.7 % after 30 d None of the degradates exceeded 10% of applied

Rate of degradation in soil (Annex IIA, point 7.1.1.2, Annex IIIA, point 9.1.1)

Method of calculation	Laboratory (20°C): 2-phase exponential ~~(hockestick)~~ for tolclofos-methyl, 1st order or 2-phase exponential ~~(hockestick)~~ for DM-TM Laboratory (10°C): 1st order

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Laboratory studies ‡ (range or median, with n value, with r^2 value)	DT_{50lab} (20°C, aerobic): 2.0-5.4 d (n= 4, r^2 = 0.992-0.999) 2-phase exponential model DM-TM DT_{50lab} (20°C, aerobic): <0.25-0.84 d (n= 3, r^2 = 0.990-0.999) single or two phase exponential model For FOCUS gw modelling – Tolclofos-methyl DT_{50lab} (aerobic, 1st order kinetics): mean DT_{50lab} 5.4 d (normalisation to 10kPa or pF2, 20°C with Q10 of 2.2), taking data points from days 0-15 for two soils, and from days 0-30 for two soils into account. (Taking data points for days 0-90 for three soils and data points from days 0-62 for one soil into account results in a mean DT_{50lab} of 15 days (r^2 = 0.70-0.83)). DM-TM: mean DT_{50lab} 0.53 d (normalisation to 10kPa or pF2, 20°C with Q10 of 2.2) DT_{90lab} (20°C, aerobic): 6.9-20 d (n= 4, r^2 = 0.992-0.999 according to DT_{50} quoted above) DM-TM DT_{90lab} (20°C, aerobic): <1-2.8 d (n=3, r^2 = 0.990-0.999) DT_{90lab} (20°C, aerobic): 6.9-20 d (n= 4, r^2 = 0.992-0.999 according to DT_{50} quoted above) DM-TM DT_{90lab} (20°C, aerobic): <1-2.8 d (n=3, r^2 = 0.990-0.999) DT_{50lab} (20°C, anaerobic): 31 d (n= 1, r^2= 0.982)
	degradation in the saturated zone‡: no data submitted and no data required.
Field studies ‡ (state location, range or median with n value)	DT_{50f}: No data submitted and no data required. DT_{90f}: No data submitted and no data required.
Soil accumulation and plateau concentration ‡	No data submitted and no data required.

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Soil adsorption/desorption (Annex IIA, point 7.1.2)

K_f /K_{oc} ‡ K_d ‡ pH dependence ‡ (yes / no) (if yes type of dependence)	Tolclofos-methyl K_{oc}: 1649-6139 (mean 3620, $^1/_n$= 0.94-0.96, 4 soils) DM-TM K_{oc}: 11.0-22.2 (mean 15.0, $^1/_n$= not determined, 3 soils). Tolclofos-methyl K_f 7.6-44 (mean 25.2 , 4 soils) DM-TM K_d: 0.18-0.33 (mean 0.27, 3 soils) No pH dependence For FOCUS gw modelling – Tolclofos-methyl: Koc mean 3620, 1/n= 0.95. DM-TM: Koc mean 15, 1/n= 0.9 (default).

Mobility in soil (Annex IIA, point 7.1.3, Annex IIIA, point 9.1.2)

Column leaching ‡	No data submitted and no data required.
Aged residues leaching ‡	No data submitted and no data required.
Lysimeter/ field leaching studies ‡	No data submitted and no data required.

PEC (soil) (Annex IIIA, point 9.1.3)

Lettuce

Tolclofos-methyl

Method of calculation	DT_{50lab}: 3.95 days (mean of 4 soils) Kinetics: 2-phase exponential (hockey stick)
Application rate	Crop: Lettuce % plant interception: soil application therefore no crop interception Number of applications: 1 Application rate(s): 2000 g as/ha

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC$_{(s)}$ (mg/kg)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial		2.67	2.67	-	-
Short term	24h	2.24	2.45	-	-
	2d	1.88	2.25		
	4d	1.32	1.92		
Long term	7d	0.78	1.54	-	-
	28d	0.11	0.56		
	50d	0.10	0.36		
	100d	0.08	0.23		

* calculated using the same kinetic model as for determination of DT_{50}

Metabolite: DM-TM

Method of calculation	DT_{50}: 0.84 days (worst case from lab studies) Kinetics: 1st order
Application rate	Crop: lettuce % plant interception: Soil application therefore no crop interception Number of applications: 1 Application rate(s): 2000 g as/ha (assumed DM-TM is formed at a maximum of 13 % of the applied dose)

PEC$_{(s)}$ (mg/kg)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial		0.34	0.34	-	-
Short term	24h	0.15	0.23	-	-
	2d	0.07	0.16		
	4d	0.01	0.10		
Long term	7d	1.0×10^{-3}	0.06	-	-
	28d	3.2×10^{-11}	0.02		
	50d	4.1×10^{-19}	8.2×10^{-3}		
	100d	5.0×10^{-37}	4.1×10^{-3}		

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Potatoes

Tolclofos-methyl

Method of calculation	DT50lab : 3.95 days (mean of 4 soils) Kinetics: 2-phase exponential (hockey stick)
Application rate	Crop: Potatoes % plant interception: applied when planting seed potatoes therefore no crop interception Number of applications: 1 Application rate(s): 625 g as/ha

PEC$_{(s)}$* (mg/kg)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial		0.83	0.83	-	-
Short term	24h	0.70	0.76	-	-
	2d	0.58	0.70		
	4d	0.41	0.60		
Long term	7d	0.24	0.48	-	-
	28d	0.03	0.18		
	50d	0.03	0.11		
	100d	0.02	0.07		

* calculated using the same kinetic model as for determination of DT_{50}

Metabolite: DM-TM

Method of calculation	DT50: 0.84 days (worst case from lab studies) Kinetics: 1st order
Application rate	Crop: Potatoes % plant interception: applied when planting seed potatoes therefore no crop interception Number of applications: 1 Application rate(s): 625 g as/ha

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC$_{(s)}$ (mg/kg)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial		0.105	0.105	-	-
Short term	24h	0.05	0.08	-	-
	2d	0.02	0.05		
	4d	3.8×10^{-3}	0.03		
Long term	7d	2.9×10^{-5}	0.02	-	-
	28d	9.5×10^{-12}	4.5×10^{-3}		
	50d	1.1×10^{-19}	2.6×10^{-3}		
	100d	1.2×10^{-37}	1.2×10^{-3}		

Route and rate of degradation in water (Annex IIA, point 7.2.1)

Hydrolysis of active substance and relevant metabolites (DT_{50}) ‡ (state pH and temperature)	pH4, 20°C: 126 days (calculated using Arrhenius equation and data from 50, 62 and 74 °C, 1st order, r^2=0.998) pH7, 20°C: 97 days (calculated using Arrhenius equation and data from 50, 62 and 74 °C, 1st order, r^2>0.999) pH9, 20°C: 102 days (calculated using Arrhenius equation and data from 50, 62 and 74 °C, 1st order, r^2=0.999)
Photolytic degradation of active substance and relevant metabolites ‡	Xenon arc lamp equivalent to sunlight intensity in November at latitude 40°N, DT_{50} for active substance (tolclofos-methyl): 38.3 days DM-TM 12.6% after 30 days Estimated from quantum yield: DT_{50} 30-44 days (latitude 20°N), 37-106 (latitude 40°N) and 43-550 days (latitude 60°N) for tolclofos-methyl
Readily biodegradable (yes/no)	No
Degradation in water/sediment	
- DT_{50} water ‡	0.9-1.6 days
- DT_{90} whole system ‡	3.1-5.4 days (1st order residual sum of squares, r^2= 0.90-0.96, n= 2)
- DT_{50} whole system ‡	15-16 days
- DT_{90} whole system ‡	59-85 days (1st order residual sum of squares for one system and 2-phase exponential for the other, r^2= 0.99, n= 2)

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Mineralization	36-53 %AR (at 100 days, study end, n= 2)
Non-extractable residues	Maximum of 26-35% after 62-76 days (n=2)
Distribution in water / sediment systems (active substance) ‡	Maximum of 58-73% in sediment after 1-3 days. DT_{50} in sediment 19-27 days (DT_{90} 64-91 days, 1st order, r^2= 0.96-0.99, n= 2)
Distribution in water / sediment systems (metabolites) ‡	Water: DM-TM max of 8.9-11% (30 days, n= 2. DT_{50} 28-42 days, 1st order, r^2= 0.90-0.96, n= 2) Sediment: DM-TM max of 4.5-13 % (30 days, n= 2).

PEC (surface water) (Annex IIIA, point 9.2.3)

Lettuce

Tolclofos-methyl

Method of calculation	DT_{50} (d): 1.6 days Kinetics: 1st order (residual sum of squares) Field or Lab: worst case from sediment water studies
Application rate	Crop: lettuce Number of applications: 1 Application rate(s): 2000 g as/ha Depth of water body: 30 cm
Main routes of entry	0.1% emission from glasshouses to adjacent water body*

* Based on the Dutch national model and thus needs to be considered by

$PEC_{(sw)}$ (µg / l)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial		0.67	0.67		
Short term	4h	0.43	0.54		
	2d	0.28	0.45		
	4d	0.12	0.32		

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC$_{(sw)}$ (µg / l)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Long term	7d	0.03	0.21		
	14d	1.5×10^{-3}	0.11		
	21d	7.5×10^{-5}	0.07		
	28d	0.4×10^{-7}	0.05		
	42d	8.4×10^{-9}	0.04		

Metabolite: DM-TM

Method of calculation	DT_{50}: 42 days Kinetics: 1st order worst case from sediment water studies
Application rate	Crop: lettuce Number of applications: 1 Application rate(s): 2000 g as/ha (assumed DM-TM is formed at a maximum of 11 % of the applied dose in water) Depth of water body: 30 cm
Main routes of entry	0.1% emission from glasshouses to adjacent water body*

* Based on the Dutch national model and needs to be considered by MS

PEC$_{(sw)}$ (µg / l)		Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial		0.07	0.07		
Short term	24h	0.07	0.07		
	2d	0.07	0.07		
	4d	0.07	0.07		
Long term	7d	0.06	0.07		
	14d	0.06	0.06		
	21d	0.05	0.06		
	28d	0.05	0.06		
	42d	0.04	0.05		

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Potatoes

Tolclofos-methyl

Method of calculation:	FOCUS version 1.1, step 1, 2 and 3 calculations were conducted for tolclophos-methyl.
Application rate:	Crop: potatoes Number of applications: 1 Application rate(s): 625 g as/ha (South Europe), 375 (North Europe)
Crop Interception:	No interception (0 %)
Application/crop type:	no drift (incorp or seed trtmt)
Number of applications per season:	1
Region and season of application[1]:	North Europe, Mar. - May.
	South Europe, Oct. - Feb.
Water solubility (mg/L):	0.71
K_{oc} (L/kg):	3620
DT_{50} water (days)[2]:	12.9
DT_{50} sediment (days)[2]:	12.9
DT_{50} soil (days)[3]:	5.4
Main routes of entry	Drainage and runoff

[1]Application timings were chosen to be consistent with those used in the FOCUS groundwater modelling
[2]Mean recalculated DT_{50} for the total system (1st order linear regression) 15.2 days for Mill stream and 10.5 days for Emperor Lake.
[3]Mean 1st order DT_{50}

Tolclofos-methyl PEC (sw) µg/L		FOCUS step 1				FOCUS step 2			
		Single application Actual		Single application Time weighted average		Single application Actual		Single application Time weighted average	
		NE	SE	NE	SE	NE	SE	NE	SE
initial		21.4	35.8	-	-	2.57	8.56	-	-
short term	24 h	20.3	35.8	20.9	34.8	2.43	8.11	2.50	8.33
	2 d	19.3	32.1	20.3	33.9	2.31	7.69	2.44	8.12
	4 d	17.3	28.8	19.3	32.2	2.07	6.90	2.31	7.70

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Tolclofos-methyl PEC (sw) µg/L		FOCUS step 1				FOCUS step 2			
		Single application Actual		Single application Time weighted average		Single application Actual		Single application Time weighted average	
		NE	SE	NE	SE	NE	SE	NE	SE
long term	7 d	14.7	24.5	17.9	29.8	1.76	5.88	2.14	7.14
	14 d	4.76	16.8	15.1	25.1	1.21	4.03	1.80	6.02
	50d	1.46	2.44	7.44	12.4	0.18	0.58	0.89	2.97
	100 d	0.10	0.17	3.97	6.62	0.01	0.04	0.48	1.58

FOCUS step 3 scenarios

Application/crop type: Incorporation to 10 cm depth (typical planting depth for potatoes (CAM 8)

Application timing:
- R1 26 April (NEU Scenario)
- R2 Mar 1 (SEU Scenario)
- R3 Mar 28(SEU Scenario)
- D3 May 4 (NEU Scenario)
- D4 May 17 (NEU Scenario)
- D6 1st crop – April 2, 2nd crop - 25 July (SEU Scenario)

Vapour Pressure (Pa): 0.000877

Freundlich Exponent: 0.95

In all run-off and drainage scenarios (R1 Pond, R1 Stream, R2 Stream, R3 Stream, D3 Ditch, D4 Pond, D4 Stream, D6 Stream early application, D6 Stream late application) the predicted concentration in surface water from the FOCUS step 3 calculations is zero.

Metabolite DM-TM

Method of calculation:	FOCUS version 1.1, step 1calculations were conducted for DM-TM
Application rate:	Crop: potatoes Number of applications: 1 Application rate(s): 625 g as/ha (South Europe)
Crop Interception:	No interception (0 %)
Application/crop type:	no drift (incorp or seed treatment)
Number of applications per season:	1

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Region and season of application[1]:	South Europe, Oct. - Feb.
Water solubility (mg/L):	1.382 mg/L (25°C)
K_{oc} (L/kg):	15
DT_{50} water (days)[2]:	33.5
DT_{50} sediment (days)[2]:	33.5
DT_{50} soil (days)[3]:	0.53
Main routes of entry	Drainage and runoff

[1]Application timings were chosen to be consistent with those used in the FOCUS groundwater modelling
[2]Mean recalculated DT_{50} for the whole system (1st order linear regression) 27 days for Mill stream and 40 days for Emperor Lake.
[3]Mean 1st order DT_{50}

DM-TM PEC (sw) µg/L		FOCUS step 1	
		Single application Actual	Single application Time weighted average
initial		2.492	-
short term	24 h	2.488	2.490
	2 d	2.483	2.488
	4 d	2.475	2.483
long term	7 d	2.461	2.477
	28 d	2.372	2.431
	50 d	2.281	2.385
	100 d	2.088	2.284

PEC (sediment)

Lettuce

Tolclofos-methyl

Method of calculation	Max. 73% partitioning to top 5 cm layer of sediment. 0.1 % emission from glasshouses to an adjacent water body.* DT50 = 27 days, worst case from sediment/water study. 1st order kinetics.
Application rate	Crop: lettuce Number of applications: 1 Application rate(s): 2000 g as/ha

* Based on the Dutch national model and thus needs to be considered by MS

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC$_{(sed)}$ (µg / kg)	Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial	1.9	-	-	-
Short term	peak: 1.9 at 1-2 days		-	-
Long term	study end: 0.66 at 42 days	-	-	-

Metabolite: DM-TM

Method of calculation	13 % partitioning to top 5 cm layer of sediment. 0.1 % emission from glasshouses to an adjacent water body*. DT_{50}= 43 days, worst case from sediment/water study. 1st order kinetics.
Application rate	Crop: lettuce Number of applications: 1 Application rate(s): 2000 g as/ha (assumed DM-TM is formed at a maximum of 13 % of the applied dose in sediment)

* Based on the Dutch national model and needs to be considered by MS

PEC$_{(sed)}$ (µg / kg)	Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial	0.34	-	-	-
Short term	peak: 0.33 at 1-2 days	-	-	-
Long term	study end: 0.17 at 42 days	-	-	-

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Potatoes

Tolclofos-methyl

Tolclofos-methyl PEC (sed) µg/L		FOCUS step 1				FOCUS step 2			
		Single application Actual		Single application Time weighted average		Single application Actual		Single application Time weighted average	
		NE	SE	NE	SE	NE	SE	NE	SE
initial		777	1.3E+03	-	-	92.9	309	-	-
short term	24 h	736	1.2E+03	756	1.3E+03	88.1	294	90.5	302
	2 d	697	1.2E+03	736	1.2E+03	83.5	278	88.1	294
	4 d	626	1.0E+03	699	1.2E+03	75.0	250	83.6	279
long term	7 d	533	888	647	1.1E+03	63.8	213	77.5	258
	14 d	366	610	546	910	43.8	146	65.3	218
	50d	52.9	88.2	269	449	6.33	21.1	32.2	107
	100 d	3.60	6.00	143	240	0.43	1.44	17.2	57.4

In all run-off and drainage scenarios (R1 Pond, R1 Stream, R2 Stream, R3 Stream, D3 Ditch, D4 Pond, D4 Stream, D6 Stream early application, D6 Stream late application) the predicted concentration in sediment from the FOCUS step 3 calculations is zero.

Metabolite DM-TM

DM-TM PEC (sed) µg/L		FOCUS step 1	
		Single application Actual	Single application Time weighted average
initial		3.78	-
short term	24 h	3.73	3.76
	2 d	3.67	3.73
	4 d	3.54	3.67
long term	7 d	3.36	3.58
	28 d	2.34	3.01
	50 d	1.60	2.54
	100 d	0.67	1.80

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC (ground water) (Annex IIIA, point 9.2.1)

Method of calculation and type of study (*e.g.* modelling, monitoring, lysimeter)	For FOCUS gw modelling, values used – Modelling using FOCUS model(s), with appropriate FOCUS gw scenarios, according to FOCUS guidance. Model(s) used: PEARL Scenarios: All scenarios Crop: Cabbage (no scenario for lettuce exists) Tolclofos-methyl: mean DT_{50lab} 5.4 d (normalisation to 10kPa or pF2, 20°C with Q10 of 2.2). K_{oc}: mean 3620, $^1/_n$= 0.95. DM-TM: mean DT_{50lab} 0.53 d (normalisation to 10kPa or pF2, 20°C with Q10 of 2.2). K_{oc}: mean 15, $^1/_n$= 0.9 (default).
Application rate	Lettuce: 2000 g a.s./ha Potatoes: 625 g a.s/ha (equivalent to a rate of 0.25 a.s. kg/tonne and a sowing rate of 2.5 tonnes/ha No. of applications: 1 Time of application for lettuce: Prior to sowing or transplantation (between the 15th January and the 15th May). Time of application for potatoes: At sowing (between 18th August and 2nd November

$PEC_{(gw)}$

Maximum concentration	< 0.001 µg/L
Average annual concentration (Results quoted for modelling with FOCUS gw scenarios, according to FOCUS guidance)	Annual average concentrations (80th percentile) according to FOCUS guidance: active substance: <0.1 µg/L (0.000 µg/L) DM-TM: < 0.1 µg/L (0.000 µg/L)

Fate and behaviour in air (Annex IIA, point 7.2.2, Annex III, point 9.3)

Direct photolysis in air ‡	No data
Quantum yield of direct phototransformation	No data
Photochemical oxidative degradation in air ‡	DT_{50}=5.30 hours (Atkinson method of calculation)
Volatilization ‡	from plant surfaces: No data from soil: No data

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

PEC (air)

Method of calculation	The available information on vapour pressure and Henry's Law Constant suggests that the compound may partition from soil, moist surfaces and water to air. A calculation according to the Atkinson method shows that the degradation half-life in air is 5.30 hours. Therefore, should tolclofos-methyl reach air, the compound will not persist and will be rapidly degraded.

$PEC_{(a)}$

Maximum concentration	Negligable

Definition of the Residue (Annex IIA, point 7.3)

Relevant to the environment	Soil: tolclofos-methyl Surface water: tolclofos-methyl and DM-TM (major metabolite but not ecotoxicologically relevant) Ground water: none

Monitoring data, if available (Annex IIA, point 7.4)

Soil (indicate location and type of study)	No data provided - none requested
Surface water (indicate location and type of study)	No data provided - none requested
Ground water (indicate location and type of study)	No data provided - none requested
Air (indicate location and type of study)	No data provided - none requested

Classification and proposed labelling (Annex IIA, point 10)

with regard to fate and behaviour data	R53

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Appendix 1.6: 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 mammals ‡	LD_{50} >5000 mg/kg bw (rats), 3500 mg/kg bw (mice)
Reproductive toxicity to mammals	NOEC = 70.6 mg as/kg bw/d
Acute toxicity to birds ‡	LD_{50} >5000 mg/kg bw (bobwhite quail, mallard, ring-necked pheasant) (LD_{50}>3777mg a.s./kg bw – formulation/bobwhite quail)
Dietary toxicity to birds ‡	LC_{50} >1624 mg/kg bw/d (mallard)
Reproductive toxicity to birds ‡	NOEL 49 mg/kg bw/d (bobwhite quail)

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

Application rate (kg as/ha)	Crop	Category (*e.g.* insectivorous bird)	Time-scale	TER	Annex VI Trigger
0.625	Potato	Small insectivorous bird	acute	> 696	<10
0.625	Potato	Small herbivorous bird	acute	>649	<10
0.625	Potato	Small insectivorous bird	short-term	> 299	<10
0.625	Potato	Small herbivorous bird	short-term	> 279	<10
0.625	Potato	Small insectivorous bird	long-term	9	<5
0.625	Potato	Small herbivorous bird	long-term	8	<5
0.625	Potato	Small herbivorous mammal	acute	601	<10
0.625	Potato	Small insectivorous mammal	acute	645	<10
0.625	Potato	Small herbivorous mammal	long-term	12	<5
0.625	Potato	Small insectivorous mammal	long-term	13	<5
0.625	Potato	Earthworm-eating bird	long-term	40.3	<5
0.625	Potato	Earthworm-eating mammal	long-term	45.6	<5

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Toxicity data for aquatic species (most sensitive species of each group) (Annex IIA, point 8.2, Annex IIIA, point 10.2)

Group	Test substance	Time-scale	Endpoint	Toxicity (mg/L)
Laboratory tests ‡				
Oncorhynchus mykiss	Tolclofos-methyl	96 h	Mortality, LC_{50}	0.69**
Oncorhynchus mykiss		97 d	Growth NOEC	0.012**
Daphnia magna		48 h	Immobilization, EC_{50}	48**
Daphnia magna		21 d	Reproduction, NOEC	0.026**
Chironomus riparius		28 d	Midge development rate, NOEC	0.25*
Scenedesmus subspicatus		72 h	Biomass, EC_{50} Growth rate, EC_{50}	0.78** >1.1**
Oncorhynchus mykiss	DM-TM	96 h	Mortality, LC_{50}	>110**
Daphnia magna		48 h	Immobilization, EC_{50}	>95**
Scenedesmus subspicatus		72 h	Biomass, EC_{50} Growth rate, EC_{50}	>97** >97**
Oncorhynchus mykiss	Tolclofos-methyl 50WP	96 h	Mortality, LC_{50}	26*
Daphnia magna		48 h	Immobilization, EC_{50}	30**
Scenedesmus subspicatus		72 h	Biomass, EC_{50} Growth rate, EC_{50}	0.65** >1.7**

* Based on nominal concentrations; ** Based on measured concentrations

Microcosm or mesocosm tests
Not required

Toxicity/exposure ratios for the most sensitive aquatic organisms (Annex IIIA, point 10.2)

Application rate (kg as/ha)	Crop	Organism	Time-scale	Distance (m)	TER	Annex VI Trigger
2	Lettuce (greenhouse) [1]	Fish (*Oncorhynchus mykiss*)	Acute	--	1030 [2]	<100
2	Lettuce (greenhouse) [1]	Fish (*Oncorhynchus mykiss*)	Long-term	--	18	<10

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Application rate (kg as/ha)	Crop	Organism	Time-scale	Distance (m)	TER	Annex VI Trigger
2	Lettuce (greenhouse) [1]	Aquatic invertebrate (*Daphnia magna*)	Acute	--	4477 6[3]	<100
2	Lettuce (greenhouse) [1]	Aquatic invertebrate (*Daphnia magna*)	Long-term	--	39	<10
2	Lettuce (greenhouse) [1]	Algae (*Scenedesmus subspicatus*)	Acute	--	970[4]	<10
2	Lettuce (greenhouse) [1]	Sediment dwelling organisms (*Chironomus riparius*)	Long-term	--	373	<10

[1] Based on Dutch national model: 0.1% emission from glasshouse uses and needs to be considered at MS level.
[2] Worst-case value used, where both technical and formulated material tested. This one is derived from the test results of technical.
[3]Worst-case value used, where both technical and formulated material tested. This one is derived from the test results of new study of formulation, since no analytical data on concentrations in the test solutions are available in the old study of formulation.
[4] Worst-case value used, where both technical and formulated material tested. This one is derived from the result of formulation.

Based on FOCUS step 3 calculations there will be no exposure of aquatic systems to tolclophos-methyl when used as a seed treatment on potatoes. The risk to aquatic organisms from this use is therefore considered as addressed. Fate and behaviour risk assessment is based on the representative uses as described in the end points list table and under point 3.2 of the Annex B.3 of the DAR. For potatoes it means that only application on the tuber before planting (either in a planting hopper or a roller table) is covered by this risk assessment. In furrow spray at planting has therefore not been assessed.

Bioconcentration

Bioconcentration factor (BCF) ‡	670 (whole fish) at 0.027mg/L tolclofos-methyl*
Annex VI Trigger:for the bioconcentration factor	not relevant
Clearance time (CT_{50}) (CT_{90})	1.1 days 3.6 days
Level of residues (%) in organisms after the 14 day depuration phase	0.9 (of maximum)

*Result from a study conducted with only one test concentration. The value should be used only as an indication.

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Effects on honeybees (Annex IIA, point 8.3.1, Annex IIIA, point 10.4)

Acute oral toxicity ‡	Study not accepted for risk assessment
Acute contact toxicity ‡	Tolclofos-methyl: LD_{50} >100 µg a.s./bee

Hazard quotients for honey bees (Annex IIIA, point 10.4)

Application rate (kg as/ha)	Crop	Route	Hazard quotient	Annex VI Trigger
Laboratory tests				
2.0	lettuce	contact	<20	50

Field or semi-field tests
Not required since tolclofos-methyl will be used as a potato tuber dressing and in greenhouses only (soil application to lettuce up to 7 days after transplant).

Effects on other arthropod species (Annex IIA, point 8.3.2, Annex IIIA, point 10.5)

Species	Stage	Test Substance	Dose (kg as/ha)	Endpoint	Effect	Annex VI Trigger
Laboratory tests						
Aphidius rhopalosiphi	adult	Formulated product (50WP)	0.0437	48-hr LR_{50} (50% mortality)	LR_{50} = 43.7 g a.s./ha 2 kg a.s./ha Lettuce (greenhouse): HQs = 45.8 (in-field) and 0.0458 (off-field)*	30% (HQ≥2: ESCORT2)
					0.625 kg a.s./ha Potato (tuber dressing): in-field HQ=14.3	30% (HQ≥2: ESCORT2)

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Species	Stage	Test Substance	Dose (kg as/ha)	Endpoint	Effect	Annex VI Trigger
Typhlodromus pyri	Proto-nymph	Formulated product (50WP)	>25	7day-LR_{50} (50% mortality)	LR_{50} > 25 kg a.s./ha 2 kg a.s./ha Lettuce (greenhouse): HQs=<0.08 (in-field) and <$8x10^{-5}$ (off-field)*	30% (HQ≥2: ESCORT2)
					0.625 kg a.s./ha Potato (tuber dressing): in-field HQ=<0.025	30% (HQ≥2: ESCORT2)
Orius sauteri	adult female	Formulated product (50WP)	1000 ppm	mortality	0% (harmless)	30%
Chrysoperla carnea	larvae	Formulated product (50WP)	1000 ppm	mortality	0% (harmless)	30%
Extended laboratory tests						
Aphidius rhopalosiphi	adult female	Formulated product (50WP)	2.0 (fresh and 7-day aged substrates)	mortality and parasi-tation rate	Mortality: Fresh residue: 3.3% Aged residue: 0% Fecundity: Fresh residue: +46.3% Aged residue: -21.7%	50% (ESCORT2)
Poecilus cupreus	adult	Formulated product (50WP)	0.625 (mixed into the soil) and 2.0 (sprayed onto soil surface)	mortality and feeding activity	Mortality: 0.625 kg as/ha: 0% 2.0 kg as/ha: 0% Parasitation: 0.625 kg as/ha: -14.2% 2.0 kg as/ha: -1.4%	50% (ESCORT2)

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Species	Stage	Test Substance	Dose (kg as/ha)	Endpoint	Effect	Annex VI Trigger
Aleochara bilineata	adult	Formulated product (50WP)	0.625 (mixed into the soil, fresh and 7-day aged substrates) and 2.0 (sprayed onto the soil surface, fresh and 7-day aged substrates)	Parasi-tation rate	Mortality: Fresh residue: 0.625 kg as/ha: 33.9% 2.0 kg as/ha: 39% Aged residue: 0.625 kg as/ha: -20% 2.0 kg as/ha: 25% Parasitation: Fresh residue: 0.625 kg as/ha: -15% 2.0 kg as/ha: -14.6% Aged residue: 0.625 kg as/ha: 7.4% 2.0 kg as/ha: -4.0%	50% (ESCORT2)

Field or semi-field tests

Since no or limited (i.e. less than 50%) effects were demonstrated in these studies, it is considered that these are sufficient to demonstrate the acceptability of any in-field effects and no further higher tier testing is necessary.

Furthermore, due to the limited use patterns, off-field exposure will be negligible and so the off-field HQ calculation is not applicable.

Effects on earthworms (Annex IIA, point 8.4, Annex IIIA, point 10.6)

Acute toxicity ‡	Tolclofos-methyl: >1000 mg a.s./kg soil, LC_{50corr} >500 mg a.s./kg soil Tolclofos-methyl 25SC: >1000 mg a.s./kg soil, LC_{50corr} >500 mg a.s./kg soil Tolclofos-methyl 10Dust: >1000 mg a.s./kg soil, LC_{50corr} >500 mg a.s./kg soil
Reproductive toxicity ‡	Not required since DT_{90} <90 days and only one application

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

Toxicity/exposure ratios for earthworms (Annex IIIA, point 10.6)

Application rate (kg as/ha)	Crop	Time-scale	TER	Annex VI Trigger
2.0	Lettuce (soil application in greenhouse)	Acute (14 days)	>187	>10
0.625	Potato (tuber dressing)	Acute (14 days)	>602	>10

Effects on soil micro-organisms (Annex IIA, point 8.5, Annex IIIA, point 10.7)

Nitrogen mineralization ‡	<25% inhibition (only transient effects) up to 25 mg a.s./kg (18.8 kg as/ha) - 12 weeks incubation
Carbon mineralization ‡	<25% inhibition up to 25 mg a.s./kg (18.8 kg as/ha) - 19-21 days incubation

Classification and proposed labelling (Annex IIA, point 10)

with regard to ecotoxicological data	N; R50/53

‡ Endpoint identified by EU-Commission as relevant for Member States when applying the Uniform Principles

APPENDIX 2 – ABBREVIATIONS USED IN THE LIST OF ENDPOINTS

ADI	acceptable daily intake
AOEL	acceptable operator exposure level
ARfD	acute reference dose
a.s.	active substance
bw	body weight
CA	Chemical Abstract
CAS	Chemical Abstract Service
CIPAC	Collaborative International Pesticide Analytical Council Limited
d	day
DAR	draft assessment report
DM	dry matter
DT_{50}	period required for 50 percent dissipation (define method of estimation)
DT_{90}	period required for 90 percent dissipation (define method of estimation)
ε	decadic molar extinction coefficient
EC_{50}	effective concentration
EEC	European Economic Community
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINKS	European List of New Chemical Substances
EMDI	estimated maximum daily intake
ER50	emergence rate, median
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FOCUS	Forum for the Co-ordination of Pesticide Fate Models and their Use
GAP	good agricultural practice
GCPF	Global Crop Protection Federation (formerly known as GIFAP)
GS	growth stage
h	hour(s)
ha	hectare
hL	hectolitre
HPLC	high pressure liquid chromatography or high performance liquid chromatography
ISO	International Organisation for Standardisation
IUPAC	International Union of Pure and Applied Chemistry
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; dosis letalis media
LOAEL	lowest observable adverse effect level
LOD	limit of detection
LOQ	limit of quantification (determination)
µg	microgram
mN	milli-Newton

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
NOEC	no observed effect concentration
NOEL	no observed effect level
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
r^2	coefficient of determination
RPE	respiratory protective equipment
STMR	supervised trials median residue
TER	toxicity exposure ratio
TMDI	theoretical maximum daily intake
UV	ultraviolet
WHO	World Health Organisation
WG	water dispersible granule
yr	year