CONCLUSION ON PESTICIDE PEER REVIEW

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

Issued on 25 September 2008

SUMMARY

Triadimenol is one of the 79 substances of the third stage Part A of the review programme covered by Commission Regulation (EC) No 1490/2002[1]. This Regulation requires the European Food Safety Authority (EFSA) to organise upon request of the EU-Commission 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 six months a conclusion on the risk assessment to the EU-Commission.

The United Kingdom being the designated rapporteur Member State submitted the DAR on triadimenol in accordance with the provisions of Article 10(1) of the Regulation (EC) No 1490/2002, which was received by the EFSA on 29 May 2006. The peer review was initiated on 30 June 2006 by dispatching the DAR for consultation of the Member States and the sole applicant Bayer Crop Science AG. Subsequently, the comments received on the DAR were examined and responded by the rapporteur Member State in the reporting table. This table was evaluated by EFSA to identify the remaining issues. The identified issues as well as further information made available by the applicant upon request were evaluated in a series of scientific meetings with Member State experts in May-June 2008.

A final discussion of the outcome of the consultation of experts took place during a written procedure with the Member States in August 2008 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. Full details of the GAPs can be found in the attached list of endpoints.

Since clarification is required with respect to certain impurities, the specification for the technical material as a whole should be regarded as provisional for the moment.

[1] OJ No L 224, 21.08.2002, p. 25, as amended by Regulation (EC) No 1095/2007 (OJ L 246, 21.9.2007, p. 19)

The representative formulated products for the evaluation were "Bayfidan EC 250", an emulsifiable concentrate (EC) containing 250 g/L triadimenol and "Baytan FS 094" a flowable concentrate for seed treatment (FS) containing 75 g/L triadimenol, 9 g/L fuberidazole and 10 g/L imazalil.

Sufficient analytical methods as well as methods and data relating to physical, chemical and technical properties are available to ensure that quality control measurements of the plant protection product are possible. Adequate methods are available to monitor triadimenol residues in food/feed of plant origin, soil, water and air.

In mammals, triadimenol is harmful to rats via the oral route (R22 "Harmful if swallowed" proposed); it is not acutely toxic via the dermal and inhalation routes, nor is a skin or eye irritant; it is not a skin sensitiser. In repeated dose studies liver is the target, with enlargement of the liver and related clinical chemistry changes. The relevant short term toxicity NOAELs are 9 and 15 mg/kg bw/day, in rats and dogs, respectively, whereas the relevant long term toxicity and carcinogenicity NOAEL is 5 mg/kg bw/day. Triadimenol does not have genotoxic and carcinogenic potential. The relevant parental and reproductive NOAEL in multigeneration studies is 6 mg/kg bw/day, and the relevant offspring NOAEL 9 mg/kg bw/day. Reduced pup survival in the multigeneration study during lactation period was noted. Furthermore, a decrease in fertility index was noted in all matings (all generations) in one study, possibly linked to the aromatase inhibition seen in an *in vitro* study. Therefore R64 "May cause harm to breastfed babies" and R62 "Possible risk of impaired fertility" were considered as appropriate (to be confirmed by EChA). As for developmental toxicity, in several rat developmental toxicity studies inconsistent effects which could be considered adverse were found (e.g. cervical and lumbar extra ribs). Placental weight was increased in the rats indicating that the substance might be an endocrine disruptor. A range of skeletal findings was seen at slight maternal toxic dose levels. R63? "Possible risk of harm to the unborn child" was proposed for consideration by EChA. Relevant maternal NOAEL is 5 mg/kg bw/day and 25 mg/kg bw/day in rat and rabbit, respectively, and relevant developmental toxicity NOAEL is 15 mg/kg bw/day and 40 mg/kg bw/day (rat and rabbit). Based on similar neurotoxic potential of triadimenol and triadimefon[2], data from the latter were used, showing a NOAEL of 2 mg/kg bw for acute exposure (reversible hyperactivity and increased motor and locomotor activity in rats, no neuropathological changes), and a subchronic NOAEL of 3.4 mg/kg bw/day. The Acceptable Daily Intake (ADI) and the Acceptable Operator Exposure Level (AOEL) are 0.05 mg/kg bw/day and the Acute Reference Dose (ARfD) is 0.05 mg/kg bw (based on an overall NOAEL of 5 mg/kg bw/day, SF 100). The estimated operator, worker and bystander exposure to the EC and the FS formulations is below the AOEL even without the use of PPE.

The metabolism of triadimenol in plant was investigated following foliar applications on grapes, cereals and sugar beet and seed treatment on cereals. After foliar or seed treatments triadimenol was found to be the major compound in grapes, cereal grains and straw and sugar beet leaves and roots,

[2] Triadimefon (M01): 1-(4-chlorophenoxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-one

accounting for 23 to 73% of the TRR. Hexose conjugate of the parent and the hydroxy metabolite M10[3] as free or conjugated were also detected in levels above 10%. Together these metabolites are present in amounts similar to or lower than the parent. Triazole Derivative Metabolites (TDMs) were also detected in cereal grains and straw following seed treatment and in cereals sown as rotational crops. Considering the significant proportion of the parent compound in the different plant parts investigated, the residue definition for monitoring was limited to triadimenol. For risk assessment, it was proposed to include in the residue definition the parent triadimenol, the metabolite M10 and their conjugates. Taking into account the proportions of the parent and of the metabolites, a conversion factor of 2 was proposed for the risk assessment for cereals only.

Concerning the TDMs, the meeting of experts was of the opinion not to include these metabolites in the triadimenol residue definitions since TDMs are not specific to triadimenol and there is currently no EU approach on how to consider these common triazole metabolites in the risk assessment. A separate residue definition has to be set and a separate risk assessment has to be performed for TDMs taking into account all the active substances of the triazole chemical class. This issue should be reconsidered when a general approach on triazole compounds and their triazole derivative metabolites is defined.

Supervised residue trials on grapes and cereals have been submitted. Residues were analysed for triadimenol only and no information was provided on the possible residue levels of the hydroxy metabolite M10 or the TDMs. Sufficient data were provided to propose a Maximum Residue Level (MRL) on wine and table grapes. On cereals, a provisional MRL was proposed for barley and oat only, awaiting additional residue data on barley in southern EU and in northern and southern EU for wheat. Triadimenol was stable under standard hydrolytic conditions and processing studies on grape showed a limited transfer of residues to wine. The submitted rotational crop studies, not performed in compliance with the requested standards, indicated that residues of the parent compound and its triazole derivative metabolites may be expected to be above the limit of quantification (LOQ). The experts' meeting was of the opinion that a new field study on rotational crops conforming to the current guidelines is required, where crops should be analysed for triadimenol and TDMs residues. Moreover, the residue situation in rotational crops should be reconsidered with regard to a global approach on TDMs.

Metabolism studies in goats and hens were carried out with the active substance triadimefon. Nevertheless and given that the major metabolic pathway of triadimefon in animals consists as a first step in producing triadimenol, these studies were considered as fully acceptable for the understanding of the triadimenol metabolism in animals. The metabolism of triadimenol in livestock is extensive and proceeds mainly via oxidation of the tertiary butyl group to the hydroxy metabolite M10 and the carboxy metabolite M02[4], both being subjected to conjugation with sulphate or glucuronic acid

[3] M10: Triadimenol-hydroxy : 4-(4-chlorophenoxy)-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butane-1,3-diol
[4] M02: 4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butanoic acid

respectively. In hens, an additional pathway consisting of desmethylation was identified. The meeting of experts concluded that triadimenol could not be a valid marker for animal products since it was observed in significant levels in ruminant liver and in poultry fat and eggs only. Therefore, the animal residue definition for risk assessment was proposed as triadimenol plus metabolite M10 and M02 and their conjugates and metabolite M28[5]. For monitoring the residue definition was proposed as triadimenol plus metabolite M10 and their conjugates and metabolite M28. Considering the limited transfer observed in the animal feeding studies and the low potential exposure to triadimenol residues through the consumption of treated food items (cereals), the meeting was of the opinion that there is no need to set MRLs for products of animal origin at this stage.

As for plants, the possible inclusion of the TDMs in the animal residue definition has been discussed. It was concluded that no significant TDMs residues resulting from the direct intake of triadimefon/triadimenol are expected in products of animal origin. Nevertheless the animal dietary burden should also take into account the additional exposure arising from TDMs residues present in feeding commodities from both, primary and rotational crops (especially in cereal straw and cereal grains). As for plants, this issue will need to be reconsidered at a later stage when a global EU approach on TDMs is defined.

The consumer risk assessment has been performed through the residues of triadimenol only and according to the residue definition proposed for plants. The contribution of the TDMs residues in primary crops, rotational crops and products of animal origin resulting from the use of triadimenol has not been evaluated and not been taken into account in the consumer risk assessment awaiting the definition of a global EU approach concerning these metabolites which are common to all active substances of the triazole chemical class. Taking into account the above considerations, the chronic and acute consumer exposures performed using the EFSA model and the proposed MRLs for cereals and grape were found to be less than 3% of the ADI and 27% of the ARfD.

In soil under aerobic conditions triadimenol exhibits moderate to high persistence forming the soil metabolite M04[6] (accounting for up to 8.2% of applied radioactivity (AR) in a lysimeter study) which exhibits low to moderate persistence. Mineralisation of the triazole ring to carbon dioxide accounted for 3.8-41% AR after 100 days. The formation of unextractable residues was a sink, accounting for 4.5-22.3 % AR after 100 days. Triadimenol exhibits low to very high mobility in soil, M04 exhibits high to very high mobility in soil. It was concluded that it was unlikely that adsorption of triadimenol was pH dependent. The adsorption of M04 was not pH dependent.
In dark laboratory natural sediment water systems triadimenol exhibited very high persistence. The terminal metabolite, CO_2, was a sink in the material balance accounting for a maximum of 3.7 % AR after 13 weeks. The necessary surface water and sediment exposure assessments were performed for

[5] M28: 1-(4-chlorophenoxy)-4-hydroxy-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-yl hydrogen sulfate
[6] M04: 1,2,4:triazole: 1*H*-1,2,4-triazole

triadimenol (up to FOCUS step 3 calculations) and for M04 (with appropriate FOCUS step 1 and 2 calculations). These values are the basis for the risk assessment discussed in this conclusion.
The potential for groundwater exposure from the applied for intended uses by triadimenol and 1,2,4-triazole above the parametric drinking water limit of 0.1 µg/L, was concluded to be low in geoclimatic situations that are represented by all the FOCUS groundwater scenarios relevant to the intended uses applied for. The atmospheric half life estimated for triadimenol (2.5 hours) gives an indication that it has not the potential to be subject to long range transport to areas where it has not been used, via the atmosphere.

Whereas the acute and short-term risk to birds from spray use in cereals indicated a low risk at Tier 1, the long-term assessment required further refinements. Use of field residue data, PD refinements and focal species in a refined assessment, indicated a low risk for large herbivorous birds. Further refinements were however required to identify a low risk to skylark feeding on insects. For vine use (spray application) the risk assessment indicated a low risk to birds, except for the long-term risk to insectivorous birds in South Europe. Refinements of PT with Chaffinch, Blue tit and Robin as focal species were derived from UK orchard studies. It was concluded in the meeting of experts that further data were required to support the use of UK orchard data to refine the long-term risk assessment for insectivorous birds in South Europe. For seed treatment use a low acute risk was identified for birds. The short-term risk assessment required further refinements. The meeting of experts did not accept the PT refinements suggested for yellowhammer, wood pigeon and skylark as focal species, and further data to substantiate the refinements were required. The long-term risk to birds was considered to be negligible, due to lack of exposure in the breeding season. EFSA however, noted that the breeding season for birds may extend into the season for use of triadimenol as a seed treatment in South Europe.
The acute risk assessment for small herbivorous and insectivorous mammals indicated a low risk for spray use in cereals. Low risk was also identified for small herbivorous mammals in the long-term assessment, after refinement of residue data. For spray use in vine the acute risk was considered as low for both North Europe and South Europe. The long-term risk assessment for both North Europe and South Europe required further refinements of interception, dissipation rate and TWA concentration in ground vegetation before a low risk was identified. For seed treatment uses, the acute risk to mammals was concluded to be low after refinement of PD. The long-term risk assessment, however, needed to be refined further. No exposure to contaminated drinking water was expected and the risk from secondary poisoning was considered to be low. The potential endocrine disrupting effects on birds may require further assessment.
Triadimenol should be classified as R51/53 “Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.” and the risk assessment for aquatic organisms indicated a low risk for all uses, based on FOCUS PECsw estimations up to Step 3. The risk to aquatic organisms from triadimenol metabolites was found to be low, as was the potential for bioaccumulation of triadimenol and its metabolites. The potential for endocrine effects on fish was not assessed in the

DAR, as no relevant studies were available. A fish early life study (ELS) and a fish screening assay (FSA) were carried out by the applicant during the peer-review process to address potential endocrine effects. However they were not eligible for submission in view of the restrictions concerning the acceptance of new (i.e. newly submitted) studies after the submission of the DAR to EFSA, as laid down in Commission Regulation (EC) No. 1095/2007.

The risk assessment for bees indicated a low risk for all uses. As triadimenol is systemic, the risk assessment for seed treatment use was based on the assumption that the concentration in the honey dew would correspond to the concentration in the plant.

The risk to non-target arthropods, earthworms, soil non-target micro and macro organisms, non-target plants and biological methods of sewage treatment was assessed as low.

No studies using the formulated products Baytan FS 094 for seed treatment were available. In consequence the risk to non-target organisms from the use of Baytan FS 094 could not be concluded since this product, besides triadimenol, also contains fuberidazole and imazalil.

Key words triadimenol, peer review, risk assessment, pesticide, fungicide

TABLE OF CONTENTS

BACKGROUND

Commission Regulation (EC) No 1490/2002 laying down the detailed rules for the implementation of the third stages of the work program referred to in Article 8(2) of Council Directive 91/414/EEC and amending Regulation (EC) No 451/2000, as amended by Commission Regulation (EC) No 1095/2007 regulates for the European Food Safety Authority (EFSA) the procedure of evaluation of the draft assessment reports provided by the designated rapporteur Member State. Triadimenol is one of the 79 substances of the third stage, part A, covered by the Regulation (EC) No 1490/2002 designating the United Kingdom as rapporteur Member State.

In accordance with the provisions of Article 10(1) of the Regulation (EC) No 1490/2002, the United Kingdom submitted the report of its initial evaluation of the dossier on triadimenol, hereafter referred to as the draft assessment report, to the EFSA on 29 May 2006. Following an administrative evaluation, the draft assessment report was distributed for consultation in accordance with Article 11(2) of the Regulation (EC) No 1490/2002 on 30 June 2006 to the Member States and the main applicant Bayer Crop Science AG 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, EFSA identified and agreed on lacking information to be addressed by the notifier as well as issues for further detailed discussion at expert level.

Taking into account the requested information received from the notifier, a scientific discussion took place in experts' meetings in May – June 2008. 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 during a written procedure with the Member States in August 2008 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 Protection Products and their Residues (PPR).

In accordance with Article 11c (1) of the amended Regulation (EC) No 1490/2002, 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. 1-1 of 13 February 2008)

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. 2-1 of 18 September 2008).

Given the importance of the draft assessment report including its addendum (compiled version of July 2008 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.

THE ACTIVE SUBSTANCE AND THE FORMULATED PRODUCT

Triadimenol is the ISO common name for (1*RS*,2*RS*;1*RS*,2*SR*)-1-(4-chlorophenoxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-ol (IUPAC).

Triadimenol belongs to the class of conazole fungicides alternatively classified as N-substituted triazole fungicides. It is a contact and systemic fungicide, it penetrates into plant tissues and active concentrations of this compound are translocated up to the leaf tips. It acts by inhibition of the demethylation at the C14 position in the fungal sterol biosynthesis. Triadimenol is used in agriculture and viticulture to control a range of fungal diseases.

Bayer CropScience and Makhteshim Agan did not agree on the joint provision of data and only Bayer CropScience submitted a complete dossier. The Makhteshim Agan source was only assessed for equivalence of the technical material.

The representative formulated products for the evaluation were "Bayfidan EC 250", an emulsifiable concentrate (EC) containing 250 g/L triadimenol and "Baytan FS 094" a flowable concentrate for seed treatment (FS) containing 75 g/L triadimenol, 9 g/L fuberidazole and 10 g/L imazalil, registered under different trade names in Europe.

The representative uses evaluated comprise:

-foliar spraying against powdery mildew and black rot in Northern Europe and against powdery mildew in Southern Europe in table and wine grapes, from growth stage of BBCH 05 up to BBCH 81, up to a maximum of 8 applications in Northern Europe and maximum 4 applications in

Southern Europe at a maximum application rate per treatment of 40 g a.s./ha and 62.5 g a.s./ha respectively, with an interval between applications of 10 to 14 days and 21 to 28 days respectively;

-foliar spraying against rusts, eyespot, *Fusarium* spp., powdery mildew, *Rhynchosporium*, *Pyrenophora teres*, *Septoria* in cereals, from growth stage of BBCH 29 up to BBCH 61, in all EU countries, up to a maximum of two applications at a maximum individual application rate per spray of 125 g a.s./ha, with an interval of 14-28 days between applications; and

-pre sowing seed treatment against *Fusarium* spp., bunt, smut in wheat, rye, triticale, oat, barley in all EU countries, at maximum application rate per treatment of 37.5 g a.s./100 kg seed (86.3 g triadimenol/ha at the theoretical highest sowing rate of 230 kg seed/ha for winter wheat).

SPECIFIC CONCLUSIONS OF THE EVALUATION

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

The minimum purity of triadimenol is 970 g/kg, which is meeting the requirements of the FAO specification AGP:CP/334 (1995). The technical material is a mixture of two diastereomers, isomer A (1*RS*,2*SR*) and isomer B (1*RS*,2*RS*). The ratio of the isomers shall be:

Diastereomer A, *RS* + *SR*, range: 70 to 85%

Diastereomer B, *RR* + *SS*, range: 15 to 30%

A combined specification was proposed in the DAR for the two sources from Bayer CropScience. There were impurities that occur only in one of the two sources. The PRAPeR 46 meeting (May 2008) concluded that the sources cannot be regarded as equivalent at Tier I and requested an equivalence assessment according to the guidance document SANCO/10597, and also proposed a data gap for the applicant to submit a new technical specification removing the impurities found in the batches below 1 g/kg.

In accordance with Article 8(1) of Commission Regulation (EC) 451/2000/EC, for the Makhteshim Agan source the Rapporteur Member State has checked only the identity and impurities of the a.s. and concluded that equivalence can be considered as acceptable. A minimum purity of 980 g/kg was proposed for the Makhteshim Agan source.

However, as the technical material of Bayer CropScience is manufactured in two different locations, the PRAPeR 46 meeting (May 2008) agreed that the equivalence check has to be done based on three specifications, two individual for Bayer CropScience, including the allocation of the reference source, and the one of Makhteshim Agan source. As the specifications for the technical materials are not finalized, it is not possible to conclude on the equivalence of the Makhteshim Agan source and the equivalence has to be determined at Member State level.

Since clarification is required with respect to certain impurities, the specification for the technical material as a whole should be regarded as provisional for the moment.

The assessment of the data package revealed no issues that need to be included as critical areas of concern with respect to the identity, physical, chemical and technical properties of triadimenol or the respective formulations. However, the following data gaps were identified:
- the dependency of the viscosity of Bayfidan EC 250 on the shear rates to be addressed
- confirmation that the highest application rate has been tested in the foam persistence determination.

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

Adequate analytical methods are available for the determination of triadimenol in the technical material (CIPAC 398/TC/M/) and in the representative formulations (GC-FID, CIPAC 398/EC/M) as well as for the determination of the respective impurities in the technical material (GC-FID).
Sufficient test methods and data relating to physical, chemical and technical properties are available to ensure that quality control measurements of the plant protection products are possible.

Adequate methods are available to monitor triadimenol residues in food/feed of plant and animal origin. Analytical methods for food of animal origin are not required since no MRLs are proposed.
The German modular multi-method DFG S19 was validated for the determination of residues of triadimenol in plant materials with LOQ of 0.05 mg/kg in grape, orange, barley grain, onion, dried hops and olive. ILV was validated for parent triadimenol in the grape, barley grain, onion and dried hops.
Residues of triadimenol in food of animal origin can also be monitored with the German modular multi-method DFG S19 with LOQ of 0.01 mg/kg.
Adequate methods are available (DFG S19) to monitor triadimenol in soil with LOQ of 0.01 mg/kg and in water (DFG W5, GC-NPD, confirmation GC/MS) with LOQ of 0.05 µg/l.
Residues of triadimenol in air can be monitored by GC-NPD with LOQ of 1 µg/m^3.
Since triadimenol is not classified as acute toxic or very toxic, analytical methods for the determination of residues of triadimenol in body fluids and/or tissues are not required.

2. Mammalian toxicology

Triadimenol was discussed in the PRAPeR 49 meeting of experts in June 2008.

In the meeting, the equivalence of batches tested in mammalian toxicology to the current proposed specification was discussed.
The physico-chemical properties experts' meeting set a data gap for the applicant to provide a new technical specification removing the impurities found in batches below 1 g/kg.
The mammalian toxicology experts' meeting focused the attention on impurities exceeding 1 g/kg in the proposed specification:
The meeting agreed that the tox batches covered the current specification as given in table 1.7 in volume 4 of the DAR. The meeting agreed that none of the impurities should be regarded as relevant.

2.1. ABSORPTION, DISTRIBUTION, EXCRETION AND METABOLISM (TOXICOKINETICS)

Triadimenol is rapidly absorbed following oral dosing, based on elimination of material via bile (>90%). It is widely distributed, with the highest concentrations in fat, urinary bladder and liver. Triadimenol is extensively metabolised, mainly through oxidation. The main metabolites are M02[7] (≈60%) and M10[8] (≈20%).

2.2. ACUTE TOXICITY

Triadimenol was harmful to rats via the oral route (oral LD_{50} 689 mg/kg bw, R22 "Harmful if swallowed" proposed). Triadimenol was not acutely toxic via the dermal (LD_{50} >5000 mg/kg bw) and inhalation (LC_{50} >0.954 mg/L/4h) routes, nor was it a skin or eye irritant; based on the available data the meeting concluded that triadimenol has no skin sensitising potential.

2.3. SHORT TERM TOXICITY

In subacute/subchronic rat studies, liver effects were identified, consisting of enlargement of the liver and related clinical chemistry changes (reversible induction of microsomal enzymes). Similar effects to rats were also recorded in mice and dogs studies. The relevant short term toxicity NOAELs are 9 and 15 mg/kg bw/day, in rats and dogs, respectively. Dermal and inhalation NOAELs are 250 mg/kg bw/day (15-day exposure, rabbit) and 229.71 mg/m^3 (~60 mg/kg bw/day) (15 days, 6h exposures, rat)

2.4. GENOTOXICITY

Triadimenol was tested for genotoxicity in a range of *in vitro* and *in vivo* assays. Sufficient evidence was available to conclude that triadimenol does not have genotoxic potential.

2.5. LONG TERM TOXICITY

Long term toxicity and carcinogenicity of triadimenol was tested in a 2 year study in rats and in a two-year and an 18-month study in mouse. The critical effect in rats was hepatotoxicity (increased liver weights and related clinical chemistry changes) without any histopathological effects.
In two chronic mouse studies the liver was the only organ showing any effects (increased weight, hepatocellular hypertrophy, single cell necrosis and, in females only, vacuolation and fatty change).
The relevant long term toxicity and carcinogenicity NOAEL is 5 mg/kg bw/day from the rat study.

2.6. REPRODUCTIVE TOXICITY

Two multigeneration studies were submitted. Effects identified included lower bodyweight gains in parental animals as well as reduced fertility, reduced litter size, reduced viability during lactation and reduced bodyweight gain of pups. In all cases, reproductive effects were accompanied by adverse

[7] M02: 4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butanoic acid
[8] M10: Triadimenol-hydroxy: 4-(4-chlorophenoxy)-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butane-1,3-diol

effects in parental animals. The relevant parental and reproductive NOAEL is 6 mg/kg bw/day, and the relevant offspring NOAEL 9 mg/kg bw/day.

The meeting considered that R64 "May cause harm to breastfed babies" is appropriate (to be confirmed by EChA) due to reduced pup survival in the multigeneration study during lactation period. Furthermore, a decrease in fertility index was noted in all matings (all generations) in one study, possibly linked to the aromatase inhibition seen in an *in vitro* study. The meeting considered that also R62 "Possible risk of impaired fertility" is appropriate (to be confirmed by EChA).

In several rat developmental toxicity studies inconsistent effects which could be considered adverse were found (e.g. cervical and lumbar extra ribs). Placental weight was increased in the rats indicating that the substance might be an endocrine disruptor. A range of skeletal findings was seen at slight maternal toxic dose levels. RMS stated that the extra ribs (i.e. 14th rib) were small in size in one study but had not been measured in all studies.

Triadimenol being a triazole fungicide, during the meeting it was noted that no information was available if M04[9] is a metabolite because the radioactive labelling was done on the phenyl ring. JMPR stated that triazole was also identified in rats as a minor metabolite.

The meeting proposed R63? "Possible risk of harm to the unborn child" (to be confirmed by EChA).

Relevant maternal NOAEL is 5 mg/kg bw/day and 25 mg/kg bw/day in rat and rabbit, respectively, and relevant developmental toxicity NOAEL is 15 mg/kg bw/day and 40 mg/kg bw/day (rat and rabbit).

2.7. NEUROTOXICITY

In the meeting of experts, 2 neurotoxicity studies conducted with triadimefon[10] were considered. Available data indicate that triadimenol and triadimefon show similar neurotoxic potential supporting the extrapolation of data from triadimefon to triadimenol. Given the structural and metabolic similarity between triadimenol and triadimefon, acute and subchronic neurotoxicity studies performed in rats with triadimefon were extrapolated to triadimenol. The experts agreed to use the acute neurotoxicity study with triadimefon to bridge to triadimenol.

In the acute study it was shown that triadimefon induces both hyperactivity and increased motor and locomotor activity in rats, but effects are reversible and are not associated with neuropathological changes (NOAEL 2 mg/kg bw). The effects in the subchronic study were consistent with the acute study but were not worsened by repeated exposure (NOAEL 3.4 mg/kg bw/day).

2.8. FURTHER STUDIES

Further toxicological studies were submitted performed with triadimefon (see section 2.7 – Neurotoxicity) and with triazole metabolites.

[9] M04: 1,2,4:triazole: 1*H*-1,2,4-triazole
[10] Triadimefon (M01): 1-(4-chlorophenoxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-one

EFSA notes that the reference values of the triazole metabolites were discussed in the PRAPeR meeting of experts 14 held in January 2007.

2.9. MEDICAL DATA

No adverse health effects were reported from formulation plant workers and no reports of poisoning incidents in man have been identified.

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

ADI

In the DAR the RMS proposed an ADI of 0.01 mg/kg bw/day based on the overall NOAEL (4 mg/kg bw/day) from the 2 year dog study and the subchronic rat neurotoxicity study, considering an additional 3-fold assessment factor to ensure a sufficient margin for possible reproductive effects.

This approach was discussed in the meeting, with particular regard to the proposal for an increased safety factor. The NOAEL in the 2 year dog study was changed after the discussion in the meeting (from 3.75 to 15 mg/kg bw/day). The lowest NOAELs are:

- 6 mg/kg bw/day was found in the 2 generation study in rats (Loeser 1984) based on reduced body weight,
- 5 mg/kg bw/day in the 2 year rat study,
- 3.4 mg/kg bw/day in the repeated dose neurotoxicity study
- 2 mg/kg bw/day in the acute neurotoxicity study.

Because of the large dose spacing in the neurotoxicity studies the experts proposed to use an overall NOAEL of 5 mg/kg bw/day. Effects on reproduction started to be seen at 15 mg/kg bw/day (multigeneration study), and 25 mg/kg bw/day (developmental effects). The meeting agreed that a SF of 100 was appropriate giving a MOS of ≥300 to the LOAEL.

The meeting agreed on an ADI of 0.05 mg/kg bw/day.

ARfD

The effects in the acute neurotoxicity study were considered as a starting point for setting an ARfD. The NOAEL from the acute neurotoxicity study was 2 mg/kg bw. A standard assessment factor of 100 was considered to be adequate since the concerns relating to reproductive effects do not necessarily apply to a single exposure. Because of the large dose spacing in the acute neurotoxicity study (NOAEL 2 mg/kg bw, LOAEL 35 mg/kg bw) the experts agreed to base the ARfD on the same principles as the ADI.

ARfD= 0.05 mg/kg bw

AOEL

The meeting considered it appropriate to set the AOEL on the same basis as the ADI and ARfD.

AOEL= 0.05 mg/kg bw/day

2.11. DERMAL ABSORPTION

Dermal absorption of triadimenol was discussed in the meeting of experts, taking into account the available *in vitro* testing, the number of tape strips and whether the relevant formulation has been tested.

The RMS based the proposal reported in the DAR on an *in vitro* study, with an exposure time of 72 hours. The amount in the tape strips was not taken into account as the vast majority of a.s. was absorbed within 24 hours. The amount in the tape strips was 1.3% for the concentrate and 0.52% for the dilution not increasing the overall dermal absorption value significantly.

The majority of the experts decided not to include the tape strips in the *in vitro* study, giving dermal absorption values as stated in the DAR (2% for the concentrate, 17% for the dilution).

Two formulations were proposed by the applicant, one of them is an EC the other is a FS. The formulation used in the *in vitro* dermal absorption study was Bayfidan EC 250. For Bayfidan FS 094, the data from the EC formulation were considered to represent 'worst-case' compared to the FS formulation, due to the large proportion of organic solvent in the EC formulation. In the absence of data with the FS formulation the meeting considered it acceptable to use the value from the EC formulation.

2.12. EXPOSURE TO OPERATORS, WORKERS AND BYSTANDERS

EFSA note after the PRAPeR meeting: in the commenting phase of the draft conclusion Austria highlighted that "the formulation Bayfidan EC 250 contains N-Methylpyrrolidone (R61 Cat. 2; revised entry 31st ATP), which should be considered in the conclusion report on triadimenol". Even if this does not change the overall risk assessment, it might be helpful information for Member States for national authorisations. The risk assessment for the formulation Bayfidan EC 250 cannot be regarded as conclusive and might be revised based on this information.

Operator

- **Bayfidan EC 250**

"Bayfidan EC 250" is an emulsifiable concentrate formulation and contains 250 g/l of the active substance (a.s.) triadimenol. Applications of "Bayfidan EC 250" are performed via broadcast air assisted sprayers and knapsack sprayers (vines) and field crop (boom) sprayers (cereals). Water will be the diluent/ carrier in all situations.

During the meeting the RMS was asked to recalculate operator, worker and bystander exposure based on the new AOEL.

The re-calculations for operator exposure are as follows:

Model	Application method (crop)	Systemic exposure (mg/kg bw/day)		% of systemic AOEL	
		No PPE	PPE	No PPE	PPE
UK POEM	Cereals (boom sprayer)	0.0784	0.0125	157	25
UK POEM	Vines (air assisted sprayer, 100 L model)	0.0672	0.0425	134	85
UK POEM	Vines (air assisted sprayer, 500 L model)	0.0444	0.0309	89	62
UK POEM	Vines (knapsack)	0.1026	0.0456	205	91
German	Cereals (boom sprayer)	0.0142	0.0102	28	20
German	Vines (air assisted sprayer)	0.0144	0.0133	29	27
German	Vines (hand held)	0.0101	0.0049	20	10

- **Baytan FS 094**

"Baytan FS 094" is a seed dressing liquid containing triadimenol (75 g/l product), fuberidazole (9 g/l product) and imazalil (10 g/l). It is applied to cereal seed.

Operator exposure assessment for seed treatment was discussed in a meeting of experts.
A French and a UK version of the model are available. The French version is more recent than the UK one. The UK version is based on geometric mean values, while the French version used 75 and 90 percentiles. A no PPE scenario is possible in the French version due to the use of transfer factors.
Calculations for triadimenol exposure either with the UK or the French versions of SeedTropex are well below the AOEL, however the French model might indicate the need of additional PPE for the cleaning operation. The experts agreed that the French version of the SeedTropex can be used.

The breathing rate of 26.7 litres per minute, considered by the RMS for the exposure assessment, was discussed in the meeting. This value from the US EPA guidance was considered probably more appropriate for some operations within a seed treatment plant that involve a high level of exertion. This was regarded as a precautionary approach.

Seed dressing
The supported use of "Baytan FS 094" is estimated to result in a total systemic exposure to triadimenol of 0.0086 mg/kg bw/day. This is within (17%) the systemic AOEL. This estimate of exposure is for the 1000 litre container size. If the 50 litre drum is used, which requires 8 mixing and

loading operations, total systemic operator exposure is marginally higher at 0.0106 mg/kg bw/day (21% of the AOEL).

Cleaning task

Measurements of dermal exposure for workers wearing disposable coveralls when cleaning seed treatment equipment are cited from a monitoring study conducted in a professional seed treatment plant in the UK. In total four operators were monitored for the cleaning task. The cleaned equipment had been used to treat oilseed rape seeds. Actual dermal exposure (ADE) determined for these operators was in the range of 0.0219 mg a.s./operation to 0.173 mg a.s./operation. The notifier has refined the SeedTropex calculation using the highest value of these four replicates (0.173 mg a.s./operation). The refined calculation also assumes operators wear respiratory protection during cleaning and calibration. This additional PPE is assumed to provide 90 % protection.

Bagging

The case is made that dust is regarded to be the main source of exposure during bagging and the contamination of dust with active substance is proportional to the dose of active substance(s) loaded onto the seed. Therefore, where the dose is lower than that used in the SeedTropex studies, a pure time dependent exposure figure results in a significant overestimation of operator exposure. Based on this the exposure data in the SeedTropex model for bagging are normalised (mg a.s/kg a.s. handled) for the amount of active substance loaded on the seed. The refined exposure assessment for the 1000 litre container suggests levels of exposure for workers treating cereal seeds with “Baytan FS 094” will be within acceptable levels (i.e. 10% of the AOEL). For the 50 litre container (which requires a greater number of mixing and loading operations) the predicted exposure is 0.007 mg/kg bw/day, which corresponds to 14% of the AOEL. If the SeedTropex exposure assessment is refined only on the basis of the submitted higher tier data for the cleaning task, which incorporate higher levels of PPE, and the assumption that RPE are also worn for this task (giving 90% protection against PIE) predicted exposure for the 1000 litre and 50 litre containers are around the AOEL (9% and 14% respectively).

Using the French version of the SeedTropex model, the following exposures are predicted, based on 70th percentile values.

	Systemic Exposure (mg/kg bw/day)	% of AOEL (0.05 mg/kg bw/day)
No PPE	0.035	70
Gloves worn during all tasks except bagging	0.025	50
Gloves are worn during all tasks except bagging. Respiratory protection is worn (level PP2 minimum) during cleaning.	0.010	20
Dermal protection worn (gloves and non-woven clothing) during all work tasks and respiratory protection (level P2 minimum) during the cleaning and bagging tasks.	0.005	10

Loading / Sowing

Based on SeedTropex data total estimated systemic exposure from sowing seed treated with "Baytan FS 094" is 0.0054 mg/kg bw/day, equivalent to 11% of the systemic AOEL. This is for 10 hours activity. Higher tier data conducted to determine operator exposure during loading treated seed into a hopper of a seed drill, suggest levels of exposure for operators sowing Baytan FS 094 treated seed will also be within acceptable levels (8% of the systemic AOEL).

Worker

- **Bayfidan EC 250**

As DFR studies with 'Bayfidan EC 250' are not available, grape DFR is predicted from the value agreed for the EUROPOEM database, which assumes a DFR of 3 μg/cm^2 per kg as/ha applied.

Based on an 8-hour working day and using a transfer coefficient of 5000 cm^2/person/hr, daily dermal exposure for a worker harvesting grapes treated with "Bayfidan EC 250", and assuming 60 kg body weight and 2 % dermal absorption (exposure assumed to be from a dry deposit), systemic exposure is estimated to be 0.0025 mg/kg bw/day, which is equivalent to 5% of the systemic AOEL.

Cereal crops are mechanically harvested, however workers may re-enter treated crops to perform tasks such as crop inspections. Exposure is predicted for 2 hours activity in the crop per day. Data in the EUROPOEM database for hand harvesting suggest transfer coefficients of 2500 cm^2/person/hr for vegetables to 5000 cm^2/person/hr for harvesting ornamentals (cutting/sorting/bundling). Whilst no transfer data specifically for cereal crops are available, hand harvesting a crop such as carnations in terms of morphology, leaf area index and work task may be considered as a suitable surrogate for rogueing activities in cereal crops. Assuming a 60 kg worker and 2 % dermal absorption, systemic exposure is estimated to be 0.0013 mg/kg bw/day, which is equivalent to 3% of the systemic AOEL.

- **Baytan FS 094**

No re-entry scenario is considered as the only intended use is treating seeds prior to sowing.

Bystander

- **Bayfidan EC 250**

Orchard and knapsack

On the basis of data on drift from spray applications to field crops and grapes (Ganzelmeier et al. 1995) at a distance of 7.5m from the source, dermal exposure of a bystander is calculated 0.0001 mg a.s./kg bw/day

Based on a study conducted by Lloyd et al (1987), which reports direct measurements of simulated bystander exposure for broadcast air assisted applications made to orchards in the UK, and assuming an application of 62.5 g triadimenol in 200 litres water, no protection from clothing and 100% inhalation, the estimated bystander exposure is 0.0033 mg/kg bw, equivalent to 7% of the AOEL of 0.05 mg/kg bw/day.

Cereals

An estimate of bystander exposure has been made by this evaluation, based on a published UK study (Lloyd and Bell, 1983) in which measurements of simulated bystander exposure were made during field crop spraying operations. Assuming an application of 125 g triadimenol in 200 litres water, no protection from clothing and 100% inhalation, the estimated bystander exposure is 0.00024 mg/kg bw, equivalent to <1% of the AOEL.

- **Baytan FS 094**

Seed treatment

Seed dressing is usually performed in professional plants. In these conditions the only possible exposure to bystanders might be to persons not directly involved in the treatment process such as forklift drivers. The exposure is estimated to be less than 1% of the AOEL.

Sowing

During this activity it is highly unlikely that exposure to bystanders will occur and, in any case, a theoretic exposure is not expected to exceed that of operators involved in sowing treated seed which was within the AOEL.

3. Residues

3.1. NATURE AND MAGNITUDE OF RESIDUES IN PLANT

Triadimenol was discussed at the PRAPeR experts' meeting for residues (PRAPeR 50, subgroup 1, round 10) in June 2008.

3.1.1. PRIMARY CROPS

The metabolism of triadimenol was investigated in grapes, cereals and sugar beet. These studies cover all representative uses supported by the applicant, including seed treatment of cereals, and were performed with ^{14}C-triadimenol labelled on the phenyl moiety except in one study on barley where the ^{14}C-triazole label was also investigated. These studies were performed using various ratios of the diastereomeric forms A and B as defined in chapter 1 but the possible isomeric conversions and the possible toxicological impact of different isomer ratios was not discussed. Globally the metabolic pathway of triadimenol in plant involves:

- hydroxylation of the tertiary butyl group leading to the hydroxy metabolite M10,
- cleavage of the parent molecule yielding the metabolite M07[11] and the triazole derivative metabolites (TDMs),
- conjugation of the active substance and its metabolites to sugar compounds,
- and to a lower extent, oxidation to triadimefon;

After foliar or seed treatments, the residue pattern in grapes, cereal grains, straw, and sugar beet leaves and roots was dominated by the parent compound that account for 23 to 73% of the TRR. Hexose conjugate of the parent (M15[12]) and metabolite KWG1342 as free (M10) or conjugated (M12[13]) were also detected in levels above 10% of the TRR. Together these metabolites are present in amounts similar to or lower than those of the parent compound. In addition, in the barley metabolism study using 14C-triazole label, triazole derivative metabolites (M05[14], M11[15] and M06[16]) were detected, up to 29% TRR in grain for the metabolite M05. Triadimefon was observed in very low proportions, usually less than 1% TRR (<0.01 mg/kg) up to 0.011 mg/kg (6% TRR) in wheat straw following seed application.

Taking into account the significant proportions of the parent compound in the different plant parts investigated, the meeting of experts concluded that triadimenol represents a good marker for residues in plants and proposed to limit the residue definition for monitoring as triadimenol only. For risk assessment, it was proposed to include in the residue definition the parent triadimenol, the hydroxy metabolite M10 and their conjugates expressed as triadimenol, considering that M10 is structurally closely related to the parent compound with probable similar toxicological properties as no information was provided for demonstrating its non toxicological relevance. In addition, since in the cereal metabolism studies triadimenol conjugates and KWG1342 free (M10) and its glucoside conjugates (M12) were found in almost similar proportions than free triadimenol, it was concluded that a conversion factor of 2 between both residue definitions should be appropriate for cereals. As the parent represents the major part of the radioactive residues (61% TRR), while metabolites account

[11] M07: 4-chlorophenol
[12] M15: 1-(4-chlorophenoxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-yl glucoside
[13] M12: 4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butyl glucoside
[14] M05: (*R*,*S*)-2-amino-3-(1*H*-1,2,4-triazol-1-yl)propanoic acid
[15] M11: 2-hydroxy-3-(1*H*-1,2,4-triazol-1-yl)propanoic acid
[16] M06: 1*H*-1,2,4-triazol-1-ylacetic acid

for low proportions in grapes, no conversion factor needs to be used for fruit crops following foliar application.

Considering the levels of TDMs in cereal grains, the meeting discussed their possible inclusion in the plant residue definitions taking into account the recommendation of the PRAPeR experts meeting 14 on toxicology in January 2007 stating that toxicological end points and reference values should be adopted for TDMs, as a result of their effect on reproduction and development. This conclusion applied to M04, M05 and M06. For M11 no information was available on the toxicity and hence no conclusion could be drawn.

The meeting recognised that TDMs are not specific to triadimenol and that there is currently no EU approach on how to consider these common triazole metabolites in the risk assessment. The meeting identified an urgent need to collect monitoring data on the background residue levels of TDMs due to the uses of active substances of the triazole chemical group over several years in a large amount of crops. Based on these considerations, the meeting of experts was of the opinion not to include the TDMs in the triadimenol residue definitions and concluded that it is necessary to set a separate residue definition for TDMs and to perform a separate risk assessment. This issue should be reconsidered when a general approach on triazole compounds and their triazole derivative metabolites is defined.

A sufficient number of supervised residue trials have been submitted to propose MRLs on grape and on barley and oat. Only triadimenol residues were analysed for and the data were therefore assessed with regard to triadimenol residues only in view of MRL setting. No information was provided on the possible TDMs residue levels in grains. MRLs on wine grapes were based on Southern and Northern GAP and on Southern GAP only for table grapes. For use of triadimenol as seed treatment, trials in wheat, rye, barley and oats were submitted but for Northern EU only. All these trials resulted in residues below the LOQ of 0.10 mg/kg. The meeting of experts agreed that additional seed treatment trials conducted in the Southern zone are needed in which samples should be analysed in accordance with the full residue definition proposed for the risk assessment (triadimenol plus metabolite M10 and their conjugates) and TDMs. For foliar uses on cereals the discussion was based on addendum 1 of April 2008 where the growth stages at the last application and the analytical validation data were detailed. Finally, provisional MRLs were proposed for barley and oat only because of the lack of additional residue data in Southern EU for barley and in both zones for wheat. As previously, analyses in accordance with the full residue definition for risk assessment are requested. These data can be considered as reliable on the basis of storage stability studies demonstrating that triadimenol residues are stable in multiple types of commodities including processed ones under long term storage (24 months) in deep freeze conditions. No information concerning the stability of metabolite M10 was provided as this was initially not included in the residue definition. Triadimenol is stable to hydrolysis in buffer solution in standard conditions representative for pasteurisation, baking, brewing, boiling and sterilisation. Ten processing studies on grape were submitted, demonstrating a limited

transfer of residues to wine, with the calculated processing factor to wine being below 0.3. In addition one study related to juice production was available.

3.1.2. SUCCEEDING AND ROTATIONAL CROPS

No rotational crop study conforming to modern standards has been provided. Instead, a 5-year lysimeter study has been submitted, which combined during the first three years seed treatments with ^{14}C-labelled triadimenol (*c.a.* 1X) and foliar applications *(c.a.* 2X*)* with ^{14}C-labelled triadimenol or triadimefon followed by sowing of untreated barley, clover and sugar beet during the last 2 years. Identification of residues resulting from soil uptake was carried out in barley and clover only. Residues of the parent triadimenol above 0.1 mg/kg and residues of the triazole derivative metabolites in the range of 0.1 to 0.33 mg/kg were found in straw and grain respectively. In clover the parent triadimenol was observed at a level of 0.046 mg/kg. Based on this study and considering that residues of the parent compound and its triazole derivative metabolites are expected to be present in rotational crops above the Limit of Quantification (LOQ), the meeting was of the opinion that a new field study on rotational crops, conforming to the current guidelines, is required. In this study crops should be analysed for triadimenol, tradimefon and TDMs residues.

3.2. NATURE AND MAGNITUDE OF RESIDUES IN LIVESTOCK

Animal metabolism studies were not carried out with triadimenol but with the active substance triadimefon labelled on the phenyl moiety only. Given that the major metabolic pathway of triadimefon in animals is the first step in producing triadimenol, these studies were considered as fully acceptable for the understanding of triadimenol metabolism in animals. The metabolism of triadimenol in livestock is extensive and proceeds mainly via stepwise oxidation of the tertiary butyl group to the hydroxy metabolite M10 and the carboxy metabolite M02, both being subjected to conjugation with sulphate (M28[17]) or with glucuronic acid (M23[18] and M30[19] respectively). In hens, an additional pathway consisting in desmethylation was identified, leading to the desmethyl-KWG1342 (M18[20]) and desmethyl-hydroxy-triadimenol (M31[21]) metabolites. The metabolic pattern found in animal tissues is complex. In ruminants the parent compound was present at representative levels in liver only (20% TRR) and the major metabolites found in edible tissues were conjugates of KWG1342, in particular its sulphate conjugate M28 in milk (45% TRR) and its glucuronide conjugate M23 in muscle, fat, liver and kidneys (30-43% TRR). In poultry, depending on the tissue, major constituents of the residue were the parent compound (25% TRR in fat), the hydroxy metabolite M10 (18% TRR in egg), the carboxy metabolite M02 in liver and muscle (18 and 24% TRR) and the metabolite M31 resulting from the demethylation route in muscle and eggs (16 to 24% TRR).

[17] M28 : 1-(4-chlorophenoxy)-4-hydroxy-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-yl hydrogen sulfate
[18] M23 : 4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butyl glucuronide
[19] M30 : 1-*O*-[4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butanoyl] glucuronide
[20] M18: 4-(4-chlorophenoxy)-2-methyl-4-(1*H*-1,2,4-triazol-1-yl)butane-1,3-diol
[21] M31 : 1-(4-chlorophenoxy)-3-methyl-1-(1*H*-1,2,4-triazol-1-yl)butane-2,3-diol

The meeting of experts concluded that triadimenol could not be a valid marker for animal products since it was observed in significant levels in ruminant liver and in poultry fat and eggs only. The inclusion of the metabolites KWG1342 and KWG1640 and their glucuronide and sulphate conjugates would ensure a residue definition for risk assessment fully protecting consumer health. Thus, the animal residue definition for risk assessment was proposed as triadimenol plus metabolites M10, M02 and their conjugates and metabolite M28. For monitoring the residue was defined as triadimenol plus metabolite M10 and their conjugates and metabolite M28.

In addition the meeting discussed whether is was sufficiently demonstrated that TDMs will not be present at significant levels in animal products since the triazole labelling was not used in the metabolism studies. From the ^{14}C-phenyl study there are no indications of an extensive cleavage since the *p*-chlorophenol or *p*-chlorophenol-sulfate metabolites resulting from the cleavage of the parent compound were observed in very low proportions (<4% TRR) in goat and poultry and in low levels with regard to the overdose rates used in these studies (>78X). Thus no significant TDMs residues resulting from the direct intake of triadimefon/triadimenol are expected in products of animal origin. Nevertheless it was noted that these studies were performed using triadimefon only but the dietary burden should also take into account the additional exposure arising from TDMs residues present in feeding commodities from both, primary and rotational crops (especially in cereal straw and cereal grains).

As for plants, it was concluded that the issue on TDMs is not specific to triadimenol. It is a general concern for all the active substances belonging to the triazole chemical class. Provisionally, TDMs have not been included in the residue definitions of a specific triazole compound. For animal products, a specific residue definition has to be set and a global risk assessment has to be performed for TDMs, taking into account the numerous triazole active substances available on the market and in attendance of the definition of a general approach concerning these compounds at EU level.

A feeding study in cows has been conducted with animals dosed with a 1:1 mixture of triadimefon/triadimenol at a rate of 25, 75 and 250 mg/kg feed, the lower dose representing *c.a.* 60X and 25X the animal burden calculated for dairy and beef cattle respectively. Milk and tissues were analysed using a total method covering free and conjugated residues of triadimefon, triadimenol, as well as metabolites M10, M02, and M09[22]. This method is appropriate in the framework of this peer review on triadimenol as its scope is even wider than the above proposed residue definition for monitoring and risk assessment. Considering the results of this study and the low transfer in animal products, the meeting concluded that there is no need to propose a MRL for products of animal origin at this stage.

[22] M09: 1-(4-chlorophenoxy)-4-hydroxy-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-one

3.3. CONSUMER RISK ASSESSMENT

Considering the new ADI and ARfD values for triadimenol, both raised to 0.05 mg/kg bw/d during the PRAPeR meeting on toxicology, no risk for the consumer resulting from representative uses on grapes and barley is expected, the Theoretical Maximum Daily Intake (TMDI) being less than 3% of the ADI and the maximum International Estimated Short Term Intake (IESTI) less than 27% of the ARfD using the EFSA model. These calculations include for cereals a conversion factor of 2 in order to take into account the metabolite M10 and the conjugates that were included in the residue definition for risk assessment.

Nevertheless, it must be pointed out that at present, the consumer risk assessment considers only the residues of triadimenol, its hydroxy metabolite M10 and their conjugates, according to the residue definitions proposed for plants. **The contribution of the TDMs metabolites** (M04, M05, M06 and M11) **to consumer exposure was not assessed since data on their actual occurrence in primary crops, animal commodities and rotational crops are lacking**. In addition, the assessment of their potential to act toxicologically in a cumulative way with the parent compound is necessary on the basis of a related opinion and guidance of the EFSA PPR panel[23]. It must be stressed that this lack of data is a generic issue and concerns all active substances of the triazole chemical class whose degradation pathway in primary crops, soil and livestock involves a cleavage of the bond to the triazole ring.

In addition, the risk assessment was performed disregarding the possible impact of a change of the isomer ratio due to plant or livestock metabolism as this was not investigated by the applicant and not discussed during the meeting.

3.4. PROPOSED MRLS

Based on the available supervised residue trials and animal feeding studies, using where relevant statistical analysis as required by current European guidelines, the following MRLs can be proposed:

- Table and wine grape 0.3 mg/kg (table grape supported by Southern GAP only)
- Barley and oat 0.1 mg/kg (supported by Northern GAP only)

Due to the low transfer of residues, no MRLs are proposed for products of animal origin.

4. Environmental fate and behaviour

Triadimenol was discussed at the PRAPeR experts' meeting for environmental fate and behaviour in May 2008 (PRAPeR 47) on the basis of the DAR, addendum 1 (April 2008) and addendum 3 (May 2008).

[23] : EFSA journal (2008) 704, 1-84, (http://www.efsa.europa.eu/cs/BlobServer/Scientific_Opinion/ppr_op_ej704_cumulative_en.pdf?ssbinary=true)

The fate and behaviour characteristics of the major metabolite M04 (a metabolite with the potential to be formed by several triazole moiety containing active substances) was also discussed at the PRAPeR experts' meeting for environmental fate and behaviour PRAPeR 12 in January 2007. Therefore the endpoints for metabolite M04 as agreed in PRAPeR 12 are included in the current conclusions for triadimenol.

As indicated in the physical-chemical section, triadimenol exists as two isomers, diastereomer A (*RS* + *SR*, range: 70 to 85%) and diastereomer B (*RR* + *SS*, range: 15 to 30%). Some studies provided in the fate and behaviour section were able to differentiate between the isomers, but others could not. Where available, the information of the relative amount at the equilibrium and/or the rate of equilibrium in the different environmental compartments is reported in the specific section. Generally, the assessment has only considered the fate of triadimenol in terms of the sum of the isomers.

At the end of the DAR commenting phase of the peer review, a data requirement was set for the submission of some studies[24] on the soil rate degradation and field dissipation of triadimenol, which Sweden had included in national considerations between 1989 and 1993. A motivation as to why these studies were not submitted in the dossier was provided by the applicant, though their statement was not completely clear at least in relation to one of the studies. Although the RMS indicated (in the reporting table) that it was not clear whether the data would significantly alter the risk assessment conducted, they did not request the submission of the new studies from the applicant, as they did not consider it possible to conduct an evaluation of these studies, on the basis of Article 11d of 1490/2002[25]. However, the EFSA considered that in this situation it could not be excluded that these studies may have implications in relation to Article 7 of Directive 91/414/EEC[26], regarding new information on potentially dangerous effects on the environment. Hence the data gap was proposed by the EFSA. The EFSA clearly indicated that the submission of these studies would not be necessary if Sweden (KEMI) made available their national evaluation and this confirmed that the data derived from these studies did not indicate any harmful effects or more critical values. The EFSA's position is that, without an independent assessment by a competent authority, it can not be excluded that information would not lead to "potentially dangerous effects". Following this reasoning, the fate and behaviour experts from the member states (PRAPeR 47) agreed that the EFSA conclusion should identify a data gap. This conclusion includes this data gap.

[24] 1) Morris RA, Mobay Ag. Chem. Report 68866. 2) Puhl RJ, Hurley JB, Thornton JS. 1979, Mobay Ag. Chem. Report 68009. 3) Vogeler K, Brennecke R. 1981. Bayer AG RA-248.

[25] COMMISSION REGULATION (EC) No 1490/2002. laying down further detailed rules for the implementation of the third stage of the programme of work referred to in Article 8(2) of Council Directive 91/414/EEC and amending Regulation (EC) No 451/2000 (*Article 11d: Submission of additional information after the draft assessment report has been submitted to the EFSA)*

[26] Council Directive 91/414/EEC concerning the placing of plant protection products on the market (*Article 7: Information on potentially harmful effects).*

4.1.1. ROUTE OF DEGRADATION IN SOIL

Route of degradation of triadimenol (^{14}C labelled at the phenyl ring) in soil under dark aerobic conditions was investigated in one study with four soils (pH 6.0 – 7.0; OC 0.931 – 2.58 %; clay 5.0 – 15.6 %) at 20ºC and 40% maximum water holding capacity (MWHC). Unextracted residues at 100d ranged from 4.45 to 22.26% AR, with mineralization at the same sample time 3.77-41.05% AR. Metabolite formation with [phenyl-UL-^{14}C] triadimenol in all four soils was generally low, with no metabolites formed at >5% AR at any sampling time. The metabolite formed in the highest amount was triadimefon, formed at a maximum of 3.88% AR after 14 days. Triadimefon is a triazole fungicide closely related to triadimenol (triadimefon is the oxidized form of triadimenol). Three other metabolites were identified M02, M03[27] and M07. In this study the TLC method was able to distinguish between isomers of triadimenol.

There was no detailed route of degradation information provided on triadimenol labelled in the triazole ring position. The applicant made reference to a lysimeter study where both triazole-labelled triadimenol and triadimefon had been applied to winter wheat grown on the lysimeters. At the sample time after harvest of the crop in the first year of the study, metabolite **M04** (1,2,4-triazole) was found at 8.2% AR down to 20 cm depth. It is noted that the applicant has taken a conservative approach in environmental exposure calculation and assumed that 100% transformation to M04 occurs; this was accepted by the peer review and considered appropriate given the omission of the radiolabelling position in the parent molecule. In practice, given the relative rapid degradation of M04 (see section 4.1.2), it is very unlikely that observed levels would reach such levels.

Supporting information on the route of degradation was derived from two studies conducted with [3,5-^{14}C] M04 applied to a total of six soils. Results suggested that the major route of dissipation of M04 would be incorporation into unextracted residues (up to 67% AR after 90 days). Mineralization accounted for max 52% AR at 90d. M04 produced a major metabolite M38[28], with peak occurrence of 30.8% AR at 12d. Triazole alanine (M05, max 3.6% AR) and triazole acetic acid (M06, max 6.93% AR) were also detected as minor metabolites. The applicant proposed a route of degradation in soil of M04 transformed to M05, M05 transformed to M06 and M06 transformed to M04.

Two anaerobic soil studies were conducted with [triazole ring-3,5-^{14}C] triadimefon to address the anaerobic degradation of triadimenol. Both studies showed that triadimefon was converted to triadimenol under anaerobic conditions, with little or no apparent further degradation to other metabolites. Thus it was concluded that triadimenol is likely to be stable under anaerobic conditions. In light of this result, the experts from Member States agreed that the position of the radiolabel is not important to investigate the environmental fate of triadimenol under anaerobic conditions in soil and therefore no additional information was required.

[27] M03: (4-chlorophenoxy)(1*H*-1,2,4-triazol-1-yl)acetic acid

[28] M38: 1,2-dihydro-1,2,4-triazol-3-one (is the tautomer of 1*H*-1,2,4-triazol-3-ol, it is the predominant form under most conditions)

A study on the anaerobic degradation of M04 was conducted on one soil. Mineralisation reached 1.3% AR during the anaerobic phase. No other volatile compounds were detected. At the end of the anaerobic incubation period (day 122), 16.3% AR was non-extractable.

One study on a single soil was submitted to address the photolytic degradation of triadimenol in soil. Whilst the lightning conditions in the study were not clear, at the end of 35 days under test conditions, triadimenol levels had reduced to 68% AR under illumination compared to 79% AR under dark conditions. Therefore it is considered that soil surface photolysis is likely to be a minor route of degradation for triadimenol with the GAPs considered for Annex I listing.

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

Rate of degradation is soil under dark aerobic conditions at 20 °C was investigated in the same study described in section 4.1.1. An additional study (Vogeler, 1976) was conducted using two BBA standard soils. Because of deficiencies already identified in the DAR, this additional study was considered not acceptable by the experts. As a result of the exclusion of the DT_{50} values derived from the BBA soils, only two valid DT_{50} are available for triadimenol, and therefore a data gap was identified for 2 additional laboratory soil degradation rates. However, it was agreed that the EU risk assessment can be finalised without these data using the endpoints derived from the available field studies. Based on the remaining SFO DT_{50} triadimenol can be classified as moderate to high persistent in soil ($DT_{50\ norm\ 20\ °C}$ = 47.3 – 158.4 d).

It was noted that the ratio of isomers A:B declined gradually in soils with the highest ability to degrade total triadimenol most quickly; in soils with the least ability to degrade total triadimenol, the isomer ratio remained virtually unchanged over time. The A isomer is most biologically active and thus it is considered that potentially faster decline of A is of no practical concern in terms of environmental exposure and risk assessment. Subsequent exposure assessments are presented in terms of total triadimenol.

For metabolite 1,2,4-triazole (M04) an aerobic soil degradation study in three biologically active soils was performed. In agreement with the list of endpoints compiled for M04 during PRAPeR 12, the SFO DT_{50} values normalised to FOCUS reference conditions[29] (20ºC and -10kPa soil moisture content) are in the range 5.0-9.9 days (geometric mean = 8.2 days).

Four field dissipation studies were conducted, which cover eight Northern European sites (4 sites in Germany, 4 sites in Sweden) and four Southern European sites (one in France, one in Portugal, one in Spain and one in Italy). The study conducted at two of the Swedish sites was considered of limited use in establishing dissipation rates by RMS. The exclusion of these field DT_{50} values was confirmed by the meeting of experts and it was agreed that due to similar deficiencies in the other Swedish trials all the field DT_{50} values derived from this study should not be used for risk assessment purposes.

[29] Using section 2.4.2 of the generic guidance for FOCUS groundwater scenarios, version 1.1 dated April 2002, Q10 value of 2.2 and Walker equation coefficient of 0.7.

Dissipation rates were calculated using simple first order kinetics and based on data from the 0-10 cm soil horizon. Generally, triadimenol was only detected very infrequently at levels around the LOQ of 0.01 mg/kg in soil layers below 10 cm. A kinetic evaluation of the results of field dissipation studies was conducted in order to derive temperature and moisture normalised DT_{50} values for use in modelling assessments. Further details on weather data used in this normalising approach were provided in addendum 3 and considered acceptable by the experts. The normalised (20ºC and pF2) field DT_{50} for triadimenol were in the range of 17.0-83.7 days, with a geometric mean of 36.5 days.

Additional information on the decline of triadimenol diastereomers A and B in the field dissipation studies was also provided in addendum 3. The experts confirmed that in these trials isomer A dissipates faster than isomer B in soil. From a biological point of view, isomer A possesses the greater biological activity, thus it was concluded that there is no practical concern in terms of environmental exposure and risk assessment.

For consideration as to whether triadimenol may be considered as "persistent", i.e. field DT_{90} value > 365 days, it is clear that under real usage conditions, triadimenol could be persistent (one field DT_{90} value exceeds 365 days). Given the proposed GAPs on cereals and vines, there is the possibility that triadimenol could accumulate when used in successive years. The calculated maximum accumulated PECsoil for triadimenol assuming vines use in Southern Europe and successive year's application is 0.161 mg/kg occurring in the third year of application. The "steady state" concentration (i.e. the concentration immediately before the first application in the following year) is 0.031 mg/kg.

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

The adsorption of triadimenol was investigated by three separate studies covering a total of 14 soils. Two of the studies pre-dated requirements for GLP compliance but were relatively well reported and the derived adsorption coefficients were considered to be reliable. In spite of the large number of soils tested, the range of pH encompassed did not cover alkaline soils (soil pH: 5.5-6.9). The applicant has addressed this, considering that the molecule is in a non-ionised state between pH 3-10, and would not be expected to show any particular pH related dependency at environmentally relevant pH. A wide range of other soils properties was considered. There was no obvious trend between pH and Koc values in the experimental data. Triadimenol exhibits low to very high mobility in soil with K_foc ranging from 14 mL/g to 702 mL/g (1/n = 0.795-0.963). Given the large database on triadimenol K_foc values and 1/n values, it was considered appropriate that the median values should be used for modelling purposes (K_foc = 223 mL/g; 1/n = 0.895).

The adsorption/desorption of metabolite M04 was investigated in four soils in satisfactory guideline batch adsorption experiments. Calculated adsorption K_foc values as agreed in PRAPeR 12 discussion on triazole containing active substances were 43-120 mL/g (1/n 0.827 – 1.016), indicating that metabolite M04 is medium-very high mobile in soil. There was no evidence of a correlation of adsorption with pH.

No column leaching or lysimeter studies were conducted to investigate mobility.

4.2. FATE AND BEHAVIOUR IN WATER

4.2.1. SURFACE WATER AND SEDIMENT

An aqueous hydrolysis study under sterile conditions was conducted on triadimenol at pH 4, 7 and 9 at both 20ºC and 40ºC for 32 days. At all temperature and pH conditions, all radioactivity found on TLC plates was comprised of two isomers of triadimenol. Thus it may be concluded that triadimenol is stable with respect to hydrolysis and that this will not be a major route of degradation in surface waters.

In an aqueous hydrolysis study conducted with ^{14}C-M04 it was concluded that M04 was stable under test conditions (pH 5-9 at 25ºC).

The aqueous photolysis of triadimenol radiolabelled in the phenyl ring was investigated in three studies. In the most recent study triadimenol degraded with a mean first order DT_{50} of 9 days under sterile experimental conditions of continuous illumination. This was considered to be equivalent to an environmental half-life of 48 summer days (June) in Athens, Greece (38º N latitude). It was also found that triadimenol only exhibited very limited adsorption of light between 290-292 nm. No individual metabolites were observed to occur > 10% AR. At the meeting of experts it was agreed that the natural half-life of 48 days indicates photo-degradation is not that rapid compared to the expected behaviour of partitioning to the sediment. Therefore, the absence of experiments with a different radiolabel position (i.e. [triazole ring-3,5-^{14}C]triadimenol) would not change the conclusion of the assessment.

No ready biodegradation study was submitted and therefore triadimenol is considered not to be ready biodegradable for classification purposes.

An aerobic sediment/water study was conducted (O.C. sediment content: 0.5% and 4.6%; water pH: 7.4 and 8.3). The study indicated relatively high levels of partitioning of triadimenol to sediment, particularly in the system with higher % organic carbon in sediment (max 52.3% AR after 2.5 weeks). Overall total system degradation was slow, with whole system first order DT_{50} values of 324-381 days. Dissipation from the water phase in both systems could not be calculated with any degree of reliability with first order kinetics ($r^2 < 0.4$). A plausible explanation is that water phase kinetics are dominated by partitioning into sediment in both systems. There was no attempt to calculate actual degradation rates in water, as required by FOCUSsw at Steps 2 and 3. However, the results of the sediment/water study tend to indicate that true degradation in this study was likely to be slow, and possibly little different from the slow degradation seen in the aqueous hydrolysis study. As a worst case for true degradation rate of triadimenol, a first order DT_{50} of 353 days should be used for each of water, sediment and whole system. In this sediment/water study, the ratio of enantiomers was determined at the beginning and at the end of the study by means of GLC on chiral phases. It was concluded that the fate of the two isomers was similar in both systems. The formation of unextracted residues was relatively low, being 0.6-2.6% AR at 13 weeks after treatment (i.e. approx. 91 DAT, study end). Similarly, mineralization was relatively low, with 2.8-3.7% AR at 13 weeks after treatment.

Only two metabolites were identified, M01 and M02. The maximum occurrence of M01 was 0.7% AR in sediment at 5 weeks after treatment; the maximum occurrence of M02 was 1.7% AR in water at 13 weeks after treatment.

It should be noted that this study only used radiolabelling in the phenyl ring. The lack of labelling in the triazole ring is a potential omission from the study design. However, given the slow degradation of triadimenol, very low metabolite formation, and the fact that identified metabolites all retained the triazole ring, it is unlikely that M04 would have been formed in significant quantities in the study. The applicant has used a conservative assumption of 100% formation in FOCUSsw modelling.

In the original DAR, for FOCUSsw Step 2 calculations, the RMS presented its own refinement of PECSw to reflect the total loading of triadimenol and metabolite M04 into the water phase. This was because the NOECs for these two substances for sediment-dwelling organisms in the ecotoxicology section were presented as water concentrations. However, a refinement of the calculation at Step 3 was necessary to achieve TERs above the trigger of 10 for sediment dwellers. Details on the RMS and applicant approaches used for deriving the required PECsw/sed values were provided in addendum 1. The experts agreed that the Step 3 approach as reported in the addendum could be used in EU level risk assessment even though the RMS identified some draw backs to some of the assumptions used. The calculations resulted in a concentration of 4.2 µg/L for triadimenol and 0.98 µg/L for metabolite M04.

A summary of the results of a monitoring programme on pesticides on a catchment in southern Sweden was provided to RMS by KEMI. The experts agreed that data on triadimenol from this database can be used as supporting information to the assessment.

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

Potential contamination of ground water by triadimenol and its soil metabolite M04, when used according the proposed representative uses, was assessed in the DAR with FOCUS GW PEARL (v.2.2.2) model and the relevant scenarios. Geometric mean temperature and moisture normalized (20 °C, pF2) field degradation soil DT_{50} of triadimenol and laboratory degradation soil DT_{50} of M04 were used for this calculation. For the cereals scenarios using spray applications, with one exception, and irrespective of early or late treatment, the 80th percentile annual average concentrations at 1m for both triadimenol and M04 were <0.0005 µg/L. Similar results were also recorded for the seed treatment use where all scenarios except Piacenza gave predicted 80th percentile annual average concentrations of <0.0005 µg/L for both triadimenol and M04. The Piacenza scenario gave a concentration of 0.0007 µg/L for triadimenol and <0.0005 µg/L for M04. For vines, the only scenario to predict concentrations >0.0005 µg/L for either triadimenol or M04 was Piacenza. At this scenario, the predicted 80th percentile annual average concentrations were 0.008 µg/L for triadimenol and 0.0015 µg/L for M04.

4.3. FATE AND BEHAVIOUR IN AIR

Triadimenol has a vapour pressure of 6 x 10^{-7} and 4 x 10^{-7} Pa (diastereomers A and B respectively) at 20ºC and Henry's Law Constant of 3 x 10^{-6} Pa and 4 x 10^{-6} Pa m^3/mole. Studies on volatilisation from plants and soil surfaces indicated that up to 5% may volatilise in 24 hours from plant surfaces, but that volatilisation from soil should be minimal. This is in agreement with the calculated Henry's Law constant/coefficient.

The calculated half-life for photochemical oxidative degradation for triadimenol is 2.5 hours assuming a global 24 hour average hydroxyl radical concentrations of 5 x 10^5 radicals/cm^3.

The evidence presented indicates that triadimenol is unlikely to volatilise from soil under normal usage conditions, but even if it did, it would degrade rapidly in the atmosphere, and thus the risk of long range transport would be negligible.

5. Ecotoxicology

Triadimenol was discussed in the PRAPeR meeting of ecotoxicology experts PRAPeR 48 (subgroup 1) in May 2008, on the basis of the DAR (May, 2006) and Addendum 1 (April, 2008).

Triadimenol is a triazole fungicide, formulated in the products 'Baytan FS 094' (a FS formulation containing nominally 75 g/l triadimenol, 9 g/l fuberidazole and 10 g/l imazalil) and 'Bayfidan 250 EC' (an EC formulation containing nominally 250 g/l triadimenol). The representative uses evaluated in this review were seed treatment ('Baytan FS 094') to cereals (winter wheat 86.3 g triadimenol/ha at 230 kg seed/ha; barley 67.5 g triadimenol/ha at 180 kg seed/ha) and as a foliar application ('Bayfidan 250 EC') in cereals (max 1-2 applications of 125 g a.s./ha) and grapes (4-8 applications in North Europe max 40 g a.s./ha; 4 applications in South Europe max 62.5 g a.s./ha).

Triadimenol belongs to a group of fungicides for which a general concern about a relevant potential for endocrine disrupting effects in humans and wildlife can be stated because of its mode of action (DMI-Fungicide).

The risk assessment for the metabolites was (when possible) based on endpoints for the triazole metabolites agreed in the PRAPeR 13 and PRAPeR 14 expert meetings.

The risk assessment was based on toxicity studies with the technical material. No studies using the formulated products were available. It should therefore be noted that the risk to non-target organisms from exposure to the seed treatment product Baytan FS 094 could not be concluded since this product besides triadimenol also contains fuberidazole and imazalil.

The risk assessment was conducted according to the following guidance documents: Risk Assessment for Birds and Mammals. SANCO/4145/2000, September 2002: Aquatic Ecotoxicology. SANCO/3268/2001 rev.4 final, October 2002; Terrestrial Ecotoxicology. SANCO/10329/2002 rev.2 final, October 2002; Risk Assessment for non-target arthropods. ESCORT 2, March 2000, SETAC.

5.1. RISK TO TERRESTRIAL VERTEBRATES

An overview of the risk assessment for birds from the intended use of triadimenol

Time span of risk	1st tier TER	Proposed refinements	Conclusion of peer review
Bayfidan EC 250, cereals			
Acute risk	LHB: >213 IB: >294	Not necessary	Low acute risk
Short-term risk	LHB: >119 IB: >186	Not necessary	Low short-term risk
Long- term/ reproductive risk	LHB: **2.4** IB: **2**	Measured residue levels in green parts of cereals. Focal species: Grey partridge (*Perdix perdix*) and skylark (*Alauda arvensis*). Refinement of PD	LHB: refined TER =13.9 in N EU LHB: refined TER =12.9 in S EU $IB_{partridge}$ refined TER=7.8 in N EU $IB_{partridge}$: refined TER=7.4 in S EU $IB_{skylark}$: refined TER=**1.9** in N EU $IB_{skylark}$: refined TER=**1.8** in S EU **High risk to IB cannot be excluded based on available information.**
Bayfidan EC 250, grapes EU North			
Acute risk	IB: >909	Not necessary	Low acute risk
Short-term risk	IB: >588	Not necessary	Low short-term risk
Long-term risk	IB: 9.3	Not necessary	Low long-term risk
Bayfidan EC 250, grapes EU South			
Acute risk	IB: >588	Not necessary	Low acute risk
Short-term risk	IB: >371	Not necessary	Low short-term risk
Long-term risk	IB: **3.95**	Focal species: Chaffinch, Blue tit and Robin. Refinement of PT	IB: Refined TER = **4.5** – 5.6. Further support for refinements needed.
Baytan FS 094, cereal seed treatment			
Acute risk	SGB: 14	Not necessary	Low acute risk
Short-term risk	SGB: **4.9**	Focal species: Wood pigeon, yellowhammer and skylark. Refinement of PT	**Refine TER based on more recent substantiated PT values agreed in PRAPeR 48**
Long-term risk	SGB: **0.05**	RMS proposed no refinement necessary due to germination of seeds and exposure outside of breeding season.	Low risk

LHB: Large herbivorous bird; IB: Insectivorous bird; SGB: Small granivorous bird

Acute and short-term studies indicated a low toxicity to Bobwhite quail (*Colinus virginianus*). For uses in cereals (spray application) the acute and short-term risk was assessed to be low, where as the long-term assessment indicated a potential risk. The long-term risk assessment for herbivorous birds was refined by using measured residue levels in green parts of cereals taken on the day after the second application performed according to the GAP. Residue data were separated into northern and southern trials. The long-term reproductive NOEC from the bobwhite quail (*Colinus virginianus*) study was revised in addendum 1 (April 2008), based on a statistic re-evaluation of effects on egg production. The revised NOEL of 7.5 mg as/kg bw/d was agreed in the expert meeting. This resulted in TER_{lt} of 13.9 for northern Europe and 12.9 for southern Europe, indicating a low risk to herbivorous birds. To refine the assessment for insectivorous birds the applicant suggested the grey partridge (*Perdix perdix*) as a focal species. The RMS suggested also to assess the risk to a small insectivorous bird and chose the skylark (*Alauda arvensis*). The food for the grey partridge was assumed to consist of 30% insects and 70% plant matter[30], and for adult skylarks of 60% insects and 40 % plant material[31,32]. Plant material was assumed to have the same residue levels as in the trials with cereals. Residue levels for insects were as in the guidance document. From the revised long-term NOEC (see addendum 1, April 2008) the resulting TER_{lt} values were 7.5 and 7.4 for grey partridge in NEU and SEU, respectively, indicating a low risk for this species. The long-term TERs for skylark were however 1.9 for NEU and 1.8 for SEU. The assessment was agreed in the expert meeting. Since these values were below the Annex VI trigger, a potential high risk was identified and further refinements were required.

For uses in vine, the risk assessment indicated a low risk to birds, except for the long-term risk to insectivorous birds in SEU, after revising the NOEC (addendum 1, April 2008). Focal bird species Chaffinch (*Fringilla coelebs*), Blue tit (*Cyanistes caeruleus*) and Robin (*Erithacus rubecula*) and PT refinements were derived from mist netting studies and radio tracking studies from orchards in UK. Long-term TER values ranging from 4.5-5.6 for the proposed species were calculated by RMS based on the upper 95% confidence limit from the 90th percentile PT value. It was concluded in the meeting of experts, that further data to support the use of UK orchard data to refine the risk assessment for insectivorous birds from use in vine were needed.

TERs at tier 1 indicated a low acute risk to granivorous birds, whereas a potential high short-term and long-term risk was identified for granivorous birds. To refine the assessment for granivorous birds the applicant proposed to use data from a field dissipation study and results from an avoidance study. The RMS disregarded both proposals for refinement. The dissipation study was performed during spring

[30] Buxton, J. M.; Crocker, D. R. (1996) Milestone report: Birds and farming: Information for risk assessment, Central Science Laboratory, Slough, Great Britain. Report No.: R-1031.
[31] Green, R. E. (1978). Factors affecting the diet of farmland skylarks Alauda arvensis. *J. Anim. Ecol.* 47: 913-928 - and - Green, R. E. (1980) Food selection by skylarks and grazing damage to sugar beet seedlings. *J. Appl. Ecol.* 17: 613-630.
[32]Garrik (1981) Diets of pipits and skylarks at Huiarua Station, Tokomaru Bay, North Island, New Zealand. *New Zealand Journal of Ecology* 4: 106-114.

and may not be representative of the dissipation during autumn. Furthermore, according to the guidance document initial residue values should be used for the acute and short-term assessment. The design of the avoidance study was not considered to be appropriate and extrapolating to other species was also problematic. The RMS proposed to refine the assessment for granivorous birds by choosing wood pigeon (*Columba palumbus*), yellowhammer (*Emberiza citrinella*) and skylark (*Alauda arvensis*) as focal species, since these species were considered to be prevalent and frequently observed in newly sown cereal fields. Based on literature data for wood pigeon[33] and radio-tracking studies of yellowhammers and skylarks in the UK 90th percentile values for time spent in the field was proposed as 13% for yellowhammer, 24.5% for wood pigeon and 41% for skylark. The time spent on the fields was assumed to correspond to the proportion of diet obtained in the treated field (PT). With these PT factors, short-term TERs of 43.8 for yellowhammer, 63.5 for wood pigeon and 15.8 for skylark were derived. During the expert meeting it was concluded that the PT values used in the refined short-term risk assessment should be revised by more recent substantiated PT values. The RMS proposed that no refinement of the long-term risk assessment was necessary since seeds would germinate within 14 days, thus excluding long-term exposure and that exposure would occur outside of the breeding-season. It was noted by EFSA that the breeding season for birds may extend into the autumn in southern Member States and long-term reproductive effect may occur from shorter duration of exposure. In case of Annex I inclusion this may be relevant to be considered by southern Member States. Overall it was concluded that the acute and long-term risk to granivorous birds was low. The short-term risk assessment needs to be updated with more substantiated PT values before a final conclusion can be taken for cereal seed treatment use.

[33] Wolf, C. (2004). Habitat and food choice of wood pigeons after the drilling of winter cereals in an agrarian landscape in England. Bayer CropScience AG, Unpublished Report No.: WFC/FS 010.

An overview of the risk assessment for mammals from the intended use of triadimenol

Active substance: Triadimenol	**1st tier TER**	**Proposed refinements**	**Conclusion of peer review**
Bayfidan EC 250 cereals			
Acute risk	SHM: 22.3 IM: 626	Not necessary	Low acute risk
Long- term/ reproductive risk	SHM: **0.91** IM: 22.2	• Measured residue levels in green parts of cereals	SHM: refined TER=6.6 in N EU SHM: refined TER=6.1 in S EU
Bayfidan EC 250, grapes EU North			
Acute risk	SHM: 89.9	Not necessary	Low acute risk
Long-term risk	SHM: **3.28**	• Application rates according to label • Refined interception • DT_{50} of residues from residue trials • Calculation of maximum TWA residue in ground vegetation	Refined TER=6.5 (early) Refined TER=7.2 (late)
Bayfidan EC 250, grapes EU South			
Acute risk	SHM: 78.4	Not necessary	Low acute risk
Long-term risk	SHM: **3.23**	• Refined interception • DT_{50} of residues from residue trials • Calculation of maximum TWA residue in ground vegetation	Refined TER=5.3 (early) Refined TER=6.5 (late)
Baytan FS 094, cereal seed treatment			
Acute risk	SGM: **7.9**	Wood mouse as focal species, refined PD of 0.6	Refined TER=13.3
Long-term risk	SGM: **0.1**	• Wood mouse as focal species • Refined PD of 0.6 • Refined PT of 0.54 • Rapid germination of seeds • Exposure outside of breeding season	Refined TER=**1.8**

SHM: Small herbivorous mammal; IM: Insectivorous mammal; SGM: Small granivorous mammal: N EU: North Europe; S EU: South Europe

Triadimenol was found to be harmful to rats in an acute toxicity study. The long-term NOEL of 8.9 mg/kg bw/d for rats was confirmed by the expert meeting on mammalian toxicology. The assessment

for herbivorous mammals in cereals was refined as for birds by using measured residue levels in green parts of cereals taken on the day after the second application performed according to the GAP. This resulted in long-term TERs of 6.6 for NEU and 6.1 for SEU. These values were above the Annex VI trigger of 5 and indicated that the risk to herbivorous mammals from the evaluated use of Bayfidan EC 250 as foliar spray in cereals was low.

The long-term risk assessment for herbivorous mammals in vine was refined for the 'northern EU early' scenario by considering application rates according to the label for each of the 8 applications. For the 'northern EU late' scenario and the use in southern EU the maximum application rate was assumed. Interception between 40 and 85%, depending on the growth stage, was assumed. A DT_{50} of 6.9 days (1st order) was used for the degradation of residues between applications. This was based on decline data from 10 residue trials where measurements were carried out on samples from days 0, 14 and 28. Even if the number of samplings was low, the variability between individual trials was relatively low and it could be assumed that it reasonably represents a realistic dissipation. A time weighted average for residues in ground vegetation, over 10 days in northern EU and 21 days in southern EU, was calculated for each scenario and then used to calculate a refined estimated theoretical exposure as daily dose per kg body weight. The resulting TERs were in the range of 5.3 to 10.7 and thus met the Annex VI trigger. The risk to mammals from the intended use in vine was considered to be low.

The acute risk to granivorous mammals was refined based on literature data on the diet of wood mouse[34,35]. A maximum of 60% cereal seeds resulted in a TER_a of 13.3. For the long-term further refinement of PT to 0.54 was introduced, based on results from radio-tracking studies in the UK. The refined TER_{lt} was 1.8. The meeting of experts considered that population modelling may be a possible way to refine the risk assessment further. It was concluded that the acute risk to granivorous mammals was low, whereas the long-term risk to mammals would require further refinements to identify low risk from the use as cereal seed treatment.

The risk from intake of contaminated drinking water were considered to be minimal for the intended uses, as exposure from puddles and leaf axils was considered to be negligible.

Metabolites

There were no metabolites detected in plants, soil or water that were considered to pose a risk to terrestrial vertebrates that would not be covered by the assessment for triadimenol.

[34] Green, R (1978). The ecology of wood mice (*Apodemus sylvaticus*) on arable farmland, J. Zool., 357-377.
[35] Gurney, J. E., Perrett, J., Crocker, D.r. and Pascual, J.A. (1998) Milestone report: Mammals and farming: Information for risk assessment.

Secondary poisoning

A $logP_{ow}$ of 3.08-3.28 triggered an assessment of the risk from secondary poisoning. Calculated TERs indicated a low risk to earthworm- and fish-eating birds and mammals from secondary poisoning.

Endocrine disruption

Potential endocrine effects of triadimenol on birds were considered in addendum 1(April 2008). It was noted that an ELS-study with triadimenol together with a fish screening assay (FSA) of 21 days was available (but not submitted to RMS) to assess potential endocrine effects. These studies could not be submitted for consideration in the peer review, in view of the restrictions concerning the acceptance of new (i.e. newly submitted) studies after the submission of the DAR to EFSA, as laid down in Commission Regulation (EC) No. 1095/2007. RMS suggested that the studies were assessed at Member State level (see 5.2 below) and could also be used to determine the need for further avian testing/assessment of endocrine effects. The meeting of experts agreed that potential endocrine effects on birds could not be addressed by mammalian effect data and Member States should have the possibility to ask for more information on endocrine properties of triadimenol to address the potential risk of endocrine disrupting effects on birds.

5.2. RISK TO AQUATIC ORGANISMS

Triadimenol was proposed to be classified as R51 “Toxic to aquatic organisms” based on the lowest EC_{50} of 9.6 mg a.s./L obtained for algae. Since the log Pow is >3 and no ready biodegradable test was available it would also be assigned R53 “May cause long term adverse effects in the aquatic environment”. The formulation Bayfidan 250 EC was of similar acute toxicity as technical triadimenol.

The acute risk from exposure of aquatic organisms to triadimenol from foliar application of Bayfidan EC 250 was estimated by comparing the maximum PEC_{sw} obtained for winter cereals in SEU by FOCUS Step 2 calculations with the EC/LC_{50} for different organisms. All acute TER values were well above the relevant Annex VI trigger indicating a low risk (TER_a= 483 for fish, 2550 for invertebrates). This assessment was considered to cover the acute risk from all evaluated uses of Bayfidan EC 250.

Using the same FOCUS Step 2 PEC estimates and the NOEC from a 28-day juvenile growth test, a TER_{lt} of 157 was derived for fish. For *Daphnia magna* and *Chironomus riparius* the TER_{lt} was 5 and thus below the Annex VI trigger. The assessment for *Daphnia* was refined by using the highest ‘global maximum’ FOCUS Step 3 PEC for surface water. For sediment dwelling organisms the Step 2 PEC_{sw} for the different uses was used. The resulting TER_{lt} for *Daphnia* were in the range of 28.6 to 55.6 and thus above the Annex VI trigger indicating a low risk. For sediment dwelling organisms only the TERs for vine in NEU met the Annex VI trigger. Both TER for early and late application were 10. For the use in vine in SEU and the use in cereals the TER was 5 and further consideration of

the risk was required. A low risk was identified for all sediment dwellers (TER = 24) for all used in a refined risk assessment (see addendum 1, April 2008), based on a FOCUS Step 3 total load PEC_{sw} of 0.0042 mg a.s./L. The meeting of experts agreed that the risk assessment for *C. riparius* should also include TER calculations based on sediment concentration, as triadimenol may accumulate in the sediment. TER_{sed} calculations were subsequently provided in the list of endpoints, still indicating a low risk to sediment dwellers.

For the use of Baytan FS 094 all acute and long-term TERs were above the relevant Annex VI trigger for aquatic organisms based on toxicity endpoints for triadimenol and Focus Step 3 $PEC_{sw.}$ The lowest TERs were TER_{lt} of 35 derived for both *D. magna* and *C. riparius.*.

No major metabolites were detected in the water/sediment study. However, the metabolites M01 and M04 were considered to be 'potentially' major in soil and may therefore contaminate surface water via drainage and/or run off. Acute toxicity studies show that M04 was less acutely toxic to fish, daphnids and algae compared to triadimenol. M04 was also of lower chronic toxicity to fish. Both an acute and a chronic risk assessment were provided for M04 in the DAR. The chronic risk assessment was, however, not required as the aquatic acute toxicity of M04 was found to be lower than the toxicity of triadimenol. The acute risk assessment to M04 indicated a low risk to aquatic organisms for all uses, based on TERs several orders of magnitude higher that the Annex VI trigger level. The metabolite M01 was of similar toxicity as triadimenol. Since the maximum occurrence was 0.7% of the applied radioactivity in sediment five weeks after treatment, the risk was considered to be covered by the assessment for triadimenol.

The BCF in whole fish for triadimenol was determined as 21 and for metabolite M01 as 64. Both substances were rapidly depurated. Metabolite M04 has a log K_{ow} below 3. Hence, the potential for bioaccumulation of triadimenol or its metabolites was considered to be low.

The potential for endocrine effects on fish was not addressed in the DAR. It was noted in addendum 1 (April 2008) that the applicant had conducted an ELS-study with triadimenol together with a fish screening assay (FSA) of 21 days to assess potential endocrine effects. These studies could not be submitted for consideration in the peer review, in view of the restrictions concerning the acceptance of new (i.e. newly submitted) studies after the submission of the DAR to EFSA, as laid down in Commission Regulation (EC) No. 1095/2007 (see above). It was agreed in the meeting of experts that the results of these studies should be examined at Member State level to determine the need for further testing/assessment of endocrine disrupting effects (e.g. Fish Full Life Cycle test (FFLC) or Fish Sexual Development Test (FSDT)).

Based on the available data and information no risk mitigation measures were required to protect the aquatic environment.

5.3. RISK TO BEES

Bees may be exposed to triadimenol following application of Bayfidan EC 250 to cereals and grapevines while foraging on flowering crop and weeds containing honeydew. Hazard quotients calculated based on acute oral and contact toxicity data were in the range of <0.58 to 1.9 for a single application of 125 g a.s./ha, hence indicating a low risk from both the technical material and the formulation Bayfidan EC 250.

Direct exposure of bees to triadimenol used as seed treatment was not expected. However, since triadimenol is systemic a worst case estimation was done by the RMS assuming that the maximum amount likely to be found in a seed was translocated to the growing plant without loss of active substance. It was assumed that the concentration in the honeydew would correspond to the concentration in the plant. Based on the assumption that a bee would consume 20 µl honeydew/day the consumption of triadimenol would be 7.5 µg/day (375 µg a.s/g seed equal to 375 µg a.s/mL honeydew). Since the acute oral toxicity of >224.8 µg a.s./bee was a factor of 30 above the daily consumption, the risk was considered to be low.

5.4. RISK TO OTHER ARTHROPOD SPECIES

The LR_{50} for both standard species, *Aphidius rhopalosiphi* and *Typhlodromus pyri*, was estimated to be >1250 g a.s./ha based on glass plate studies with the formulation Bayfidan EC 250. Hazard quotients (HQ) were calculated for in-field and off-field situations for the proposed uses in accordance with the guidance in ESCORT 2. For all evaluated uses of Bayfidan EC 250 the HQs were far below the trigger for further concern. Additional studies with soil/ground dwelling (*Poecilus cupreus, Aleochara blineata, Calathus fuscipes*) and foliar dwelling (*Coccinella septempunctatata, Chrysoperla carnea*) confirm the low risk.

For the proposed use of triadimenol in the formulation Baytan FS 094 used as seed treatment the HQ approach of calculating the risk was not applicable. However, no effects on mortality or sub-lethal parameters >30% were observed in laboratory studies with four soil dwelling species (*P. cupreus, A. blineata,Pardosa* spp., *Bembidion tetracolum*) using Baytan FS 094 at seed rates covering or close to the proposed seed rate of 230 kg seed/ha.

It was concluded that the use of triadimenol for the evaluated uses would pose a low risk to non-target arthropods.

5.5. RISK TO EARTHWORMS

Acute and chronic toxicity studies were conducted with technical triadimenol and the formulations Bayfidan EC 250 and Baytan FS 094. TERs were calculated using the maximum accumulated PEC_{soil} for the proposed uses. All acute TERs were far above the Annex VI trigger for all evaluated uses. The

long-term TERs for the use of Bayfidan EC 250 were in the range of 26-37.5; hence also well above the Annex VI trigger. The NOEC for Baytan FS 094 was 1150 kg seed/ha. With the maximum application rate of 230 kg seed/ha this leads to a TER of 5 which was exactly equal to the Annex VI trigger. The NOEC of 1150 kg seed/ha was the highest application rate tested and no LOEC was derived in the study.

An acute toxicity study with the metabolite M04 and chronic studies with the metabolites M01 and M04 were available. The acute TER for M04 and long-term TER for M01 were far above the Annex VI trigger indicating a low risk. The long-term TER for M04 was revised in addendum 1 (April 2008), using the NOEC of 1.0 mg/kg endpoint for M04 (1,2,4-triazole) agreed at PRAPeR 13. The TERs were well above the Annex VI trigger for all intended uses (TERs ranges from 25.6 to 43.5), indicating a low risk from M04. It was concluded that the acute and long-term risks to earthworms were low.

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

Studies of effects on *Folsomia candida* and *Hypoaspis aculeifer* were available using technical triadimenol and the formulated products Bayfidan EC 250 and Baytan FS 094. TERs calculated using the maximum accumulated PEC_{soil} for the proposed use patterns and successive year's application were far above the Annex VI trigger indicating a low risk for collembola and soil mites as representing soil macro-organisms. Additionally a litter bag study using Bayfidan EC 250 showed no adverse effects on degradation of straw.

The soil metabolite M04 was a "potentially major" metabolite. The NOEC obtained in a study on reproductive effects on collembola was used to calculate the TER. For all representative uses the TERs were well above the Annex VI trigger indicating a low risk. No data were available for the metabolites M38 and M01, which were also potentially major metabolites in soil but not expected to be persistent. Given the low risk for triadimenol and the metabolite M04, no adverse effects on soil macro-organisms from these metabolites were expected.

In conclusion the risk to soil macro-organisms was considered to be low.

5.7. RISK TO SOIL NON-TARGET MICRO-ORGANISMS

Effects on soil nitrogen transformation and soil respiration were studied using technical triadimenol and the formulation Bayfidan EC 250. No effects >25% were observed for a period of 28 days at concentrations corresponding to approximately 1 and 10 times the maximum accumulated PEC_{soil}. The effects of the "potentially major" triazole metabolite M04 were also investigated with no effects >25% detected at a treatment rate approximately 9 times the maximum accumulated PEC_{soil}. Two other metabolites, M38 and M01, were detected in the soil degradation studies at levels <10%. No separate studies with these metabolites were available. The effects of M38 were considered to be

covered by the study with M04, since peak concentrations of M38 were detected after 12 days in an aerobic soil degradation study with M04. Since no adverse effects were observed with triadimenol or the metabolite M04, no adverse effects are expected with the metabolite M01. The risk from triadimenol to soil micro-organisms was considered to be low. It should however be noted that no studies are available to conclude on the risk to soil micro-organisms from the proposed use of the formulation Baytan FS 094 as a seed treatment since this formulation besides triadimenol also contains fuberidazole and imazalil.

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

No exposure of non-target plants off-field was expected from the use of triadimenol as a seed treatment. Effects on emergence and growth following pre-sowing of oat, turnip and cress were studied at three different treatment rates of technical triadimenol. Cress was the most sensitive species with an EC_{50} for growth of 71 mg a.s/kg dw soil and a NOEC of 1 mg a.s./kg dw soil. Additionally, screening tests on phytotoxic effects on a total of 11 species were available following pre- and post emergence treatment using technical triadimenol and a formulation equivalent to Bayfidan 250 EC. In the study with the formulation no visual effects were observed up to and including 625 g a.s./ha. However, in the pre-emergence test conducted with technical triadimenol 80 and 50% phytotoxic effects were observed with *Amaranthus retroflexus* and *Sinapis arvensis*, respectively, at a dose rate of 125 g a.s./ha. The RMS compared the NOEC for cress of 1 mg a.s./kg soil with the maximum accumulated PEC_{soil} of 0.161 mg a.s./kg dw soil for vine in SEU and calculated a TER of 6.2. Since this TER was above the trigger of 5 and all effects observed were for the in-field situation, a low risk was expected for non-target plants outside the treated field.

5.9. RISK TO BIOLOGICAL METHODS OF SEWAGE TREATMENT

The EC_{50} was determined as >10000 mg a.s./L in an activated sludge respiration inhibition test. The maximum initial PEC in surface water from use as a foliar spray was 0.0174 mg a.s./L. No adverse effects on biological methods of sewage treatment were therefore expected should triadimenol reach sewage treatment plants.

6. Residue definitions

Soil

Definitions for risk assessment: triadimenol, M04
Definitions for monitoring: triadimenol

Water

Ground water

Definitions for exposure assessment:	triadimenol, M04
Definitions for monitoring:	triadimenol

Surface water

Definitions for risk assessment:	triadimenol; originating from soil via runoff and drainage: M04
Definitions for monitoring:	triadimenol

Air

Definitions for risk assessment:	triadimenol
Definitions for monitoring:	triadimenol

Food of plant origin

Definitions for risk assessment:	triadimenol, M10 and their conjugates
Definitions for monitoring:	triadimenol

Food of animal origin

Definitions for risk assessment:	triadimenol, M10, M02 and their conjugates and M28
Definitions for monitoring:	triadimenol, M10 and their conjugates and M28 expressed as triadimenol

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

Soil

Compound (name and/or code)	Persistence	Ecotoxicology
Triadimenol	Moderate to high persistence Single first order DT_{50} 47.3-158.4 days (20°C, -10kPa soil moisture) DT_{50} 23.0-127.6 days DT_{90} 76.3-423.9 days (field studies)	The risk to soil living organisms was assessed to be low on basis of the data available.
M04	Low persistence Single first order DT_{50} 5.0-9.9 days (20°C, -10kPa soil moisture)	The risk to soil living organisms was assessed to be low on basis of the data available.

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 relevance	Ecotoxicological relevance
Triadimenol	Low to very high mobility	No	Yes	Yes	Yes

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 relevance	Ecotoxicological relevance
	K_{foc} 14-702 mL/g				
M04	high to very high mobility K_{foc} 43-120 mL/g	No	Yes	Yes (see outcome of PRAPeR 14 – Jan 07)	Yes

Surface water and sediment

Compound (name and/or code)	Ecotoxicology
triadimenol	The risk to aquatic organisms was assessed to be low on basis of the available data. Potential endocrine disrupting effects on fish need to be addressed.
M04	The risk to aquatic organisms was assessed to be low on basis of the available data.

Air

Compound (name and/or code)	Toxicology
triadimenol	Not acutely toxic via inhalation

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

- A revised technical specification (relevant for Bayer CropScience for all representative uses evaluated, data gap identified by PRAPeR 46 meeting (May 2008), date of submission unknown; refer to chapter 1)
- Dependency of the viscosity of Bayfidan EC 250 on the shear rates to be addressed (relevant for representative uses evaluated with spraying applications, data gap identified in the PRAPeR 46 meeting (May 2008), date of submission unknown; refer to chapter 1)
- Confirmation that the highest application rate has been tested in the foam persistence determination (relevant for representative uses evaluated with spraying applications, data gap identified in the PRAPeR 46 meeting (May 2008), date of submission unknown; refer to chapter 1)
- Information allowing the setting of a residues definition for triazole metabolite derivatives (TMDs) and allowing the assessment of consumer exposure to primary crops, rotational crops and products of animal origin (relevant for all uses evaluated, no submission date proposed by the applicant; refer to chapter 3)
- A comparison of the mode of action of triadimenol and the triazole metabolite derivatives is required in order to assess possible cumulative toxicity resulting of the combined exposure to these compounds (relevant for all uses evaluated, data gap identified by EFSA after the expert meetings; refer to chapter 3.3).
- A new field study on rotational crops conforms to the current guidelines where crops should be analysed for triadimenol and TDMs residues (relevant for uses in cereals, no submission date proposed by the applicant; refer to chapter 3.1.2).
- Information on the possible change of the isomeric ratio due to plant or livestock metabolism and its possible impact on the consumer risk assessment (relevant for all intended uses; data gap identified by EFSA after the meeting of expert; no submission date proposed; refer to chapter 3.3).
- Additional seed treatment trials conducted in Southern EU including residue analyses performed in accordance with the residue definition proposed for risk assessment and TDMs (relevant for cereal seed treatment, no submission date proposed by the applicant; refer to chapter 3.1.1)..
- Additional foliar residue trials on barley (Southern EU) and on wheat (both zones) including residue analyses performed in accordance with the residue definition proposed for risk assessment. (relevant for uses in cereals, no submission date proposed by the applicant; refer to chapter 3.1.1).
- Submission of the following soil rate degradation studies and field dissipation studies: Morris RA, Mobay Ag. Chem. Report 68866; Puhl RJ, Hurley JB, Thornton JS. 1979, Mobay Ag. Chem. Report 68009; Vogeler K, Brennecke R. 1981. Bayer AG RA-248 (relevant for all representative

uses evaluated; date of submission unknown; data gap identified in the PRAPeR 47 meeting (May 2008), refer to section 4)

- Laboratory degradation rates for triadimenol with 2 additional soils (relevant for all representative uses evaluated; date of submission unknown; data gap identified in the PRAPeR 47 meeting (May 2008) but considered not essential to finalised the assessment, refer to point 4.1.2)
- Further refinements of the risk assessment to insectivorous birds (Skylark) are required for spray application in cereals. (relevant for cereal uses evaluated with spraying applications, data gap identified in the PRAPeR 48 meeting (May 2008), date of submission unknown; refer to point 5.1)
- Further refinements of the risk assessment to insectivorous birds are required for use in vine. (relevant for vine uses in South Europe, data gap identified in the PRAPeR 48 meeting (May 2008), date of submission unknown; refer to point 5.1)
- The short-term risk assessment to granivorous birds needs to be updated with more recent PT values before a final conclusion can be taken for cereal seed treatment use. (relevant for use as cereal seed treatment, data gap identified in the PRAPeR 48 meeting (May 2008), date of submission unknown; refer to point 5.1)
- Further refinements of the long-term risk to granivorous mammals are required for use as cereal seed treatment (relevant for use as cereal seed treatment, data gap identified in the PRAPeR 48 meeting (May 2008), date of submission unknown; refer to point 5.1)
- A risk assessment of potential endocrine disrupting effects is required for birds (relevant for all intended uses, data gap identified in the PRAPeR 48 meeting (May 2008), date of submission unknown; refer to point 5.1)
- Studies to address the aquatic toxicity of the formulated product Baytan FS 094, containing the three active substances triadimenol, fuberidazole and imazalil, are required. (relevant for use as seed treatment, data gap identified in the DAR, date of submission unknown; refer to point 5.2)
- Studies to address the potential endocrine effects on fish are required (relevant for all intended uses, data gap identified in the PRAPeR 48 meeting (May 2008), date of submission unknown; the applicant has conducted and ELS-study and a fish screening assay (FSA) to examine potential endocrine effects. These studies should be submitted to Member States. Further studies may however be required at Member State level to address potential endocrine effects (e.g. FFLC study); refer to point 5.2)

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 applicant on table and wine grapes, cereals and seed treatment on cereals, against several agriculturally important phytopathogens. For full details of the GAP please refer to the attached end points.

The representative formulated products for the evaluation were “Bayfidan EC 250”, an emulsifiable concentrate (EC) containing 250 g/L triadimenol and “Baytan FS 094” a flowable concentrate for seed treatment (FS) containing 75 g/L triadimenol, 9 g/L fuberidazole and 10 g/L imazalil.

Since clarification is required with respect to certain impurities, the specification for the technical material as a whole should be regarded as provisional for the moment.

Sufficient analytical methods as well as methods and data relating to physical, chemical and technical properties are available to ensure that quality control measurements of the plant protection products are possible.

Triadimenol residues in plants can be determined with a multi-residue method (DFG S19).

Adequate analytical methods are available to monitor triadimenol residues in the environmental matrices.

In mammals, triadimenol is harmful to rats via the oral route (R22 “Harmful if swallowed” proposed); it is not acutely toxic via the dermal and inhalation routes, nor it is a skin or eye irritant; it is not a skin sensitiser. In repeated dose studies liver is the target, with enlargement of the liver and related clinical chemistry changes. The relevant short term toxicity NOAELs are 9 and 15 mg/kg bw/day, in rats and dogs, respectively, whereas the relevant long term toxicity and carcinogenicity NOAEL is 5 mg/kg bw/day. Triadimenol does not have genotoxic and carcinogenic potential. The relevant parental and reproductive NOAEL in multigeneration studies is 6 mg/kg bw/day, and the relevant offspring NOAEL 9 mg/kg bw/day. Reduced pup survival in the multigeneration study during lactation period was noted. Furthermore, a decrease in fertility index was noted in all matings (all generations) in one study, possibly linked to the aromatase inhibition seen in an *in vitro* study. Therefore R64 “May cause harm to breastfed babies” and R62 “Possible risk of impaired fertility” were considered as appropriate (to be confirmed by EChA). As for developmental toxicity, in several rat developmental toxicity studies inconsistent effects which could be considered adverse were found (e.g. cervical and lumbar extra ribs). Placental weight was increased in the rats indicating that the substance might be an endocrine disruptor. A range of skeletal findings was seen at slight maternal toxic dose levels. R63? “Possible risk of harm to the unborn child” was proposed for consideration by EChA. Relevant maternal NOAEL is 5 mg/kg bw/day and 25 mg/kg bw/day in rat and rabbit, respectively, and relevant developmental toxicity NOAEL is 15 mg/kg bw/day and 40 mg/kg bw/day

(rat and rabbit). Based on similar neurotoxic potential of triadimenol and triadimefon, data from the latter were used, showing a NOAEL of 2 mg/kg bw for acute exposure (reversible hyperactivity and increased motor and locomotor activity in rats, no neuropathological changes), and a subchronic NOAEL of 3.4 mg/kg bw/day. The ADI and the AOEL are 0.05 mg/kg bw/day and the ARfD is 0.05 mg/kg bw (based on an overall NOAEL of 5 mg/kg bw/day, SF 100). The estimated operator, worker and bystander exposure to the EC and the FS formulations is below the AOEL even without the use of PPE.

The metabolism of triadimenol in plant was investigated following foliar applications on grapes, cereals and sugar beet and seed treatment on cereals. After foliar or seed treatments triadimenol was found to be the major compound in grapes, cereal grains and straw, and sugar beet leaves and roots, accounting for 23 to 73% of the TRR. Hexose conjugate of the parent and the hydroxy metabolite M10 as free or conjugated were also detected in levels above 10%. Together these metabolites are present in amounts similar to or lower than the parent. Triazole Derivative Metabolites (TDMs) were also detected in cereal grains and straw following seed treatment and in cereals sown as rotational crops. Considering the significant proportion of the parent compound in the different plant parts investigated, the residue definition for monitoring was limited to triadimenol. For risk assessment, it was proposed to include in the residue definition the parent triadimenol, the metabolite M10 and their conjugates. Taking into account the proportions of the parent and of the metabolites, a conversion factor of 2 was proposed for the risk assessment for cereals only.

Concerning the TDMs, the meeting of experts was of the opinion not to include these metabolites in the triadimenol residue definitions since TDMs are not specific to triadimenol and there is currently no EU approach on how to consider these common triazole metabolites in the risk assessment. A separate residue definition has to be set and a separate risk assessment has to be performed for TDMs taking into account all the active substances of the triazole chemical class. This issue should be reconsidered when a general approach on triazole compounds and their triazole derivative metabolites is defined.

Supervised residue trials on grapes and cereals have been submitted. Residues were analysed for triadimenol only and no information was provided on the possible residue levels of the hydroxy metabolite M10 or the TDMs. Sufficient data were provided to propose a MRL on wine and table grapes. On cereals, a provisional MRL was proposed for barley and oat only, awaiting additional residue data on barley in southern EU and in northern and southern EU for wheat. Triadimenol was stable under standard hydrolytic conditions and processing studies on grape showed a limited transfer of residues to wine. The submitted rotational crop studies, not performed in compliance with the requested standards, indicated that residues of the parent compound and its triazole derivative metabolites may be expected to be above the limit of quantification (LOQ). The experts' meeting was of the opinion that a new field study on rotational crops conforming to the current guidelines is

required, where crops should be analysed for triadimenol, tradimefon and TDMs residues. Moreover, the residue situation in rotational crops should be reconsidered with regard to a global approach on TDMs.

Metabolism studies in goats and hens were carried out with the active substance triadimefon. Nevertheless and given that the major metabolic pathway of triadimefon in animals consists as a first step in producing triadimenol, these studies were considered as fully acceptable for the understanding of the triadimenol metabolism in animals. The metabolism of triadimenol in livestock is extensive and proceeds mainly via oxidation of the tertiary butyl group to the hydroxy metabolite M10 and the carboxy metabolite M02, both being subjected to conjugation with sulphate or glucuronic acid respectively. In hens, an additional pathway consisting of desmethylation was identified. The meeting of experts concluded that triadimenol could not be a valid marker for animal products since it was observed in significant levels in ruminant liver and in poultry fat and eggs only. Therefore the animal residue definition for risk assessment was proposed as triadimenol plus metabolite M10 and M02 and their conjugates and metabolite M28. For monitoring the residue was defined as triadimenol plus metabolite M10 and their conjugates and metabolite M28. Considering the limited transfer observed in the animal feeding studies and the low potential exposure to triadimenol residues through the consumption of treated food items (cereals), the meeting was of the opinion that there is no need to set MRLs for products of animal origin at this stage.

As for plants, the possible inclusion of the TDMs in the animal residue definition has been discussed. It was concluded that no significant TDMs residues resulting from the direct intake of triadimefon/triadimenol are expected in products of animal origin. Nevertheless the animal dietary burden should also take into account the additional exposure arising from TDMs residues present in feeding commodities from both, primary and rotational crops (especially in cereal straw and cereal grains). As for plants, this issue will need to be reconsidered at a later stage when a global EU approach on TDMs is defined.

The consumer risk assessment has been performed through the residues of triadimenol only and according to the residue definition proposed for plants. **The contribution of the TDMs residues in primary crops, rotational crops and products of animal origin resulting from the use of triadimenol has not been evaluated and not been taken into account in the consumer risk assessment** awaiting the definition of a global EU approach concerning these metabolites which are common to all active substances of the triazole chemical class. Taking into account the above considerations, the chronic and acute consumer exposures performed using the proposed MRLs for cereals and grape were found to be below the toxicological values set for triadimenol.

The information available on the fate and behaviour in the environment was considered sufficient to carry out an appropriate environmental exposure assessment at the EU level when following agreed

assessment practices with the exception that a data gap is identified for the submission of some soil metabolism studies that were indicated by a Member State during the peer review. For the applied for intended uses, the potential for groundwater exposure by triadimenol and its identified soil metabolite M04 above the parametric drinking water limit of 0.1 µg/L, is low. The atmospheric half life estimated for triadimenol (2.5 hours) gives an indication that it has not the potential to be subject to long range transport to areas where it has not been used, via the atmosphere.

Whereas the acute and short-term risk to birds from spray use in cereals indicated a low risk at Tier 1, the long-term assessment required further refinements. Use of field residue data, PD refinements and focal species in a refined assessment, indicated a low risk for large herbivorous birds. Further refinements were however required to identify a low risk to skylark feeding on insects. For vine use (spray application) the risk assessment indicated a low risk to birds, except for the long-term risk to insectivorous birds in South Europe. Refinements of PT with Chaffinch, Blue tit and Robin as focal species were derived from UK orchard studies. It was concluded in the meeting of experts that further data were required to support the use of UK orchard data to refine the long-term risk assessment for insectivorous birds in South Europe. For seed treatment use a low acute risk was identified for birds. The short-term risk assessment required further refinements. The meeting of experts did not accept the PT refinements suggested for yellowhammer, wood pigeon and skylark as focal species, and further data to substantiate the refinements were required. The long-term risk to birds was considered to be negligible, due to lack of exposure in the breeding season. EFSA however, noted that the breeding season for birds may extend into the season for use of triadimenol as a seed treatment in South Europe.

The acute risk assessment for small herbivorous and insectivorous mammals indicated a low risk for spray use in cereals. Low risk was also identified for small herbivorous mammals in the long-term assessment, after refinement of residue data. For spray use in vine the acute risk was considered as low for both North Europe and South Europe. The long-term risk assessment for both North Europe and South Europe required further refinements of interception, dissipation rate and TWA concentration in ground vegetation before a low risk was identified. For seed treatment uses, the acute risk to mammals was concluded to be low after refinement of PD. The long-term risk assessment, however, needed to be refined further. No exposure to contaminated drinking water was expected and the risk from secondary poisoning was considered to be low. The potential endocrine disrupting effects on birds may require further assessment.

Triadimenol should be classified as R51/53 ‘Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment” and the risk assessment for aquatic organisms indicated a low risk for all uses, based on FOCUS PECsw estimations up to Step 3. The risk to aquatic organisms from triadimenol metabolites was found to be low, as was the potential for bioaccumulation of triadimenol and its metabolites. The potential for endocrine effects on fish was not assessed in the DAR, as no relevant studies were available. A fish ELS-study and a fish screening assay (FSA) were carried out by the applicant during the peer-review process to examine potential endocrine effects.

However they were not eligible for submission in view of the restrictions concerning the acceptance of new (i.e. newly submitted) studies after the submission of the DAR to EFSA, as laid down in Commission Regulation (EC) No. 1095/2007. The studies should be submitted to Member States for assessment. Further studies may, however, be required to address potential endocrine effects (e.g. FFLC, FSDT).

The risk assessment for bees indicated a low risk for all uses. As triadimenol is systemic, the risk assessment for seed treatment use was based on the assumption that the concentration in the honey dew would correspond to the concentration in the plant.

The risk to non-target arthropods, earthworms, soil non-target micro and macro organisms, non-target plants and biological methods of sewage treatment was assessed as low.

No studies using the formulated products Baytan FS 094 for seed treatment were available. In consequence the risk to non-target organisms from the use of Baytan FS 094 could not be concluded since this product, besides triadimenol, also contains fuberidazole and imazalil.

Critical areas of concern

- Areas of concern highlighted by EFSA after the meeting of experts: the operator, worker and bystander risk assessment for “Bayfidan EC 250” should be regarded as inconclusive as this preparation contains triadimenol and N-methylpyrrolidone (the latter in considerable amount) and the influence of N-methylpyrrolidone (classified R61 Cat.2, revised entry 31st ATP) on the risk has not been investigated
- Further refinement of risk assessment to insectivorous birds from use in cereals
- Further refinement of risk assessment to insectivorous birds from use in vine
- The short-term risk assessment to granivorous birds has not been finalised
- Further refinement of risk assessment to granivorous mammals from use as cereal seed treatment
- The risk assessment of potential endocrine disrupting effects was missing for birds, mammals and fish.

Appendix 1 – List of endpoints

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

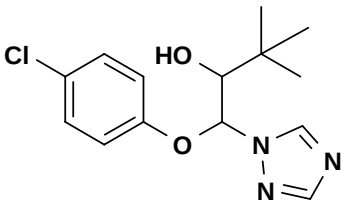
Identity, Physical and Chemical Properties, Details of Uses, Further Information

Active substance (ISO Common Name) ‡	Triadimenol
Function (*e.g.* fungicide)	Fungicide
Rapporteur Member State	United Kingdom

Identity (Annex IIA, point 1)

Chemical name (IUPAC) ‡	(1*RS*,2*RS*;1*RS*,2*SR*)-1-(4-chlorophenoxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-ol
Chemical name (CA) ‡	β-(4-chlorophenoxy)-α-(1,1-dimethylethyl)-1*H*-1,2,4-triazole-1-ethanol (unstated stereochemistry)
CIPAC No ‡	398
CAS No ‡	55219-65-3
EC No (EINECS or ELINCS) ‡	259-537-6
FAO Specification (including year of publication) ‡	The triadimenol content shall be declared (not less than 940 g/kg) and, when determined, the content obtained shall not differ from that declared by more than ± 20 g/kg. (AGP:CP/334) 1995. isomer A (1*RS*,2*SR*), isomer B (1*RS*,2*RS*) Diastereomer A, *RS* + *SR*, range: 70 to 85% Diastereomer B, *RR* + *SS*, range: 15 to 30% 4-chlorophenol the maximum content must not exceed 5 g/kg
Minimum purity of the active substance as manufactured ‡	970 g/kg isomer A (1*RS*,2*SR*), isomer B (1*RS*,2*RS*) Diastereomer A, *RS* + *SR*, range: 70 to 85% Diastereomer B, *RR* + *SS*, range: 15 to 30%
Identity of relevant impurities (of toxicological, ecotoxicological and/or environmental concern) in the active substance as manufactured	None

Appendix 1 – List of endpoints

Molecular formula ‡	$C_{14}H_{18}ClN_3O_2$
Molecular mass ‡	295.8 g/mol
Structural formula ‡	

Appendix 1 – List of endpoints

Physical and chemical properties (Annex IIA, point 2)

Melting point (state purity) ‡	A isomer 138.2°C B isomer 133.5°C
Boiling point (state purity) ‡	See temperature of decomposition
Temperature of decomposition (state purity)	270 °C (2)
Appearance (state purity) ‡	colourless crystals Active substance as manufactured: white to grey powder (Unknown purity)
Relative density (state purity) ‡	A isomer = 1.237 @ 22 °C (3) B isomer = 1.299 @ 22 °C (4)
Vapour pressure (in Pa, state temperature) ‡	Diastereomer A (SR): (3) 6 x 10-7 Pa at 20 °C 1 x 10-6 Pa at 25 °C Diastereomer B (SS and RR): (4) 4 x 10-7 Pa at 20 °C 9 x 10-7 Pa at 25 °C
Henry's law constant ‡	Henry's law constant at 20 °C (calculated) Diastereomer A: 3×10^{-6} Pa m^3 mol^{-1} Diastereomer B : 4×10^{-6} Pa m^3 mol^{-1}
Solubility in water (state temperature, state purity and pH) ‡	Triadimenol isomer A: 0.049 g/L at 20°C pH 7 (9) Triadimenol isomer B: 0.095 g/L at 20°C pH 7 (10)
Solubility in organic solvents ‡ (state temperature, state purity)	n-heptane 0.45 g/L xylene 18 g/L dichloromethane > 250 g/L 2-propanol 140 g/L 1-octanol 60 g/L polyethyleneglycol 71 g/L acetone 190 g/L ethyl acetate 150 g/L acetonitrile 61 g/L dimethylsulfoxide > 250 g/L all at 20 °C (11)
Surface tension ‡ (state concentration and temperature, state purity)	54.4mN/m at 20°C (90 % saturated solution)(98.3%)

Appendix 1 – List of endpoints

Partition co-efficient ‡ (state temperature, pH and purity)	Triadimenol isomer A: (12) Pow -- 1200 log Pow, = 3.08 at 25 °C Triadimenol isomer B: (11) Pow -- 1900 log Pow, = 3.28 at 25 °C log Pow for 1,2,4-triazole = -0.71 at 25 °C pH 7 Triadimefon has a Log Pow = 3.11 at 22°C
Dissociation constant (state purity) ‡	No dissociation occurs under the test conditions (5,7)
UV/VIS absorption (max.) incl. ε ‡ (state purity, pH)	Triadimenol isomer A 224.4 nm…..12951 (5) Triadimenol isomer B 224.6 nm……12995 (7):
Flammability ‡ (state purity)	Not highly flammable (17)
Explosive properties ‡ (state purity)	Not explosive (17)
Oxidising properties ‡ (state purity)	Non-oxidising (97.9%)

1 Triadimenol pure isomer A (purity unknown), triadimenol pure isomer B (purity unknown)
2 Triadimenol (mixture of diastereomers SR and SS or RR, batch APF 18068550, purity 99.9 %)
3 Triadimenol pure isomer A (diastereomer SR, batch 870616ELB05, purity 99.8 %)
4 Triadimenol pure isomer B (diastereomer SS and RR, batch 870615ELB05, purity 99.9 %)
5 Triadimenol pure isomer A (diastereomer SR, batch APF 11028100, purity 98.2 %)
6 Triadimenol pure isomer A (diastereomer SR, batch APF 12107900 (KRJ 121079), purity 99.4 %)
7 Triadimenol pure isomer B (diastereomer SS and RR, batch APF 12028100, purity 94.4 %)
8 Triadimenol pure isomer B (diastereomer SS and RR, batch APF 11107900 (KRJ 111079), purity 99.6 %)
9 [phenyl-UL-^{14}C] Baytan form I (isomer B, radiochemical purity 98 %, specific radioactivity 5.38 x 106 dpm/mg = 5.38 MBq/mg)
10 [phenyl-UL-^{14}C] Baytan form II (isomer A, radiochemical purity 98 %, specific radioactivity 5.97 x 106 dpm/mg -- 5.97 MBq/mg)
11 Triadimenol (mixture of diastereomers SR and SS or RR, batch 940627ELB04, purity 98.3 %)
12 Triadimenol pure isomer A (diastereomer SR, batch KRJ 110281, purity 99.7 %)
13 Triadimenol pure isomer B (diastereomer SS and RR, batch KRJ 120281, purity 98.1 %)
14 [phenyl-UL-^{14}C] Baytan (mixture of isomers A and B, radiochemical purity 99 %, specific radioactivity 19.8 mCi/mmole = 2.48 MBq/mg)
15 phenyl-UL-^{14}C]triadimenol (mixture of isomers A and B, radiochemical purity 99 %, specific radioactivity 1.97 MBq/mg -- 2.48 MBq/mg)
16 Triadimenol batch 881201ELB01, purity 96.7 %; mixture of diastereomers SR (79.8 %) and SS or RR (16.9 %)
17 Triadimenol M techn. (article no. 04 900 928, batch 233913029, purity 97.9 %)
18 96.2 % isomer A and 3.7 % isomer B

Appendix 1 – List of endpoints

Summary of representative uses evaluated (triadimenol)*

Crop and/ or situation (a)	Member State or Country	Product name	F G or I (b)	Pests or Group of pests controlled (c)	Preparation		Application				Application rate per treatment (for explanation see the text in front of this section)			PHI (days) (m)	Remarks
					Type (d-f)	Conc. of as (i)	method kind (f-h)	growth stage & season (j)	number min/ max (k)	interval between applications (min)	g as/hL min – max (l)	water L/ha min – max	g as/ha min – max (l)		
grape (table and wine)	EU North	Bayfidan	F	Powd. mildew, Black Rot	EC	250 g/l	overall spray	start BBCH 05 up to 81	4-8	10-14d	0.94 – 6.67	600–1600	15–40	28–35	
grape (table and wine)	EU South	Bayfidan	F	Powd. mildew	EC	250 g/l	overall spray	start BBCH 05 up to 81	4	21-28d	3.75-31.25	200–1000	37.5–62.5	7 (table) 14 (wine)	[2] [4]
barley, oat	EU North South	Bayfidan	F	Rusts, Eyespot, Pyren. teres, Powd. Mildew, Fusarium spp., Rhynchospor	EC	250 g/l	overall spray	start BBCH 29 up to 61	1–2 #	14–28 d # ref. to growth stage	-	200–400	125	28–35	[1] [2] [4]
wheat, rye, triticale	EU North South	Bayfidan	F		EC	250 g/l	overall spray	start BBCH 29 up to 61	1–2 #	14–28 d # ref. to growth stage	-	200–400	125	28–35	[1] [2] [4]
wheat, rye, triticale, oat, barley	EU North South	Baytan	F	Fusarium spp., Bunt, Smut	FS	94 g/l (75+9+10)	seed treat-ment	pre sowing	1	n.a. (0)	-	500 ml prod. / dt	37.5 g Triadi m. / dt	not applic able	[1] [3] [4]

Appendix 1 – List of endpoints

Crop and/ or situation	Member State or Country	Product name	F G or I	Pests or Group of pests controlled	Preparation		Application				Application rate per treatment (for explanation see the text in front of this section)			PHI (days)	Remarks
(a)			(b)	(c)	Type (d-f)	Conc. of as (i)	method kind (f-h)	growth stage & season (j)	number min/ max (k)	interval between applications (min)	g as/hL min – max (l)	water L/ha min – max	g as/ha min – max (l)	(m)	
													seed*		

[1] The risk assessment has revealed data gaps in section B7.
[2] Further refinements were required for the long-term risk to insectivorous birds
[3] Further refinements were required for the short-term and long-term risk to small granivorous birds and for the long-term risk to small granivorous mammals
[4] The risk assessment do not address potential endocrine disrupting effects on all relevant non target organisms (e.g. fish and birds)

* For uses where the column "Remarks" is marked in grey further consideration is necessary. Uses should be crossed out when the notifier no longer supports this use(s).
(a) For crops, the EU and Codex classifications (both) should be taken into account; where relevant, the use situation should be described (e.g. fumigation of a structure)
(b) Outdoor or field use (F), greenhouse application (G) or indoor application (I)
(c) *e.g.* biting and suckling insects, soil born insects, foliar fungi, weeds
(d) *e.g.* wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
(e) GCPF Codes - GIFAP Technical Monograph No 2, 1989
(f) All abbreviations used must be explained
(g) Method, e.g. high volume spraying, low volume spraying, spreading, dusting, drench
(h) Kind, *e.g.* overall, broadcast, aerial spraying, row, individual plant, between the plant- type of equipment used must be indicated
(i) g/kg or g/L. Normally the rate should be given for the active substance (according to ISO) and not for the variant in order to compare the rate for same active substances used in different variants (e.g. fluoroxypyr). **In certain cases, where only one variant is synthesised, it is more appropriate to give the rate for the variant (e.g. benthiavalicarb-isopropyl).**
(j) Growth stage at last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including where relevant, information on season at time of application
(k) Indicate the minimum and maximum number of application possible under practical conditions of use
(l) The values should be given in g or kg whatever gives the more manageable number (e.g. 200 kg/ha instead of 200 000 g/ha or 12.5 g/ha instead of 0.0125 kg/ha
(m) PHI - minimum pre-harvest interval

Appendix 1 – List of endpoints

Methods of Analysis

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

Technical as (analytical technique)	GC-FID CIPAC 398/TC/M/
Impurities in technical as (analytical technique)	GC-FID
Plant protection product (analytical technique)	EC formulation GC-FID CIPAC 398/EC/M FS formulation GC-FID

Analytical methods for residues (Annex IIA, point 4.2)

Residue definitions for monitoring purposes

Food of plant origin	Triadimenol
Food of animal origin	Triadimenol, M10 and their conjugates and M28 expressed as triadimenol
Soil	Triadimenol
Water surface	Triadimenol
drinking/ground	Triadimenol
Air	Triadimenol

Monitoring/Enforcement methods

Food/feed of plant origin (analytical technique and LOQ for methods for monitoring purposes)	DFG method S19 LOQ=0.05 mg/kg S19 was validated for parent triadimenol in the following: Orange, grape, onion, barley grain, dried hops, and olive ILV was validated for parent triadimenol in the following Grape, barley grain, onion and dried hops.
Food/feed of animal origin (analytical technique and LOQ for methods for monitoring purposes)	DFG method S19 LOQ 0.01 mg/kg Analytical method for food of animal origin is not required since no MRLs are proposed
Soil (analytical technique and LOQ)	DFG method S19 LOQ 0.01 mg/kg
Water (analytical technique and LOQ)	DFG W5 0.05 µg/l (GC-NPD, confirmation GC/MS) (drinking water and surface water)
Air (analytical technique and LOQ)	GC-NPD LOQ 0.001 mg/m^3

Appendix 1 – List of endpoints

Body fluids and tissues (analytical technique and LOQ)	Not required as not classified as toxic or very toxic.

Classification and proposed labelling with regard to physical and chemical data (Annex IIA, point 10)

	RMS/peer review proposal
Active substance	None

Appendix 1 – List of endpoints

Impact on Human and Animal Health

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

Rate and extent of oral absorption ‡	>90% (based on urinary and biliary excretion within 24 hours). Maximal concentration in plasma at ≈1 hour after administration.
Distribution ‡	Widely distributed. Highest peak concentrations in fat, urinary bladder and liver (rapid elimination from all organs and tissues).
Potential for accumulation ‡	No evidence for accumulation.
Rate and extent of excretion ‡	Rapid and extensive (>95%) within 24 hours, mainly via bile (>90%) in males. Urine is a significant route of excretion in females (≈50%); no bile data for females.
Metabolism in animals ‡	Extensively metabolised (>85%) by stepwise oxidations; main metabolites triadimenol-carboxy (≈60%) and triadimenol-hydroxy (≈20%).
Toxicologically relevant compounds ‡ (animals and plants)	Parent compound 1,2,4-triazole, triazole acetic acid, triazole alanine[36]
Toxicologically relevant compounds ‡ (environment)	Parent compound 1,2,4-triazole, triazole acetic acid, triazole alanine[37]

Acute toxicity (Annex IIA, point 5.2)

Rat LD50 oral ‡	689-752 mg/kg bw	R22
Rat LD50 dermal ‡	>5000 mg/kg bw	
Rat LC50 inhalation ‡	>0.954 mg/L/4h (nose only; aerosol; max. attainable concentration)	
Skin irritation ‡	Non-irritant	
Eye irritation ‡	Slightly irritating (no classification proposed)	
Skin sensitisation ‡	Non-sensitiser (Magnusson & Kligman)	

Short term toxicity (Annex IIA, point 5.3)

Target / critical effect ‡	Liver (↑ liver weight, enzyme induction, clinical chemistry effects)	
Relevant oral NOAEL ‡	90 day rat: 8-9 mg/kg bw/day~~)~~ 90 day & 2 year dog: 15~~-~~mg/kg bw/day~~)~~	
Relevant dermal NOAEL ‡	21 day rabbit: 250 mg/kg bw/day (15 exposures)	

[36] Not reported because no radiolabel data for the triazole ring
[37] Not reported because no radiolabel data for the triazole ring

Appendix 1 – List of endpoints

Relevant inhalation NOAEL ‡	21 day rat: 229.71 mg/m^3 (≈60 mg/kg bw/day) (15 times 6h exposures)	

Genotoxicity ‡ (Annex IIA, point 5.4)

No genotoxic potential	

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

Target/critical effect ‡	Liver (hepatotoxicity)	
Relevant NOAEL ‡	2 year rat: 5 mg/kg bw/day) 18 month & 2 year mouse: 19 mg/kg bw/day)	
Carcinogenicity ‡	No carcinogenic potential	

Reproductive toxicity (Annex IIA, point 5.6)

Reproduction toxicity

Reproduction target / critical effect ‡	Reduced fertility, ↓ litter size and reduced viability and growth during lactation at parentally toxic dose levels (10-20% reduced bodyweights)	R62, R64
Relevant parental NOAEL ‡	6 mg/kg bw/day based on ↓ bodyweights	
Relevant reproductive NOAEL ‡	6 mg/kg bw/day based on reduced fertility and ↓ litter size	
Relevant offspring NOAEL ‡	9 mg/kg bw/day based on reduced viability and growth during lactation	

Developmental toxicity

Developmental target / critical effect ‡	Rats: ↑ incidence of extra ribs and ↑ placental weight at maternally toxic dose (↓ bodyweight gains). Cleft palate at high dose level Rabbits: ↑ post-implantation losses, ↓ litter size, ↓ foetal weight, ↑ abnormal or incomplete ossification at maternally toxic dose (↓ bodyweight gains and food consumption).	R63?
Relevant maternal NOAEL ‡	Rat: 5 mg/kg bw/day Rabbit: 25 mg/kg bw/day	
Relevant developmental NOAEL ‡	Rat: 15 mg/kg bw/day Rabbit: 40 mg/kg bw/day	

Appendix 1 – List of endpoints

Neurotoxicity (Annex IIA, point 5.7)

Acute neurotoxicity ‡	NOAEL = 2 mg/kg bw/day, based on hyperactivity with increased motor and locomotor activity [Study performed with triadimefon]	
Repeated neurotoxicity ‡	NOAEL = 3.4 mg/kg bw/day), based on hyperactivity (both sexes) and increased motor and locomotor activity (females) [Study performed with triadimefon]	
Delayed neurotoxicity ‡	No data – not required	

Other toxicological studies (Annex IIA, point 5.8)

Mechanism studies ‡	No data submitted
Studies performed on metabolites or impurities ‡	One week feeding study in rats with separate A and B isomers of triadimenol. No marked differences in toxicity between isomer forms (isomer A was more potent as a liver enzyme inducer). 1,2,4-triazole, triazole alanine and triazole acetic acid (see PRAPeR 14)

Medical data ‡ (Annex IIA, point 5.9)

Occupational health monitoring in a formulation facility (≈15 persons on several occasions per year)	No evidence of adverse effects to workers in a formulation facility. No cases of poisoning.

Summary (Annex IIA, point 5.10)	Value	Study	Safety factor
ADI ‡	0.05 mg/kg bw/day	Overall NOAEL rat chronic study + acute and subchronic neurotoxicity study + multigeneration study	100

Appendix 1 – List of endpoints

AOEL ‡	0.05 mg/kg bw/day	Overall NOAEL rat chronic study + acute and subchronic neurotoxicity study + multigeneration study	100
ARfD ‡	0.05 mg/kg bw	Overall NOAEL rat chronic study + acute and subchronic neurotoxicity study + multigeneration study	100

Dermal absorption ‡ (Annex IIIA, point 7.3)

Bayfidan EC 250	Concentrate: 2% Spray dilution: 17% *In vitro* study using rat and human skin
Baytan FS 094	Concentrate: 2% Spray dilution: not relevant (seed treatment product) Extrapolation of data from Bayfidan EC 250 study

Appendix 1 – List of endpoints

Exposure scenarios (Annex IIIA, point 7.2)

Operator	**Bayfidan EC 250** UK POEM Cereals (boom sprayer): 157% AOEL (no PPE) - 25 % AOEL (PPE) Vines (air assisted sprayer, 100 L): 134% AOEL (no PPE) - 85 % AOEL (PPE) Vines (air assisted sprayer, 500 L) : 89% AOEL (no PPE) - 62 % AOEL (PPE) Vines (knapsack) : 205% AOEL (no PPE) - 91 % AOEL (PPE) German model Cereals (boom sprayer): 28% AOEL (no PPE) Vines (air assisted sprayer) : 29% AOEL (no PPE) Vines (hand held) : 20% AOEL (no PPE) **Baytan FS 094** SeedTropex (French version) 70% AOEL (no PPE)
Workers	**Bayfidan EC 250** 3% AOEL **Baytan FS 094** No re-entry expected
Bystanders	**Bayfidan EC 250** Max 7% AOEL **Baytan FS 094** 1% AOEL

Classification and proposed labelling with regard to toxicological data (Annex IIA, point 10)

	RMS/peer review proposal
Triadimenol	Xn; R22 (Harmful if swallowed), R62, R63?, R64

Appendix 1 – List of endpoints

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

Plant groups covered	Fruit crops (grape), Cereals (wheat, barley) and Root/tuber crops (sugar beet)
Rotational crops	Cereals, leafy crop and root crop.
Metabolism in rotational crops similar to metabolism in primary crops?	Yes
Processed commodities	Grape - Wine
Residue pattern in processed commodities similar to residue pattern in raw commodities?	Yes
Plant residue definition for monitoring	Triadimenol
Plant residue definition for risk assessment	Triadimenol, M10 and their conjugates
Conversion factor (monitoring to risk assessment)	2 for cereals 1 for fruit and root crops

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

Animals covered	Ruminants and Poultry
Time needed to reach a plateau concentration in milk and eggs	≈3 days (limited data available)
Animal residue definition for monitoring	Triadimenol, M10 and their conjugates and M28 expressed as triadimenol
Animal residue definition for risk assessment	Triadimenol, M10, M02 and their conjugates and M28
Conversion factor (monitoring to risk assessment)	Not proposed at this stage.
Metabolism in rat and ruminant similar (yes/no)	Yes
Fat soluble residue: (yes/no)	No

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

Data requirement.

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

Stable in a range of crops for more than 12 months

Appendix 1 – List of endpoints

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

	Ruminant:	Poultry:	Pig:
	Conditions of requirement of feeding studies		
Expected intakes by livestock ≥ 0.1 mg/kg diet (dry weight basis) (yes/no - If yes, specify the level)	Yes (dairy=0.34, beef = 0.78)	no	no
Potential for accumulation (yes/no):	yes	yes	yes
Metabolism studies indicate potential level of residues ≥ 0.01 mg/kg in edible tissues (yes/no)	no	no	no
	Feeding studies (Specify the feeding rate in cattle and poultry studies considered as relevant) Residue levels in matrices : Mean (max) mg/kg		
Muscle	not necessary		
Liver	not necessary		
Kidney	not necessary		
Fat	not necessary		
Milk	not necessary		
Eggs			

Appendix 1 – List of endpoints

Summary of residues data according to the representative uses on raw agricultural commodities and feedingstuffs (Annex IIA, point 6.3, Annex IIIA, point 8.2)

Crop	Northern or Southern Regions	Trials results relevant to the representative uses (a)	Recommendation/ comments	MRL estimated from trials according to the representative use	**HR** (c)	**STMR** (b)
Grapes	Northern	16 trials: 5x <0.05, 0.05, 0.06, 3x 0.07, 0.09, 0.10, 0.11, 0.12, 0.15 and 0.20 mg/kg	PHI: 28 days MRL of 0.3 mg/kg proposed on the basis of northern trials (Rmax: 0.19 and Rber: 022)	**0.3 mg/kg**	0.20	0.07
	Southern	8 trials: Table grape: <0.02, 0.02, 3x 0.03, 0.04, 0.06 and 0.07 mg/kg Wine grape: <0.02, 3x 0.02, 0.04, 0.05, 0.06 and 0.11 mg/kg	PHI: 14 days wine grape 7 days table grape		Table: 0.07 Wine: 0.11	Table: 0.03 Wine: 0.03
Barley (Foliar uses)	Northern	7 trials: Grain: 7x <0.1 mg/kg Straw: <0.10, 0.10, 0.50, 0.62, 0.64, 0.69 and 1.25 mg/kg	Data are acceptable	**0.1 mg/kg**	Grain: 0.1 Straw: 1.25	Grain: 0.1 Straw: 0.62

(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 representative use
(c) Highest residue

Appendix 1 – List of endpoints

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

ADI	0.05 mg/kg bw/day
TMDI (% ADI) according to WHO European diet	0.6%
TMDI (% ADI) according to national (to be specified) diets	
IEDI (WHO European Diet) (% ADI)	
NEDI (specify diet) (% ADI)	UK Model: Grapes < 1% of the ADI 0.000014 mg/kg bw/day Cereals <1% of the ADI 0.00031 mg/kg bw/day
Factors included in IEDI and NEDI	
ARfD	0.05 mg/kg bw
IESTI (% ARfD)	
NESTI (% ARfD) according to national (to be specified) large portion consumption data	UK model highest intake was for table grapes at 24% of the ARfD.
Factors included in IESTI and NESTI	
TMDI (% ADI) according to EFSA European diet	Less than 3%
IESTI (% ARfD) according to EFSA European diet	Less than 27%

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

Crop/ process/ processed product		Number of studies	Processing factors		Amount transferred (%)
			Transfer factor	Yield factor	
Grapes	Wine	10	0.5		
	Must	11	0.5		
	Juice	1	1.1		
	Wet pomace	1	1.3		
	Dry pomace	1	3.9		
	Raisins	1	5.8		

Appendix 1 – List of endpoints

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

Barley and Oats	0.1 mg/kg (based on Northern Europe trials only)
Table and wine grapes	0.3 mg/kg

When the MRL is proposed at the LOQ, this should be annotated by an asterisk after the figure.

Appendix 1 – List of endpoints

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

Mineralization after 100 days ‡	Parent triadimenol Phenyl ring label: 3.77-41.05% AR at 100 days (n = 4) 1,2,4-triazole (M04) 1.6-52% AR after 90-120 days triazole label (n=6)
Non-extractable residues after 100 days ‡	Phenyl ring label: 4.45 – 22.26% AR at 100 days (n = 4) 1,2,4-triazole (M04) 38-67% AR after 90-120 days triazole label (n=6)
Metabolites requiring further consideration ‡ - name and/or code, % of applied (range and maximum)	No metabolites greater than 5% AR at any time point with phenyl ring label. Triazole ring not labelled; in absence of other information, 1,2,4-triazole (M04) assumed to be formed at 100% for environmental exposure assessment. Note also metabolite 1,2-dihydro-triazolone (M38) was formed at maximum of 30.8% AR in a study on degradation of 1,2,4-triazole (M04).

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

Anaerobic degradation ‡

Mineralization after 100 days	Parent triadimenol No studies on triadimenol. Two studies with triadimefon indicate rapid conversion to triadimenol, which undergoes little or no further degradation. Metabolite 1,2,4-triazole (M04) 1.3% AR after 126 d triazole label (n=1)
Non-extractable residues after 100 days	Parent triadimenol No studies on triadimenol. Two studies with triadimefon indicate rapid conversion to triadimenol, which undergoes little or no further degradation. Metabolite 1,2,4-triazole (M04) Max 21% AR at 64 days declining to 16% AR at study end (126d), triazole label (n=1)
Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	None

Appendix 1 – List of endpoints

Soil photolysis ‡

Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	In dark and illuminated samples no metabolites >2% AR

Appendix 1 – List of endpoints

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

Laboratory studies ‡

Parent triadimenol	Aerobic conditions						
Soil type	X[38]	pH	t. °C / % MWHC	DT_{50} /DT_{90} (d)	DT_{50} (d) 20 °C pF2/10kPa	St. (r^2)	Method of calculation
Silt loam		6.0	20ºC/40% MWHC	178/591	158.4	0.933	SFO
Sandy loam		6.9	20ºC/40% MWHC	57/191	47.3	0.946	SFO
Geometric mean/median				136.8/455.3	136.7		

* = temperature corrected only Note, two values with r^2 <0.7 removed from listing

Data gap identified at PRAPeR 47 experts' meeting for laboratory degradation rates for triadimenol with 2 additional soils (not essential to finalise the risk assessment).

Metabolite 1,2,4-triazole (M04)	Aerobic conditions, metabolite applied as starting material							
Soil type	X[1]	pH	t. °C / % MWHC	DT_{50}/ DT_{90} (d)	f. f. k_{dp}/k_f	DT_{50} (d) 20 °C pF2/10kPa	St. (r^2)	Method of calculation
Sandy loam		6.4	20ºC/40% MWHC	6.3/21.0	-*	5.0**	0.75	SFO
Loamy sand		5.8	20ºC/40% MWHC	9.9/32.9	-*	9.9**	0.81	SFO
Silt loam		6.7	20ºC/40% MWHC	12.2/40.7	-*	8.2**	0.95	SFO
Geometric mean/median				9.1/30.4		7.4/8.2**		

* formation fraction not calculable, metabolite applied as starting material
** endpoints agreed in PRAPeR 12 experts' meeting

[38] X This column is reserved for any other property that is considered to have a particular impact on the degradation rate.

Appendix 1 – List of endpoints

Field studies ‡

Parent	Aerobic conditions								
Soil type (indicate if bare or cropped soil was used).	Location (country or USA state).	X[1]	pH	Depth (cm)	DT_{50} (d) actual	DT_{90}(d) actual	St. (r^2)	DT_{50} (d) Norm.	Method of calculation
Weak loamy silt	Germany		6.3	0-10	66.6	221.4	0.895	31.5	SFO
Silty sand	Germany		6.1	0-10	54.8	182.1	0.860	34.3	SFO
Loamy sand	Germany		6.5	0-10	127.6	423.9	0.809	83.7	SFO
Loam	France		7.8	0-10	60.7	201.7	0.881	58.5[1]	SFO
Loam	Portugal		7.7	0-10	89.3	296.7	0.803	40.2	SFO
Silty clay loam	Spain		7.2	0-10	42.4	140.8	0.982	24.1	SFO
Loamy sand	Italy		6.8	0-10	23.0	76.3	0.992	17.0	SFO
Geometric mean					64.9	215.7		36.5	

NC = not calculated [1] = back calculated from DT90 Two sites with r^2<0.7 excluded

pH dependence ‡ (yes / no) (if yes type of dependence)	No
Soil accumulation and plateau concentration ‡	See PECsoil calculation

Laboratory studies ‡

Parent	Anaerobic conditions – DT50 not calculable, triadimenol appears to be stable under anaerobic conditions

Appendix 1 – List of endpoints

Met 1,2,4 triazole (M04)	Anaerobic conditions, metabolite applied as starting material							
Soil type	X[1]	pH	t. °C / % MWHC	DT_{50}/ DT_{90} (d)	f. f. k_{dp}/k_f	DT_{50} (d) 20°C pF2/10kPa	St. (r^2)	Method of calculation
Silt loam		7.3	20ºC/40% MWHC for 4 days before flooding	81.2/269.7 from start of anaerobic phase (day 4 of study); 58/192.7 combined aerobic + anaerobic phases	-	-	0.948 for anaerobic phase; 0.777 for combined aerobic + anaerobic phase	SFO

Appendix 1 – List of endpoints

Soil adsorption/desorption (Annex IIA, point 7.1.2)

Parent Triadimenol ‡							
Soil Type	OC %	Soil pH	Kd (mL/g)	Koc (mL/g)	Kf (mL/g)	Kfoc (mL/g)	1/n
Loam	1.58	5.5	-	-	5.26	333	0.88
Silty clay	1.11	6.7	-	-	2.37	14	0.963
Sand	1.95	6.9	-	-	4.05	208	0.932
Höfchen[1]	0.96	5.8	-	-	5.66	590	0.841
Laacherhof[1]	1.87	6.1	-	-	2.25	120	0.795
Leichlingen[1]	1.36	6.5	-	-	2.20	162	0.859
South Tyrol[1]	2.69	6.9	-	-	4.27	159	0.867
Eschweiler[1]	1.10	6.3	-	-	2.55	232	0.896
Standard soil 1[1]	2.89	6.9	-	-	3.12	108	0.908
Standard soil 2[1]	0.69	5.5	-	-	1.90	275	0.864
Loamy sand	0.58	5.6	-	-	1.61	278	0.939
Loamy sand	0.4	6.1	-	-	0.73	183	0.917
Silt loam	0.88	6.3	-	-	2.30	261	0.903
Sandy clay loam	0.13	6.4	-	-	0.91	702	0.894
Arithmetic mean/median					2.80/2.34	273/223	0.890/0.895
pH dependence, Yes or No			No				

[1] = soil type not specified in study

Metabolite 1,2,4 triazole (M04)							
Soil Type	OC %	Soil pH	Kd (mL/g)	Koc (mL/g)	Kf (mL/g)	Kfoc (mL/g)	1/n
Silty clay	0.7	8.8	-	-	0.833	120**	0.897
Clay loam	1.74	6.9	-	-	0.748	43**	0.827
Silty clay loam	0.70	7.0	-	-	0.722	104**	0.922
Sandy loam	0.81	6.9	-	-	0.720	89**	1.016
Arithmetic mean						89**	0.91
pH dependence (yes or no)			No				

Note that the highest Kfoc of 202 ml/g is excluded as an outlier
** endpoints agreed in PRAPeR 12 experts' meeting

Appendix 1 – List of endpoints

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

Column leaching ‡	No information submitted, none required
Aged residues leaching ‡	No information submitted, none required
Lysimeter/ field leaching studies ‡	No information submitted, none required

Appendix 1 – List of endpoints

PEC (soil) (Annex IIIA, point 9.1.3)

Parent Triadimenol

Method of calculation

Single first order kinetics, longest field dissipation DT50 with r^2>0.7 = 127.6 days

Application data

Crop: Cereals – Spray application

Depth of soil layer: 5cm

Soil bulk density: 1.5g/cm^3

PECsoil for triadimenol, two applications to cereals, 125 g a.s./ha, 70% interception, 14 day spray interval

		TWA
PEC_{INI} mg/kg (2nd)	0.096	0.096
1	0.096	0.096
2	0.095	0.096
4	0.094	0.095
7	0.093	0.095
14	0.089	0.093
28	0.083	0.089
50	0.073	0.084
100	0.056	0.074

The 21 day time weighted average as required by ecotox for terrestrial risk assessment is 0.091 mg/kg.

The calculated maximum accumulated PECsoil for triadimenol assuming this use pattern and successive years application is 0.112 mg/kg occurring in the fourth year of application. The 'steady state' concentration (i.e. the concentration immediately before the first application in the following year) is 0.017 mg/kg.

Appendix 1 – List of endpoints

Crop: Cereals – seed treatment

Depth of soil layer: 5cm
Soil bulk density: 1.5g/cm^3

PECsoil for triadimenol, one application to cereals at 90 g a.s./ha (assuming 240 kg seed/ha and 37.5 a.s./100 kg of seed).

		TWA
PEC_{INI} mg/kg (1st)	0.120	0.120
1	0.119	0.120
2	0.119	0.119
4	0.117	0.119
7	0.116	0.118
14	0.111	0.116
28	0.103	0.111
50	0.091	0.105
100	0.070	0.093

The 21 day time weighted average as required by ecotox for terrestrial risk assessment is 0.113 mg/kg.

The calculated maximum accumulated PECsoil for triadimenol assuming this use pattern and successive years application is 0.139 mg/kg occurring in the third year of application. The 'steady state' concentration (i.e. the concentration immediately before the first application in the following year) is 0.019 mg/kg.

Appendix 1 – List of endpoints

Crop: Vines (N. Europe)

Depth of soil layer: 5cm
Soil bulk density: 1.5g/cm^3

PECsoil for triadimenol, Northern European vines, eight applications of 40 g a.s./ha at minimum 10 day intervals; crop interception values selected by the rapporteur as 40%, 50%, 50%, 60%, 60%, 70%, 70%, 85%.

		TWA
PEC_{INI} mg/kg (8th)	0.134	0.134
1	0.134	0.134
2	0.133	0.134
4	0.131	0.133
7	0.129	0.132
14	0.124	0.129
28	0.115	0.125
50	0.102	0.118
100	0.078	0.104

The calculated maximum accumulated PECsoil for triadimenol assuming this use pattern and successive years application is 0.156 mg/kg occurring in the fifth year of application. The 'steady state' concentration (i.e. the concentration immediately before the first application in the following year) is 0.031 mg/kg.

Appendix 1 – List of endpoints

Crop: Vines (S. Europe)

Depth of soil layer: 5cm
Soil bulk density: 1.5g/cm^3

PECsoil for triadimenol, Southern European vines, four applications at 62.5 g/ha with a minimum interval of 21 days; crop interception values selected by the rapporteur as 40%, 50%, 50% and 60%.

		TWA
PEC_{INI} mg/kg (4th)	0.139	0.139
1	0.138	0.139
2	0.138	0.138
4	0.136	0.138
7	0.134	0.137
14	0.129	0.134
28	0.120	0.129
50	0.106	0.122
100	0.081	0.107

The calculated maximum accumulated PECsoil for triadimenol assuming this use pattern and successive years application is 0.161 mg/kg occurring in the third year of application. The 'steady state' concentration (i.e. the concentration immediately before the first application in the following year) is 0.031 mg/kg.

Appendix 1 – List of endpoints

Metabolite 1,2,4 triazole (M04) Method of calculation	Molecular weight relative to the parent: 0.234. 100% formation from parent assumed. DT_{50} (d): 8.2 days, longest from lab studies with $r^2 \geq 0.85$ Kinetics: SFO With multiple application scenarios and metabolites, there is uncertainty with respect to peak metabolite formation, and as a worst case, PECsoil for this metabolite is calculated on the basis of the maximum total dose of triadimenol.
Application data	**Crop: Cereals – Spray application** Depth of soil layer: 5cm Soil bulk density: 1.5g/cm^3 PECsoil for M04 following spray use of triadimenol on cereals

			TWA
PEC_{INI} mg/kg	0	0.023	0.023
	1	0.022	0.022
	2	0.020	0.022
	4	0.017	0.020
	7	0.013	0.018
	14	0.007	0.014
	28	0.002	0.009
	50	0.000	0.005
	100	0.000	0.003

Appendix 1 – List of endpoints

Crop: Cereals – seed treatment

Depth of soil layer: 5cm

Soil bulk density: 1.5g/cm^3

PECsoil for M04 following seed treatment use of triadimenol on cereals

			TWA
PEC_{INI} mg/kg	0	0.028	0.028
	1	0.026	0.027
	2	0.024	0.026
	4	0.020	0.024
	7	0.016	0.021
	14	0.009	0.016
	28	0.003	0.011
	50	0.000	0.007
	100	0.000	0.003

Crop: Vines (N. Europe)

Depth of soil layer: 5cm

Soil bulk density: 1.5g/cm^3

PECsoil for M04 following spray use of triadimenol on Northern European vines

			TWA
PEC_{INI} mg/kg	0	0.039	0.039
	1	0.036	0.038
	2	0.033	0.036
	4	0.028	0.033
	7	0.022	0.030
	14	0.012	0.023
	28	0.004	0.015
	50	0.001	0.009
	100	0.000	0.005

Appendix 1 – List of endpoints

Crop: Vines (S. Europe)

Depth of soil layer: 5cm

Soil bulk density: 1.5g/cm^3

PECsoil for M04 following spray use of triadimenol on Southern European vines

			TWA
PEC_{INI} mg/kg	0	0.039	0.039
	1	0.036	0.037
	2	0.033	0.036
	4	0.028	0.033
	7	0.022	0.029
	14	0.012	0.023
	28	0.004	0.015
	50	0.001	0.009
	100	0.000	0.005

Metabolite 1,2-dihydro-triazolone M38 (major metabolite of 1,2,4 triazole)

Method of calculation

Molecular weight relative to the parent: 0.288.

30.8% formation from parent assumed.

DT_{50} (d): not calculated

Kinetics: SFO

With multiple application scenarios and metabolites, there is uncertainty with respect to peak metabolite formation, and as a worst case, PECsoil for this metabolite is calculated on the basis of the maximum total dose of triadimenol.

Application data

Crop: Cereals – Spray application

Depth of soil layer: 5cm

Soil bulk density: 1.5g/cm^3

'Initial' PECsoil for 1,2-dihydro-triazolone is 0.009 mg/kg

Crop: Cereals – seed treatment

Depth of soil layer: 5cm

Soil bulk density: 1.5g/cm^3

'Initial' PECsoil for 1,2-dihydro-triazolone is 0.010 mg/kg

Appendix 1 – List of endpoints

Crop: Vines (N. Europe) Depth of soil layer: 5cm Soil bulk density: 1.5g/cm^3 'Initial' PECsoil for 1,2-dihydro-triazolone is 0.015 mg/kg
Crop: Vines (S. Europe) Depth of soil layer: 5cm Soil bulk density: 1.5g/cm^3 'Initial' PECsoil for 1,2-dihydro-triazolone is 0.015 mg/kg

Appendix 1 – List of endpoints

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

Hydrolytic degradation of the active substance and metabolites > 10 % ‡	Triadimenol (20ºC, 40ºC); 1,2,4 triazole (25ºC) pH 5: Stable
	Triadimenol (20ºC, 40ºC); 1,2,4 triazole (25ºC) pH 7: Stable
	Triadimenol (20ºC, 40ºC); 1,2,4 triazole (25ºC) pH 9: Stable
Photolytic degradation of active substance and metabolites above 10 % ‡	DT_{50} : 9 days under experimental conditions Natural light, Athens, Greece, 39°N in June; DT_{50} 48 days
Quantum yield of direct phototransformation in water at Σ > 290 nm	Quantum yield determination considered invalid
Readily biodegradable ‡ (yes/no)	No data submitted, substance considered 'not readily biodegradable'.

Degradation in water / sediment

Parent	Distribution (Max in sed 25.4 – 52.3% AR after 2.5 weeks)									
Water / sediment system	pH water phase	pH sed	t. °C	DT_{50}-DT_{90} whole sys.	St. (r^2)	DT_{50}-DT_{90} water	St. (r^2)	DT_{50}-DT_{90} sed	St. (r^2)	Method of calculation
Ijzendoorn	7.4	N/A	22	381/1266[1]	0.85	N/C[2]		N/C[2]		SFO
Lienden	8.3	N/A	22	324/1076[1]	0.72	N/C[2]		N/C[2]		SFO
Geometric mean/median										

N/A = not available [1] = DT50 and DT90 extrapolated beyond end of study
[2] = not calculated. Dissipation from the water phase in both systems could not be calculated with any degree of reliability with first order kinetics. (r^2 < 0.4) since water phase kinetics is dominated by partitioning into sediment in both systems.

Appendix 1 – List of endpoints

Metabolites	No metabolites in water or sediment at >1.7% AR at any time. For environmental exposure assessment, 1,2,4 triazole (M-04) assumed to form at 100% AR				
Mineralization and non extractable residues					
Water / sediment system	pH water phase	pH sed	Mineralization x % after n d. (end of the study).	Non-extractable residues in sed. max x % after n d	Non-extractable residues in sed. max x % after n d (end of the study)
Ijzendoorn	7.4	N/A	2.8% at 13 weeks	2.6 at 13 weeks	2.6 at 13 weeks
Lienden	8.3	N/A	3.7% at 13 weeks	0.6 at 13 weeks	0.6 at 13 weeks

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

Parent and metabolite 1,2,4 triazole (M04)

Parameters used in FOCUSsw step 2 (step 1 not performed

Version control no. of FOCUS calculator: v 1.1

Input parameter	Unit	Triadimenol	1,2,4 triazole (M04)
Physico-chemical parameters			
Molecular mass	$g.mol^{-1}$	295.8	69.1
Water solubility	$mg.l^{-1}$	95	700000
Soil degradation parameters			
$^{\$}$Geometric mean Half-life	days	36.5	9.9***
Max. observed formation	%	-	100%**
Sediment/water degradation parameters			
Mean Half-life (whole system)	days	353*	$^{@}$999
Max. observed formation	%	-	100%**
Sorption parameters			
$^{£}$Median K_{foc}	$cm^3.g^{-1}$	223	89^{+}

$^{@}$ arbitrary high value as measured data not available, also set for degradation DT50 in water and sediment compartments $^{\$}$ half lives were from field dissipation studies normalised to 20˚C and field capacity moisture content (-10kPa), as recommended by FOCUS guidance. $^{£}$ see section B.8.2.4. * also set for degradation DT50 in water and sediment compartments; value from 22˚C study, NOT normalised to 20˚C. **extreme worst case assumption *** notifier stated that DT50 soil used was 7 days, geometric mean of temperature and moisture normalised lab data. In practice, value used was 9.9 days, the median uncorrected DT50. $^{+}$ mean value

Appendix 1 – List of endpoints

Application scenarios for triadimenol implemented in FOCUS Step 2

	Crop	Dose/ treatment (g/ha)	No treats	Application interval	Interception (%*)	Season
Cereals spray N Europe	Winter cereals	125	2	14 days	Minimal canopy (25%)	March - May
Cereals spray S Europe	Winter cereals	125	2	14 days	Minimal canopy (25%)	March - May
Cereals seed treatment N & S Europe	Incorporation/seed treatment	90	1	-	No interception	Oct – Feb
Vines early N Europe	Vines early	40	8	10 days	Minimal canopy (40%)	March - May
Vines early S Europe	Vines early	62.5	4	21	Minimal canopy (40%)	March - May
Vines late N Europe	Vines late	40	8	10	Average canopy (50%)	June - Sept
Vines late S Europe	Vines late	62.5	4	21	Average canopy (50%)	June - Sept

* As specified by FOCUS

Parameters used in FOCUSsw step 3 (if performed)

Version control no.'s of FOCUS software: SWASH v 1.1, MACRO 4.4.2, PRZM 1.1.1 and TOXSWA 1.1.1

Appendix 1 – List of endpoints

Input parameter	Unit	Triadimenol
Physico-chemical parameters		
Molecular mass	$g.mol^{-1}$	295.8
Water solubility (at 20˚C)	mg/l	95
Foliar parameters		
Half-life (default)	days	10
Wash off coefficient (default)	cm^{-1} mm^{-1}	0.5 0.05
Soil degradation parameters		
[$]Geometric mean Half-life	days	36.5
Sediment/water degradation parameters		
[*]Mean Half-life (water, 22˚C)	days	353
*Mean Half-life (sediment, 22˚C)	days	353
Sorption parameters		
[£]Median K_{fOC}	$cm^3.g^{-1}$	223
[£]Arithmetic mean Freundlich adsorption exponent (1/n)	-	0.898

[$] half lives were from field dissipation studies normalised to 20˚C and field capacity moisture content (-10kPa), as recommended by FOCUS guidance. [£] see section B.8.2.4. [*] see section B.8.4.6 and table B.8.58, the value was from the whole systems, but is considered reasonable approximation to the water and sediment degradation half lives by the rapporteur; value from 22˚C, input as from 20˚C study – in practice not difference seen in highest PECsw or PECsed.

Simulations were based on the following uses:

Winter cereals seed treatment, 1 x 90 g/ha
Winter cereals spring spray treatment, 2 x 125 g a.s./ha from GS30, 14 day interval
Vines S Europe, early treatment, 4 x 62.5 g a.s./ha, 21 day interval
Vines S Europe, late treatment, 4 x 62.5 g a.s./ha, 21 day interval

For those uses with multiple spray applications, Step 3 calculations were not run using single applications to ascertain the influence of increased spray drift percentage. The notifier justified this on the basis that Step 2 runs gave the highest PEC values from multiple applications. The Rapporteur has investigated the TOXSWA output files and the maximum PECsw values for the spray uses all occur at 3 – 9 days after a spray application, indicating that spray drift is not the dominant input factor for calculation of the PEC.

Note that for the purposes of application timing at Step 3, the length application window was set on the basis of the default minimum, this being 30 days + ([number of applications – 1] x minimum application interval).

Winter cereals seed treatment:

For the seed treatment use, application method was set to 'incorporation'. In the case of run-off scenarios with PRZM, the Chemical Application Method was set to CAM 1 (application to soil with linear decline to 4cm). In practice, this will be a worst-case simulation for run-off. The Rapporteur's experience of FOCUSsw Step 3 modelling of run-off from seed treatments is that if the more

Appendix 1 – List of endpoints

appropriate CAM 8 setting with the dose placed at 4cm depth is used, run-off losses are zero. Planting dates were set as shown below, this being the initial date in the application window. The dates were derived from the cropping information in the FOCUS groundwater scenarios, which the notifier matched to the scenarios in FOCUSsw.

Planting dates specified to FOCUSsw Pesticide Application Timer (PAT) for the intended use of triadimenol as a seed treatment on winter sown cereals.

FOCUSsw scenario	Planting date
D1	10/9
D2	7/10
D3, R1	12/10
D4	12 – 20/10
D5	20/10
D6	15/11
R3	25/11
R4	25/11

FOCUS Step 2 - Triadimenol

Calculated concentrations of triadimenol in the water body according to FOCUS Step 2 v 1.1 (water column 30cm, sediment 5cm, ratio field to water body 10:1); Southern European cereals.

	PECsw (µg/l)		PECsed (µg/kg dry sediment)	
Time. (d)	Actual	TWA	Actual	TWA
0	17.4	---	38.5	---
1	17.3	17.4	38.4	38.5
2	17.2	17.3	38.4	38.4
4	17.2	17.3	38.2	38.4
7	17.1	17.2	38.0	38.3
14	16.8	17.1	37.5	38.0
21	16.6	17.0	37.0	37.7
28	16.4	16.8	36.5	37.5
42	15.9	16.6	35.5	37.0
50	15.7	16.5	34.9	36.7
100	14.2	15.7	31.7	35.0

As the NOEC for sediment dwelling organisms is given as a surface water concentration, a refinement of the PECsw for step 3 is to take the worst case PECsw (R3, 3.5 µg/L) and PECsed (D1, 5.228 µg/kg) from step 3. If the combined mass of a.s. is dispersed into the water phase, the highest initial PECsw prior to partitioning to the sediment would be 4.2 µg/L.

FOCUS Step 3 – triadimenol

The highest observed global maximum PEC_{SW} of triadimenol following use on winter cereals as a seed treatment according to the GAP table occurred in scenario R3 (stream), where 2.761 µg/l was

Appendix 1 – List of endpoints

predicted. The global maximum PEC_{SED} for triadimenol also occurred in scenario R3 (stream), where 0.701 µg/kg was predicted. Results are given below.

FOCUS Step 3 PEC_{SW} and PEC_{SED} for triadimenol following seed treatment use on winter cereals at scenario R3 (stream, PEC_{SW} and PEC_{SED}).

Days after global maximum	**Concentration in surface water (µg/l)**	**TWA PEC_{SW} (µg/l)**	**Concentration in sediment (µg/kg)**	**TWA PEC_{SED} (µg/kg)**
0	2.761		0.701	
1	0.008	1.424	0.374	0.576
2	0.002	0.716	0.276	0.467
4	0.001	0.359	0.204	0.359
7	0.000	0.205	0.160	0.285
14	0.000	0.158	0.221	0.266
21	0.000	0.105	0.162	0.240
28	0.000	0.079	0.137	0.218
42	0.000	0.053	0.110	0.186
50	0.000	0.044	0.100	0.173
100	0.000	0.024	0.079	0.132
Scenario PEC_{SW} & PEC_{SED}= R3 (stream)				

Summary of global maximum PEC_{SW} and PEC_{SED} of triadimenol from all drainage (D) and runoff (R) scenarios following the use of triadimenol seed treatment on winter cereals (FOCUS Step 3). Highest concentration is in bold text.

Scenario	**Global Max PEC_{SW} (µg/l)**	**Global Max PEC_{SED} (µg/kg)**
D1 (ditch)	0.000	0.001
D1 (stream)	0.000	0.000
D2 (ditch)	0.003	0.009
D2 (stream)	0.002	0.005
D3 (ditch)	0.000	0.000
D4 (pond)	0.018	0.092
D4 (stream)	0.048	0.037
D5 (pond)	0.008	0.034
D5 (stream)	0.014	0.010
D6 (ditch)	0.017	0.017
R1 (pond)	0.046	0.198
R1 (stream)	1.936	0.416
R2 (stream)	W cereals not at R2	W cereals not at R2
R3 (stream)	**2.761**	**0.701**
R4 (stream)	2.393	0.640

The highest 21 day time weighted average concentrations for surface water and sediment were both from the R3 (stream) scenario, and were 0.105 µg/l and 0.240 µg/kg respectively.

Note that as parameterisation of runoff scenarios with the seed treatment should have included

Appendix 1 – List of endpoints

placement of the dose at 4cm depth, no contamination from triadimenol via runoff or erosion into surface water should have occurred; thus PECsw and PECsed should have been zero at all three appropriate runoff scenarios.

Winter cereals spray

The application windows used was set by the Notifier taking consideration of likely spray timings against cereal diseases, and the emergence dates set by FOCUS. The initial dates of the application windows are shown below. It should be noted that the Notifier simulated early and late timings

Application window specified to FOCUSsw Pesticide Application Timer (PAT) for the intended use of triadimenol as a spray treatment on winter cereals.

FOCUSsw scenario	Initial date in application window (early; late)
D1	18 April; 16 May
D2	18 April; 16 May
D3	18 April; 16 May
D4	18 April; 16 May
D5	18 April; 16 May
D6	18 March; 16 April
R1	18 April; 16 May
R3	18 March; 16 April
R4	18 March; 16 April

The highest observed global maximum PEC_{SW} of triadimenol following use on winter cereals as a spray according to the GAP table occurred in scenario R3 (stream), where 3.519 µg/l was predicted. The global maximum PEC_{SED} for triadimenol occurred in scenario D1 (ditch), where 5.228 µg/kg was predicted. Results are given in below. All the highest concentrations were predicted from the earlier application scenarios.

FOCUS Step 3 PEC_{SW} and PEC_{SED} for triadimenol following spray use on winter cereals at scenario R3 (stream, PEC_{SW}) and D1 (ditch, PEC_{SED}).

Days after global maximum	**Concentration in surface water (µg/l)**	**TWA PEC_{SW} (µg/l)**	**Concentration in sediment (µg/kg)**	**TWA PEC_{SED} (µg/kg)**
0	3.519		5.228	
1	0.729	2.988	5.227	5.228
2	0.014	1.592	5.224	5.228
4	0.003	0.800	5.210	5.227
7	0.001	0.458	5.176	5.223
14	0.000	0.245	5.053	5.209
21	0.000	0.164	4.891	5.186
28	0.001	0.142	4.712	5.154
42	0.000	0.102	4.327	5.126
50	0.000	0.088	4.115	5.114
100	0.000	0.046	3.118	5.026

Appendix 1 – List of endpoints

Scenario PEC_{SW} = R3 (stream); PEC_{SED} = D1 (ditch)

Summary of global maximum PEC_{SW} and PEC_{SED} of triadimenol from all drainage (D) and runoff (R) scenarios following the use of triadimenol as a spray on winter cereals (FOCUS Step 3). Highest concentration is in bold text.

Scenario	**Global Max PEC_{SW} (µg/l)**	**Global Max PEC_{SED} (µg/kg)**
D1 (ditch)	1.39	**5.23**
D1 (stream)	0.95	2.65
D2 (ditch)	2.04	4.96
D2 (stream)	1.28	2.13
D3 (ditch)	0.69	0.30
D4 (pond)	0.16	0.72
D4 (stream)	0.59	0.25
D5 (pond)	0.10	0.58
D5 (stream)	0.64	0.24
D6 (ditch)	0.75	1.02
R1 (pond)	0.25	0.81
R1 (stream)	3.01	0.97
R2 (stream)	W cereals not at R2	W cereals not at R2
R3 (stream)	**3.52**	1.55
R4 (stream)	2.83	0.88

The highest 21 day time weighted average concentrations for surface water and sediment were both from the D1 (ditch) scenario, and were 1.238 µg/l and 5.186 µg/kg respectively.

Vines early

The application windows used in Step 3 modelling are shown below. It was noted that the Notifier did not simulate the Northern European GAP for vines, which ought to have been conducted for scenario R1. However, the notifier argued that Step 2 calculations for the Northern scenario gave an acceptable risk assessment, and thus the Northern European GAP was not run at Step 3.

Initial date of application window specified to FOCUSsw Pesticide Application Timer (PAT) for the intended use of triadimenol as a spray treatment on vines (early treatment).

FOCUSsw scenario	Initial application date
D6	24 March
R1	24 March
R3	24 March
R4	24 March

The highest observed global maximum PEC_{SW} of triadimenol following use on vines (early) as a spray according to the GAP table occurred in scenario R4 (stream), where 1.922 µg/l was predicted. The global maximum PEC_{SED} for triadimenol also occurred in scenario R4 (stream), where 0.728 µg/kg was predicted. Results are given below.

Appendix 1 – List of endpoints

FOCUS Step 3 PEC_{SW} and PEC_{SED} for triadimenol following spray use on vines (early) at scenario R4 (stream, PEC_{SW} and PEC_{SED}).

Days after global maximum	Concentration in surface water (µg/l)	TWA PEC_{SW} (µg/l)	Concentration in sediment (µg/kg)	TWA PEC_{SED} (µg/kg)
0	1.922		0.728	
1	1.052	1.196	0.469	0.663
2	0.003	1.107	0.373	0.600
4	0.001	0.561	0.290	0.513
7	0.000	0.325	0.232	0.421
14	0.000	0.163	0.174	0.318
21	0.000	0.109	0.152	0.269
28	0.000	0.083	0.131	0.238
42	0.000	0.055	0.106	0.199
50	0.000	0.047	0.096	0.184
100	0.000	0.024	0.084	0.132
Scenario = R4 (stream)				

Table B.8.99 Summary of global maximum PEC_{SW} and PEC_{SED} of triadimenol from all drainage (D) and runoff (R) scenarios following the use of triadimenol as a spray on vines (early) (FOCUS Step 3). Highest concentration is in bold text.

Scenario	Global Max PEC_{SW} (µg/l)	Global Max PEC_{SED} (µg/kg)
D1 (ditch)	Vines not at this scenario	Vines not at this scenario
D1 (stream)	Vines not at this scenario	Vines not at this scenario
D2 (ditch)	Vines not at this scenario	Vines not at this scenario
D2 (stream)	Vines not at this scenario	Vines not at this scenario
D3 (ditch)	Vines not at this scenario	Vines not at this scenario
D4 (pond)	Vines not at this scenario	Vines not at this scenario
D4 (stream)	Vines not at this scenario	Vines not at this scenario
D5 (pond)	Vines not at this scenario	Vines not at this scenario
D5 (stream)	Vines not at this scenario	Vines not at this scenario
D6 (ditch)	0.326	0.585
R1 (pond)	0.037	0.148
R1 (stream)	0.632	0.254
R2 (stream)	0.502	0.288
R3 (stream)	0.677	0.280
R4 (stream)	**1.922**	**0.728**

The highest 21 day time weighted average concentrations for surface water and sediment were both from the D6 (ditch) scenario, and were 1.119 µg/l and 0.490 µg/kg respectively.

The Rapporteur has simulated the Northern European GAP at scenario R1 and notes that the predicted concentrations are lower than those predicted from use of the S. European GAP.

Appendix 1 – List of endpoints

Vines late

The application windows used in Step 3 modelling are shown below. As with early vines, it was noted that the Notifier did not simulate the Northern European GAP for vines, which ought to have been conducted for scenario R1.

Application window specified to FOCUSsw Pesticide Application Timer (PAT) for the intended use of triadimenol as a spray treatment on vines (late treatment).

FOCUSsw scenario	Application window
D6	26 May
R1	26 May
R3	26 May
R4	26 May

The highest observed global maximum PEC_{SW} of triadimenol following use on vines (late) as a spray according to the GAP table occurred in scenario R4 (stream), where 1.823 µg/l was predicted. The global maximum PEC_{SED} for triadimenol occurred in scenario D6 (ditch), where1.675 µg/kg was predicted. Results are given below.

FOCUS Step 3 PEC_{SW} and PEC_{SED} for triadimenol following spray use on vines (late) at scenarios R4 (stream, PEC_{SW}) and D6 (ditch, PEC_{SED}).

Days after global maximum	**Concentration in surface water (µg/l)**	**TWA PEC_{SW} (µg/l)**	**Concentration in sediment (µg/kg)**	**TWA PEC_{SED} (µg/kg)**
0	1.823		1.675	
1	1.819	1.817	1.663	1.674
2	0.004	1.016	1.632	1.670
4	0.001	0.509	1..540	1.658
7	0.000	0.310	1.390	1.627
14	0.000	0.155	1.143	1.523
21	0.000	0.104	0.999	1.414
28	0.000	0.083	0.900	1.359
42	0.000	0.055	0.767	1.328
50	0.000	0.049	0.711	1.279
100	0.000	0.025	0.513	1.087
Scenario = PECsw = R4 (stream); PECsed = D6 (ditch)				

Appendix 1 – List of endpoints

Summary of global maximum PEC_{SW} and PEC_{SED} of triadimenol from all drainage (D) and runoff (R) scenarios following the use of triadimenol as a spray on vines (late) (FOCUS Step 3). Highest concentration is in bold text.

Scenario	Global Max PEC_{SW} (µg/l)	Global Max PEC_{SED} (µg/kg)
D1 (ditch)	Vines not at this scenario	Vines not at this scenario
D1 (stream)	Vines not at this scenario	Vines not at this scenario
D2 (ditch)	Vines not at this scenario	Vines not at this scenario
D2 (stream)	Vines not at this scenario	Vines not at this scenario
D3 (ditch)	Vines not at this scenario	Vines not at this scenario
D4 (pond)	Vines not at this scenario	Vines not at this scenario
D4 (stream)	Vines not at this scenario	Vines not at this scenario
D5 (pond)	Vines not at this scenario	Vines not at this scenario
D5 (stream)	Vines not at this scenario	Vines not at this scenario
D6 (ditch)	0.902	**1.675**
R1 (pond)	0.092	0.391
R1 (stream)	0.758	0.303
R2 (stream)	0.868	0.202
R3 (stream)	0.912	0.216
R4 (stream)	**1.823**	0.954

The highest 21 day time weighted average concentrations for surface water and sediment were both from the D6 (ditch) scenario, and were 0.329 µg/l and 1.414 µg/kg respectively.

The Rapporteur has simulated the Northern European GAP at scenario R1 and notes that the predicted concentrations are lower than those predicted from use of the S. European GAP.

The highest PEC values at Step 3 are summarised below.

Maximum PEC values from FOCUSsw Step 3 calculations

Crop	PECsw (µg/l)	PECsed (µg/kg)
Cereal seed treatment	2.761	0.701
Cereals spray	3.519	5.228
Vines early	1.922	0.728
Vines late	1.823	1.675

FOCUS Step 2 – 1,2,4 triazole (M04)

Calculated concentrations of 1,2,4 triazole (M04) in the water body according to FOCUS Step 2 v 1.1 (water column 30cm, sediment 5cm, ratio field to water body 10:1); Southern Europe winter cereals treatment.

Appendix 1 – List of endpoints

	*PECsw (µg/l)		*PECsed(µg/kg dry sediment)	
Time (d)	Actual	TWA	Actual	TWA
0	3.15	---	2.79	---
1	3.13	3.14	2.79	2.79
2	3.13	3.14	2.78	2.79
4	3.13	3.13	2.78	2.78
7	3.12	3.13	2.77	2.78
14	3.10	3.12	2.76	2.77
21	3.09	3.11	2.75	2.77
28	3.07	3.10	2.73	2.76
42	3.04	3.09	2.71	2.75
50	3.03	3.08	2.69	2.74
100	2.92	3.03	2.60	2.69

* Note this decline is based on an unmeasured worst case assumption of a DT50 whole system of 999 days.

As the NOEC for sediment dwelling organisms is given as a surface water concentration, a refinement of the PECsw for step 3 for 1,2,4-triazole is as follows: given that the highest initial PECsw for triadimenol prior to partitioning to the sediment would be 4.2 µg/L, assuming instantaneous and 100% conversion to 1,2,4-triazole, th e max PECsw for metabolite prior to partitioning to the sediment would be 0.98 µg/L (taking into account molecular mass difference).

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

Method of calculation and type of study (*e.g.* modelling, monitoring, lysimeter)	FOCUS PEARL v 2.2.2, see below for input parameters
Application rate	See below

$PEC_{(gw)}$

Maximum concentration	Not applicable for FOCUSgw approach
Average annual concentration (Results quoted for modelling with FOCUS gw scenarios, according to FOCUS guidance)	See below

Substance input parameters for triadimenol and M04 in groundwater modelling

Appendix 1 – List of endpoints

	Triadimenol	**M04**
Parameters		
Molecular weight	295.8	69.1
Solubility in water (mg/l at 20˚C)	95	
Vapour pressure (Pa at 20˚C)	4.1×10^{-7}	
First order DT_{50} (days)	36.5	7
Reference temperature (˚C)	20	20
Reference soil moisture (pF)	2	2
Activation energy (kJ/mole)	54	54
Moisture exponent	0.7	0.7
Kom-value (ml/g)	129.6	51.7
Exponent of the Freundlich isotherm	0.898	0.92
Formation fraction	-	1

Appendix 1 – List of endpoints

Application timings, crop interception factors and doses used in groundwater modelling of triadimenol and M04

	Treat1	Treat 2	Treat 3	Treat 4	Treat 5	Treat 6	Treat 7	Treat 8
W. cereals spray N Europe early (nominal dose 2 x 125 g a.s./ha /treatment, 14 day interval)								
Date of treatment	18 April	2 May						
% interception	70	70						
Dose reaching soil (g/ha)	37.5	37.5						
W. cereals spray N Europe late (nominal dose 2 x 125 g a.s./ha /treatment, 14 day interval)								
Date of treatment	16 May	30 May						
% interception	70	90						
Dose reaching soil (g/ha)	37.5	12.5						
W. cereals spray S Europe early (nominal dose 2 x 125 g a.s./ha /treatment, 14 day interval)								
Date of treatment	18 March	1 April						
% interception	70	70						
Dose reaching soil (g/ha)	37.5	37.5						
W. cereals spray S Europe late (nominal dose 2 x 125 g a.s./ha /treatment, 14 day interval)								
Date of treatment	18 April	2 May						
% interception	70	90						
Dose reaching soil (g/ha)	37.5	12.5						
W. cereals seed treatment (nominal dose 90 g a.s./ha); drilling depth set to 5cm								
Date of treatment	7 days before emergence[1]							
% interception	0							
Dose reaching soil (g/ha)	90 (incorpor-ated to 4cm)							
Vines S Europe spray (nominal dose 4 x 62.5 g a.s./ha, 21 day interval)								
Date of	14 March	4 April	25 Apr	16 May				

Appendix 1 – List of endpoints

	Treat1	Treat 2	Treat 3	Treat 4	Treat 5	Treat 6	Treat 7	Treat 8
treatment								
% interception	40	40	50	60				
Dose reaching soil (g/ha)	37.5	37.5	31.25	25.0				
Vines N Europe spray (nominal dose 8 x 40 g a.s./ha, 10 day interval)								
Date of treatment	14 April	24 Apr	4 May	14 May	24 May	3 June	13 June	23 June
% interception	40	40	50	50	60	60	70	85
Dose reaching soil (g/ha)	24	24	20	20	16	16	12	6

1 Pragmatic choice of value used as relative application date in FOCUS-PEARL, due to differing intervals between planting and emergence for FOCUS groundwater scenarios; FOCUS defined dates of emergence vary from 13 September – 23 November depending on scenario.

PEC(gw) - FOCUS modelling results (80th percentile annual average concentration at 1m)

Cereals – spray application early and late

	Scenario	Parent (µg/L)	Metabolite (µg/L)		
			M04	2	3
FOCUS PEARL / Cereals - spray	Chateaudun	<0.0005	<0.0005		
	Hamburg	<0.0005	<0.0005		
	Jokioinen	<0.0005	<0.0005		
	Kremsmunster	<0.0005	<0.0005		
	Okehampton	<0.0005	<0.0005		
	Piacenza	0.0007	<0.0005		
	Porto	<0.0005	<0.0005		
	Sevilla	<0.0005	<0.0005		
	Thiva	<0.0005	<0.0005		

Appendix 1 – List of endpoints

Cereals – seed treatment

	Scenario	Parent (µg/L)	Metabolite (µg/L)		
			M04	2	3
FOCUS PEARL / Cereals - spray	Chateaudun	<0.0005	<0.0005		
	Hamburg	<0.0005	<0.0005		
	Jokioinen	<0.0005	<0.0005		
	Kremsmunster	<0.0005	<0.0005		
	Okehampton	<0.0005	<0.0005		
	Piacenza	0.0007	<0.0005		
	Porto	<0.0005	<0.0005		
	Sevilla	<0.0005	<0.0005		
	Thiva	<0.0005	<0.0005		

Vines

	Scenario	Parent (µg/L)	Metabolite (µg/L)		
			M04	2	3
FOCUS PEARL / Vines	Chateaudun	<0.0005	<0.0005		
	Hamburg	<0.0005	<0.0005		
	Jokioinen	-	-		
	Kremsmunster	<0.0005	<0.0005		
	Okehampton	-	-		
	Piacenza	0.008	0.0015		
	Porto	<0.0005	<0.0005		
	Sevilla	<0.0005	<0.0005		
	Thiva	<0.0005	<0.0005		

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

Direct photolysis in air ‡	Not applicable
Quantum yield of direct phototransformation	Not applicable- limited absorption at 290 nm
Photochemical oxidative degradation in air ‡	Software: PHOTO (Version 3). Half-life 2.5 hours assuming 24 hour OH radical concentration of 5 x 10^5 radicals/cm^3.

Appendix 1 – List of endpoints

Volatilization ‡	Vapour pressure 6 x 10^{-7} and 4 x 10^{-7} Pa (diastereomers A and B respectively) at 20˚C and Henry's Law Constant of 3 x 10^{-6} and 4 x 10^{-6} Pa.m^3/mole (diastereomers A and B respectively).
	Volatilisation from soil: minimal Volatilisation from plant surfaces: up to 5% in 24 hours.

PEC (air)

Method of calculation	None

$PEC_{(a)}$

Maximum concentration	Expected to be negligible based on vapour pressure and Henry's Law constant

Definition of the Residue (Annex IIA, point 7.3)

Relevant to the environment (for risk assessment)	Soil: triadimenol, 1,2,4-triazole SW: triadimenol originating from soil via runoff or drainage: 1,2,4-triazole Sediment: triadimenol GW: triadimenol, 1,2,4-triazole Air: triadimenol

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

Soil (indicate location and type of study)	None
Surface water (indicate location and type of study)	None
Ground water (indicate location and type of study)	None
Air (indicate location and type of study)	None

Appendix 1 – List of endpoints

Classification and proposed labelling (Annex IIA, point 10)

with regard to fate and behaviour data	Candidate R53

Appendix 1 – List of endpoints

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

Species	Test substance	Time scale	End point (mg/kg bw/day)	End point (mg/kg feed)
Birds				
Bobwhite quail (*Colinus virginianus*)	a.s.	Acute	LD_{50}: >2000	-
Bobwhite quail (*Colinus virginianus*)	metabolite M01 triadimefon	Acute	LD_{50}: >2000	-
Bobwhite quail (*Colinus virginianus*)	metabolite M05 triazole alanine	Acute	LD_{50}: >5000	-
Bobwhite quail (*Colinus virginianus*)	a.s.	Short-term	LDD_{50}: >705	LC_{50}: >5205
Bobwhite quail (*Colinus virginianus*)	metabolite M01 triadimefon	Short-term	LDD_{50}: >880	LC_{50}: >4640
Mallard (*Anas platyrhynchos*)	metabolite M05 triazole alanine	Short-term	LDD_{50}: >1309	LC_{50}: >5000
Bobwhite quail (*Colinus virginianus*)	a.s.	Long-term	NOEL: 7.5[1]	NOEC: 100
Bobwhite quail (*Colinus virginianus*)	metabolite M01 triadimefon	Long-term	NOEL: 43.5	NOEC: 587
Mammals				
Male rat	a.s.	Acute	LD_{50}: 689	-
Female rat	metabolite M01 triadimefon	Acute	LD_{50}: 1020	-
Rat	metabolite M05 triazole alanine	Acute	LD_{50}: >5000	-
Rat	metabolite M04 1,2,4 Triazole	Acute	LD_{50}: 1648	-
Male rat	a.s.	Long-term	NOEL: 8.88	NOEC: 100

[1] Amended from DAR - see Addendum 1

Appendix 1 – List of endpoints

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

Avian acute, short- and long-term TERs for 'Bayfidan EC 250' (cereals and vine spray treatment scenario)

Crop	Species/ scenario	Toxicity end point mg/kg bw/day	ETE mg/kg bw/d	TER	Annex VI trigger	Refined TER
Acute:						
Cereals	large herbivorous bird	LD50: > 2000	9.4	> 213	10	-
Cereals	insectivorous bird	LD50: > 2000	6.8	> 294	10	-
Vines (northern EU)	insectivorous bird	LD50: > 2000	2.2	> 909	10	-
Vines (southern EU)	insectivorous bird	LD50: > 2000	3.4	> 588	10	-
Short-term:						
Cereals	large herbivorous bird	LDD50[1]: > 705	5.9	> 119	10	-
Cereals	insectivorous bird	LDD50[1]: > 705	3.8	> 186	10	-
Vines (northern EU)	insectivorous bird	LDD50[1]: > 705	1.2	> 588	10	-
Vines (southern EU)	insectivorous bird	LDD50[1]: > 705	1.9	> 371	10	-
Long-term (reproductive):						
Cereals	large herbivorous bird	NOEL: 7.5	3.1	**2.4**	5	N EU: 13.9[2] S EU: 12.9[2]
Cereals	insectivorous bird	NOEL: 7.5	3.8	**2**	5	N EU: **1.9**[3] S EU: **1.8**[3] (Skylark)
Vines (northern EU)	insectivorous bird	NOEL: 7.5	1.2	6.25	5	-
Vines (southern EU)	insectivorous bird	NOEL: 7.5	1.9	**3.95**	5	-
Cereals	fish-eating bird	NOEL: 7.5	0.0007[4]	10714	5	

[1] LDD50: Dietary Daily Dose.
[2] based on refined residue levels on cereal shoots - see B.9.1.7 in DAR + Addendum 1.
[3] based on refined residue levels and adjustment to PD - see B.9.1.7 in DAR + Addendum 1.
[4] based on highest FOCUS Step 3 PECsw from foliar use on cereals and revised NOEL from Addendum 1

Appendix 1 – List of endpoints

Avian acute, short- and long-term TERs for 'Baytan FS 094' (seed treatment scenario)

Time Scale	Species/ scenario	Toxicity end point mg/kg bw/day	ETE mg/kg bw/d	TER	Annex VI trigger	Refined TER
Acute	small granivorous bird	LD50: >2000	142.5	14	10	-
Short-term dietary	small granivorous bird	LDD50[1]: >705	142.5	**4.9**	10	-
Long-term reproductive	small granivorous bird	NOEL: 7.5	142.5	**0.053**	5	N/A[2]
Long-term reproductive	earthworm-eating bird	NOEL: 7.5	0.374[3]	20	5	

[1] LDD50: Dietary Daily Dose.
[2] Not applicable due to use and exposure outside of the bird breeding season for autumn/winter-sown cereals only.
TER-calculations for seed treatments are based on triadimenol only, not other a.s.
[3] Based on highest PECsoil from cereal seed-treatment use and revised NOEL from Addendum 1

Appendix 1 – List of endpoints

Mammalian acute and long-term TERs for 'Bayfidan EC 250' (cereal and vine spray treatment scenario)

Time Scale	Species/ scenario	Toxicity end point mg/kg bw/day	ETE mg/kg bw/d	TER	Annex VI trigger	Refined TER
Acute:						
Cereals (early)	small herbivorous mammal	LD50: 689	30.84	22.3	10	-
Cereals (late)	insectivorous mammal	LD50: 689	1.10	626	10	-
Vines N EU (early/late)	small herbivorous mammal	LD50: 689	7.66	89.9	10	-
Vines S EU (early/late)	small herbivorous mammal	LD50: 689	8.79	78.4	10	-
Long-term reproductive						
Cereals (early)	small herbivorous mammal	NOEL: 8.88	9.80	**0.91**	5	N EU: 6.6[1] S EU: 6.1[1]
Cereals (late)	insectivorous mammal	NOEL: 8.88	0.40	22.2	5	-
Vines N EU (early/late)	small herbivorous mammal	NOEL: 8.88	2.71	**3.28**	5	N EU, vines (early): 6.5[2] N EU, vines (late): 7.2[2]
Vines S EU (early/late)	small herbivorous mammal	NOEL: 8.88	2.75	**3.23**	5	N EU, vines (early): 5.3[2] N EU, vines (late): 10.7[2]
Cereals	fish-eating mammal	NOEL: 8.88	0.00055[3]	16145	5	

[1] based on refined residue levels on cereal shoots - see B.9.3.4 in DAR + Addendum 1.
[2] based on refinements to crop interception, PD and residue levels - see B.9.3.4 in DAR + Addendum 1.
[3] based on highest FOCUS Step 3 PECsw from foliar use on cereals.

Appendix 1 – List of endpoints

Mammalian acute and long-term TERs for 'Baytan FS 094' (seed treatment scenario)

Time Scale	**Species/ scenario**	**Toxicity end point mg/kg bw/day**	**ETE mg/kg bw/d**	**TER**	**Annex VI trigger**	**Refined TER**
Acute	small granivorous mammal	LD50: 689	86.25	**7.9**	10	13.3[1]
Long-term reproductive	small granivorous mammal	NOEL: 8.88	86.25	**0.1**	5	**1.8**[2]
Long-term reproductive	earthworm-eating mammal	NOEL: 8.8	0.476[3]	18.7	5	

[1] based on adjustments to PD - see B.9.3.4 in DAR + Addendum 1.
[2] based on adjustments to PT - see B.9.3.4 in DAR + Addendum 1. Although still below the trigger, for autumn/winter sown cereals use and exposure will be short term and outside of the main small mammal breeding season in Northern MS and so the long-term risk may be considered acceptable.
[3] based on highest PECsoil from cereal seed-treatment use

Risks to terrestrial vertebrates from metabolites of triadimenol and from other sources of exposure (bioaccumulation/ secondary poisoning *via* fish and earthworms and consumption of vegetation from treated seed) are determined to be low (all TERs >187).

Appendix 1 – List of endpoints

Toxicity data for aquatic species - a.s. and formulation (most sensitive species of each group) (Annex IIA, point 8.2, Annex IIIA, point 10.2)

Group & Species	Test substance	Time-scale	Endpoint	Toxicity (mg/l)
Acute, sub-chronic				
cold water fish *Oncorhynchus mykiss*	technical triadimenol	96 h, static	LC_{50}	21.3
cold water fish *Oncorhynchus mykiss*	'Bayfidan 250 EC'	96 h, flow-through	LC_{50}	42 [**9.66** a.s. ≡]
warm water fish *Leuciscus idus melanotus*	technical triadimenol	96 h, static	LC_{50}	17.4
warm water fish *Leuciscus idus melanotus*	'Bayfidan 250 EC'	96 h, static	LC_{50}	79 [18.2 a.s. ≡]
invertebrate *Daphnia magna*	technical triadimenol	48 h, static	EC_{50}	**51**
invertebrate *Daphnia magna*	'Bayfidan 250 EC'	48 h, static	EC_{50}	253 [58.6 a.s. ≡]
green alga *Pseudokirchneriella subcapitata*	technical triadimenol	72 h, static	E_bC_{50} E_rC_{50}	9.6 38
green alga *Pseudokirchneriella subcapitata*	'Bayfidan 250 EC'	72 h, static	E_bC_{50} E_rC_{50}	12.2 [**2.83** a.s. ≡] 41.13 [9.51 a.s. ≡]
Chronic				
cold water fish *Oncorhynchus mykiss*	technical triadimenol	28 d, semi-static, growth	NOEC	**3.13**
invertebrate *Daphnia magna*	technical triadimenol	21 d, semi-static, reprod.n	NOEC	**0.1**
invertebrate *Daphnia magna*	'Bayfidan 250 EC'	21 d, semi-static	NOEC	0.11 a.s. ≡
sediment dwelling invertebrate *Chironomus riparius*	technical triadimenol	28 d, static, in presence of sediment	NOEC	**0.1** NOECsed = 0.667 mg/kg[1]
Fish bioconcentration study				
Lepomis machrochirus	technical triadimenol	28 d, flow-through	BCF (whole fish): 21, clearance ½ life: 0.42 d	
Activated sludge				
Activated sludge	technical triadimenol	3 h static	EC_{50}	>10000
Microcosm or mesocosm tests				
None submitted				

[1] calculated at PRAPeR 48.

Appendix 1 – List of endpoints

Metabolites: Acute and chronic aquatic toxicity endpoints for M01 (triadimefon) and M04 (1, 2, 4-triazole).

Group ***Species***	**M01 (triadimefon)** **LC/EC_{50} and NOEC mg M01/l**[1]	**M04 (1,2,4-triazole)** **LC/$EC_{50}$and NOEC mg M04/l**
Acute, sub-chronic		
Fish *Oncorhynchus mykiss*	4.08	498[2]
Fish *Lepomis macrochirus*	10.0	-
Invertebrates *Daphnia magna*	7.16	> 100[2]
Algae *Pseudokirchneriella subcapitata*	E_rC_{50}: 2.01 (no biomass value)	E_bC_{50}: 8.2[2]
Chronic		
Fish *Pimephelas promelas*)	0.17	100
Invertebrates *Daphnia magna*	0.0521	-
Fish bioconcentration study		
Lepomis machrochirus	BCF (whole fish): 64, clearance ½ life: 0.6 d	-

[1] The maximum occurrence of M01 was only 0.7% AR in sediment five weeks after treatment, it is also of similar toxicity to the a.s.. Therefore, the risk posed by M01 is considered to be covered by the assessment for the parent compound and only M04 is discussed below.

[2] Updated from DAR using agreed 1,2,4-triazole endpoints taken from PRAPeR 13.

Appendix 1 – List of endpoints

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

'Bayfidan EC 250': Foliar spray use on cereals and grapes

FOCUS Step 2 acute and chronic TERs for aquatic life

Test substance	Organism/ group	Timescale	Toxicity endpoint (≡ mg a.s./l)	PECsw (mg/l)[1]	TER	Annex VI Trigger
'Bayfidan 250 EC'	fish	acute	9.66	0.02	483	100
technical triadimenol	fish	chronic	3.13	0.02	156.5	10
technical triadimenol	aquatic invertebrates	acute	51	0.02	2550	100
technical triadimenol	aquatic invertebrates	chronic	0.1	0.02	**5**	10
technical triadimenol	sediment dwelling invertebrates	chronic	0.1	0.02	**5**	10
'Bayfidan 250 EC'	algae	acute/subchronic	2.83	0.02	142	10

FOCUS Step 3 chronic TERs for free swimming and sediment dwelling invertebrates

Test organism	NOEC (mg a.s./l)	Step 3 PEC (mg a.s./l)	Step 3 TER	Annex VI trigger
Winter cereals:				
Daphnia magna	0.1	0.0035	28.6	10
Chironomus riparius	0.1 0.667 mg/kg[2]	0.0042[1] 0.00523 mg/kg[2]	24[1] 128[2]	10
Vines (early, northern MS):				
Daphnia magna	0.1	0.0019	52.6	10
Chironomus riparius	0.1	0.0042[1]	24[1]	10
Vines (late, northern MS):				
Daphnia magna	0.1	0.0018	55.6	10
Chironomus riparius	0.1	0.0042[1]	24[1]	10
Vines (early, southern MS):				
Daphnia magna	0.1	0.0019	52.6	10
Chironomus riparius	0.1	0.0042[1]	24[1]	10
Vines (late, southern MS):				
Daphnia magna	0.1	0.0018	55.6	10
Chironomus riparius	0.1 0.667 mg/kg[2]	0.0042[1] 0.00168 mg/kg[2]	24[1] 397[2]	10

[1] Amended from original DAR. A single dose was tested in the *Chironomus* study, resulting in a NOEC of 0.1 mg a.s./l (given as a water concentration). A realistic worst case FOCUS Step 3 total load PEC of 4.2 µg a.s./L (0.0042 mg a.s./L) has been proposed in Addendum 1 covering all GAP.

[2] PRAPeR 48 also derived long-term sediment TERs based on a calculated NOECsed of 0.667 mg/kg and the maximum PECsed values for cereals and southern late vines from Table B.8.103. Overall the risk to sediment dwellers was considered to be low.

Appendix 1 – List of endpoints

FOCUS Step 2 acute and chronic TERs for triadimenol metabolite M04

Test organisms (most sensitive species where more than one tested)	Timescale	LC/EC50 or NOEC (mg/l)	PEC (mg/l) [1]	TER	Annex VI trigger
Fish	acute	498[4]	0.0032	155625[4]	100
Fish	chronic	100	0.0032	31250	10
Aquatic invertebrates	acute	>100[4]	0.0032	>31250[4]	100
Aquatic invertebrates	chronic	0.01[2]	0.0032	3.1[2]	10
Sediment dwelling invertebrates	chronic	0.01[2]	0.0035[3]	2.9[2]	10
Algae	sub-chronic	8.2[4]	0.0032	2563[4]	10

[1] Worst case PEC is taken to be equivalent to that of triadimenol.
[2] In the absence of data - calculated by dividing the triadimenol end point by 10 to cover any unlikely increase in toxicity of the metabolite compared to the a.s. TERs considered acceptable given the worst case assumptions of toxicity and exposure used.
[3] The triadimenol NOEC for sediment dwelling organisms was given as a water concentration, therefore a PECsw value calculated to reflect the total load of M04 in the water system as calculated at FOCUS Step 2.
[4] Updated from DAR using agreed 1,2,4-triazole (M04) endpoints taken from PRAPeR 13.

'Baytan FS 094': Cereal seed treatment

FOCUS Step 3 acute and chronic TERs for aquatic life

Test substance	Organism/ group	Timescale	Toxicity endpoint (≡ mg a.s./l)	PECsw (mg/l)[1]	TER	Annex VI Trigger
technical triadimenol	fish	acute	17.4	0.0028	6214	100
technical triadimenol	fish	chronic	3.13	0.0028	1118	10
technical triadimenol	aquatic invertebrates	acute	51	0.0028	18214	100
technical triadimenol	aquatic invertebrates	chronic	0.1	0.0028	35	10
technical triadimenol	sediment dwelling invertebrates	chronic	0.1 0.667 mg/kg[2]	0.0028 0.0007 mg/kg[2]	35 958[2]	10
technical triadimenol	algae	acute/ subchronic	9.6	0.0028	3428	10

[1] The maximum PECsw for all scenarios from Table B.8.103 has been used as a worst case for both acute and chronic assessments.
[2] PRAPeR 48 also derived long-term sediment TERs based on a calculated NOECsed of 0.667 mg/kg and the maximum PECsed values for cereal seed treatment from Table B.8.103.

Appendix 1 – List of endpoints

FOCUS Step 2 acute and chronic TERs for triadimenol metabolite M04

Test organisms (most sensitive species where more than one tested)	Timescale	LC/EC50 or NOEC (mg/l)	PEC (mg/l) [1]	TER	Annex VI trigger
Fish	acute	498[4]	0.00746	66756[4]	100
Fish	chronic	100	0.00746	13404	10
Aquatic invertebrates	acute	>100[4]	0.00746	>13404[4]	100
Aquatic invertebrates	chronic	0.01[2]	0.00746	1.3[2]	10
Sediment dwelling invertebrates	chronic	0.01[2]	0.0035[3]	2.9[2]	10
Algae	sub-chronic	8.2[4]	0.00746	1099[4]	10

[1] Worst case PEC is taken to be equivalent to that of triadimenol.
[2] In the absence of data - calculated by dividing the triadimenol end point by 10 to cover any unlikely increase in toxicity of the metabolite compared to the a.s. TERs considered indicated a low risk given the worst case assumptions of toxicity and exposure used.
[3] The triadimenol NOEC for sediment dwelling organisms was given as a water concentration, therefore a PECsw value was calculated to reflect the total load of M04 in the water system as calculated at FOCUS Step 2. This was stated in Section B.8.5 to cover all other uses of triadimenol.
[4] Updated from DAR using agreed 1,2,4-triazole (M04) endpoints taken from PRAPeR 13.

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

Test substance	Acute oral toxicity (LD_{50} µg/bee)	Acute contact toxicity (LD_{50} µg/bee)
technical triadimenol	>224.8	> 200
'Bayfidan EC 250'	64.4 a.s.	> 200 a.s.
'Baytan FS 094'	298 a.s.	> 2232 a.s.
Field or semi-field tests - none required		

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

'Bayfidan EC 250': Foliar spray use on cereals and grapes

Crop use	Maximum application rate (g a.s./ha)	Lowest 48 h acute LD_{50} (≡ µg a.s./bee)	Hazard quotient	Annex VI trigger
Cereals	125	Oral: 64.4	Q_{HO}: 1.9	50
		Contact: >200	Q_{HC}: <0.63	50
Grape vines (S EU highest)	62.5	Oral: 64.4	Q_{HO}: 0.97	50
		Contact: >200	Q_{HC}: <0.31	50

'Baytan FS 094': Cereal seed treatment

The usual Hazard Quotient calculation is not appropriate for seed treatments, however triadimenol has some systemic activity and bees may be exposed orally via aphid honeydew or the nectar of flowering

Appendix 1 – List of endpoints

weeds. A very approximate calculation, based on the levels of tridimenol potentially found in plant tissues and the acute oral LD_{50} for the a.s., gives a Q_{HO} of <30 indicating a low risk to bees.

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

Effects data on technical triadimenol and 'Bayfidan EC 250'

Laboratory tests with standard sensitive species

Test species	Test substance, Study type, duration, Exposure	Ecotoxicological effects/endpoint
Typhlodromus pyri	EC 250, laboratory test, 14d, spray deposits on glass plates	LR_{50} > 1250 g a.s./ha[2]
		corr. Mortality [%] Effect on Reproduction [%]
	125 g a.s./ha	14 8
	250 g a.s./ha	8 0
	625 g a.s./ha	13 25
	1250 g a.s./ha	35 51
Aphidius rhopalosiphi	EC 250, laboratory test, 48 h, (+9 d) spray deposits on glass plates	
		corr. Mortality [%] Effect on Reproduction [%]
	125 g a.s./ha	47 -4 [1)]
Aphidius rhopalosiphi	EC 250, laboratory test, 48 h, spray deposits on glass plates	LR_{50} > 1250 g a.s./ha[2]
		corr. Mortality [%]
	250 g a.s./ha	0
	625 g a.s./ha	32.2
	1250 g a.s./ha	16.95
Aphidius rhopalosiphi	EC 250, extended laboratory, 24 h (+9 d), spray deposits on barley seedlings	
		corr. Mortality [%] Effect on Reproduction [%]
	125 g a.s./ha	23.1 39
Aphidius rhopalosiphi	EC 250, extended laboratory, 24 h (+10 d), spray deposits on barley seedlings	
		corr. Mortality [%] Effect on Reproduction [%]
	250 g a.s./ha	17 -82 [1)]
	400 g a.s./ha	0 -59 [1)]
	625 g a.s./ha	7 -35 [1)]

[1)] negative values indicate a reproduction performance that was higher as in the control treatment.

[2)] the glass plate studies on the two sensitive species were conducted at multiples of field rate only and the tests (and dose ranges) were not designed to achieve accurate LR50s.

Appendix 1 – List of endpoints

Further laboratory and extended laboratory studies

Test species	Test substance, Study type, duration, Exposure	Ecotoxicological effects/endpoint	
Coccinella septempunctata	EC 250, laboratory test, 14d, spray deposits on glass plates 62 g a.s./ha 110 g a.s./ha 220 g a.s./ha 350 g a.s./ha 625 g a.s./ha	corr. Mortality [%] -3.44[2)] 0.0 27.59 3.46	Effect on Reproduction <u>Fecundity (mean no. eggs/female/day):</u> Control: 10.14 62 g a.s./ha: 13.17 (+29.9%) 110 g a.s./ha: 11.81 (+16.5%) 200 g a.s./ha: 10.50 (+3.6%) 350 g a.s./ha: 17.89 (+76.4%) 625 g a.s./ha: 7.18 (-29.2%) <u>Mean hatching rate:</u> Control: 91.69% 62 g a.s./ha: 92.79% (+1.2%) 110 g a.s./ha: 84.76% (-7.6%) 200 g a.s./ha: 87.35% (-4.7%) 350 g a.s./ha: 79.43% (-13.4%) 625 g a.s./ha: 68.14% (-25.7%) <u>Mean no. fertile eggs/female/day:</u> Control: 9.36 62 g a.s./ha: 12.36 (+32%) 110 g a.s./ha: 9.88 (+5.6%) 200 g a.s./ha: 9.23 (-1.4%) 350 g a.s./ha: 14.46 (+54.5%) 625 g a.s./ha: 5.91 (-36.9%)
Aleochara blineata	EC 250, laboratory test, 119 d, spray application on quartz sand 125 g a.s./ha 250 g a.s./ha 625 g a.s./ha		Effect on Reproduction [%] -0.4 4.8 7.8

Appendix 1 – List of endpoints

Chrysoperla carnea	EC 250, laboratory test, spray deposits on glass plates 250 g a.s./ha 625 g a.s./ha 1250 g a.s./ha	corr. Mortality [%] Effect on Reproduction -3.65 [2)] No stat. sig. adverse effect -5.77 [2)] on fecundity or hatch 0.0 rate up to 1250 g a.s./ha
Poecilus cupreus (larvae)	a.s, extended laboratory test, a.s. mixed into Lufa 2.1 soil 0.1 mg a.s./kg 1 mg a.s./kg 10 mg a.s./kg[3)]	corr. Mortality [%] 5.6 No stat. sig. adverse effect 0 on development time or - 5.6 [2)] body mass up to 10 g a.s./ha
Pterostichus melanarius and *Calathus fuscipes*	EC 250 14 d, extended laboratory test mixed into artificial soil 28 d, laboratory test, direct over-spray 28 d, extended laboratory test, over-spray in 'model biotope'	 No adverse effects up to 1000 mg a.s./kg d.wt.s. No adverse effects up to 500 g a.s./ha No adverse effects up to 500 g a.s./ha

[1)] negative values indicate a reproduction performance that was higher as in the control treatment.
[2)] negative values indicate a mortality rate that was lower as in the control treatment.
[3)] a value of 10 mg a.s./kg is equivalent to an application rate of 7500 g a.s./ha.

Effects data on 'Baytan FS 094'

Test species	**Test substance, Study type, duration, Exposure**	**Ecotoxicological effects/endpoint**
Poecilus cupreus (adults)	FS 094 – treated seeds Ext. laboratory, sandy soil, 43d, 261 kg seeds/ha, 1305 ml product/ha	Mortality [%][1, 2] -2.8 No stat. sig. adverse effects observed on completion of metamorphosis, development time or body mass.
Aleochara bilineata (adults/larvae)	FS 094 – treated seeds Ext. laboratory, natural soil, 210 kg seeds/ha, 1050 ml product/ha	Mortality [%][1, 2] -1.7 Viable offspring[%] 24
Pardosa spp. (adults)	FS 094 – treated seeds Ext. laboratory, Lufa 2.1 soil, 14d, 270 kg seeds/ha, 1527 ml product/ha	Mortality [%][1, 2] -2.9 Feeding capacity [%] 3
Bembidion tetracolum (adults)	FS 094 – treated seeds Ext. laboratory, quartz sand, 14d, 210 kg seeds/ha, 1050 ml product/ha	Mortality [%][1] 3.3 Food consumption [%] 12.5

[1)] corrected for control mortality
[2)] negative values indicate an effect on mortality that was lower than in the control

Appendix 1 – List of endpoints

Field or semi-field tests
No data required or submitted

Appendix 1 – List of endpoints

Risk to other non-target arthropod species

'Bayfidan EC 250': Foliar spray use on cereals and grapes

Hazard quotients for in-field scenario:

Species	Application rate (g a.s./ha)	MAF[1]	LR_{50} (g a.s./ha)	Hazard Quotient	Trigger
Cereals (EU north & south):					
A. rhopalosiphi	125	1.7 (2.3: 1 default)	> 1250	< 0.17	2
T. pyri	125	1.7 (2.3: 1 default)	>1250	< 0.17	2
Grapevines (EU north):					
A. rhopalosiphi	40	3.5 (2.3:1 default)	> 1250	< 0.11	2
T. pyri	40	3.5 (2.3:1 default)	>1250	< 0.11	2
Grapevines (EU south):					
A. rhopalosiphi	62.5	2.7 (2.3:1 default)	> 1250	< 0.14	2
T. pyri	62.5	2.7 (2.3:1 default)	>1250	< 0.14	2

[1]Taken from Appendix III, ESCORT 2.

Appendix 1 – List of endpoints

Hazard quotients for off-field scenario:

Species	Application rate (g a.s./ha)	MAF[1]	Drift factor[2]	LR_{50} (g a.s./ha)	Hazard Quotient	Trigger value
Cereals (EU north & south):						
A. rhopalosiphi	125	1.7 (2.3: 1 default)	0.0238	>1250	< 0.004	2
T. pyri	125	1.7 (2.3: 1 default)	0.0238	>1250	< 0.004	2
Grapevines (EU north):						
A. rhopalosiphi	40	3.5 (2.3:1 default)	0.0626	>1250	< 0.007	2
T. pyri	40	3.5 (2.3:1 default)	0.0626	>1250	< 0.007	2
Grapevines (EU south):						
A. rhopalosiphi	62.5	2.7 (2.3:1 default)	0.0671	>1250	< 0.009	2
T. pyri	62.5	2.7 (2.3:1 default)	0.0671	>1250	< 0.009	2

[1] Taken from Appendix III, ESCORT 2.
[2] Drift factor = Drift value/100 (Drift values taken from Appendix IV, ESCORT 2).

The HQ values are below the trigger value of 2 and indicate that the in- and off-field risk posed to non-target arthropods from the use of triadimenol on cereals and grapevines is acceptable. This is supported by the data on other soil (ground dwelling beetles) and foliar (beetle and lacewing) dwelling non-target arthropods.

‘Baytan FS 094’: Cereal seed treatment

At rates close to or in excess of those proposed, no statistically significant effects on mortality or sub-lethal parameters in relevant soil dwelling species were seen greater than the 30% trigger from ESCORT 1 or 50% from ESCORT 2. It is concluded that the proposed use of triadimenol as seed treatment will pose a low risk to non-target arthropods.

Appendix 1 – List of endpoints

Effects on earthworms, other soil macro-organisms and soil micro-organisms (Annex IIA points 8.4 and 8.5. Annex IIIA, points, 10.6 and 10.7)

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

Effects data on technical triadimenol 'Bayfidan EC 250' and 'Baytan FS 094'

Species	**Test substance, timescale**	**Peat content in soil**	**Endpoint**[1] (mg **a.s.**/kg d.wt.s. unless otherwise stated)
Eisenia fetida	a.s. acute	10%	LC_{50} 781 corr.: 390.5
Eisenia fetida	EC 250 acute	10%	LC_{50} >178 corr.: >89
Eisenia fetida	FS 094 acute	10%	LC_{50} >1000 corr.: >500 mg form.n/kg d.wt.s.
Eisenia fetida	a.s. long-term	5%	NOEC 100
Eisenia fetida	EC 250 long-term	10%	NOEC 8.33 corr.: 4.2
Eisenia fetida	FS 094 long-term	5%	NOEC 1150 kg treated seed/ha

1) A correction factor of 2 has been applied, to correct for the lipophilic character of the test substance (log P_{ow} > 2) in combination with the organic matter content (peat) of 10% in the test substrate.

Effects data on soil metabolites M01 and M04.

Species	**Substance**	**Timescale**	**Endpoint (mg a.s./kg d.w. soil)**
Eisenia fetida	M04	acute	LC_{50}: > 1000
Eisenia fetida	M01	long-term	NOEC: 30.34
Eisenia fetida	M04	long-term	NOEC: 1.0[1]

Only M04 was considered a relevant metabolite for risk assessment
Since the log Kow is <2, no correction of endpoints is necessary.
[1] Amended from DAR using agreed endpoint from PRAPeR 13

Appendix 1 – List of endpoints

Risk to earthworms

'Bayfidan EC 250': Foliar spray use on cereals and grapes

Acute TER calculations:

Substance	LC50corr (mg a.s./kg d.w. soil)	PEC (mg a.s./kg d.w. soil) [1]	TERcorr	Annex VI trigger
Cereals:				
Triadimenol	390.5	0.112	3486	10
Bayfidan EC 250	>89	0.112	>794	10
Vines (Northern Europe):				
Triadimenol	390.5	0.156	2503	10
Bayfidan EC 250	>89	0.156	>570	10
Vines (Southern Europe):				
Triadimenol	390.5	0.161	2425	10
Bayfidan EC 250	>89	0.161	>552	10

[1] The chosen PEC is the calculated maximum accumulated PECsoil for triadimenol assuming the proposed use pattern and application over successive years.

Chronic TER calculations:

Substance	NOECcorr (mg a.s./kg d.w. soil)	PEC (mg a.s./kg d.w. soil) [1]	TERcorr	Annex VI trigger
Cereals:				
Triadimenol	100	0.112	893	5
Bayfidan EC 250	4.2	0.112	37.5	5
Vines (Northern Europe):				
Triadimenol	100	0.156	641	5
Bayfidan EC 250	4.2	0.156	27	5
Vines (Southern Europe):				
Triadimenol	100	0.161	621	5
Bayfidan EC 250	4.2	0.161	26	5

[1] The chosen PEC is the calculated maximum accumulated PECsoil for triadimenol assuming the proposed use pattern and successive years application.

'Baytan FS 094': Cereal seed treatment

Acute TER calculations:

Substance	LC50corr (mg a.s./kg d.w. soil)	PEC (mg a.s./kg d.w. soil) [1]	TERcorr	Annex VI trigger
Triadimenol	390.5	0.139	2809	10
Baytan FS 094	>500	0.139	<3597	10

[1] The chosen PEC is the calculated maximum accumulated PECsoil for triadimenol assuming the proposed use pattern and successive years application.

Appendix 1 – List of endpoints

Chronic TER calculations:
The maximum application rate is proposed as 230 kg seeds/ha. If this is divided into the NOEC of 1150 kg seeds/ha the resulting TER is 5. This is exactly equal to the Annex VI trigger value of 5 and the RMS proposes that there is a sufficient margin of safety to indicate that the risk to earthworms posed by triadimenol in 'Baytan FS 094' is acceptable.

Risk from soil metabolites (both foliar spray and seed treatment uses)

The acute risk to earthworms from soil metabolite M04 (1,2,4-triazole):

Substance	**LC50 (mg/kg d.w. soil)**	**PEC (mg/kg d.w. soil)**	**TER**	**Annex VI trigger**
Use of 'Bayfidan 250 EC':				
Cereals	>1000	0.023	43478	10
Vines (N MS)	>1000	0.039	25641	10
Vines (S MS)	>1000	0.039	25641	10
Use of 'Baytan FS 094':				
Cereal seed treatment	>1000	0.028	35714	10

The chronic risk to earthworms from M04 (1,2,4-triazole):

Substance	**NOEC (mg/kg d.w. soil)**	**PEC (mg/kg d.w. soil)**	**TER**	**Annex VI trigger**
Cereals:				
M04	1.0[1]	0.023	43.5[1]	5
Vines (Northern Europe):				
M04	1.0[1]	0.039	25.6[1]	5
Vines (Southern Europe):				
M04	1.0[1]	0.039	25.6[1]	5
Cereal seed treatment:				
M04	1.0[1]	0.028	35.7[1]	5

[1] Amended from DAR using agreed endpoint from PRAPeR 13

Appendix 1 – List of endpoints

Effects on other soil macro-organisms and the process of soil organic matter breakdown (Annex IIIA, point 10.6.2)

Species	**Test substance/ timescale**	**Peat content in soil**	**Endpoint** (mg a.s./kg d.wt.s.)
Folsomia candida	a.s. long-term	10%	NOEC: 1000 corr. 500[2]
Folsomia candida	EC 250 acute	10%	EC_{50}: 407 corr. 203.5[2]
Folsomia candida	FS 094 long-term	10%	NOEC: 260.3 mg product/kg soil corr. 130.2[2]
Folsomia candida	M04 (1,2,4-triazole) long-term	10%	NOEC: 1.8
Hypoaspis aculeifer	EC 250 long-term	Standard LUFA soil	NOEC: 100
Steinernema carpocapsae	a.s.	-	NOEC: 20 mg a.s./L[1]

Type of study	**Test substance and rate**	**Time scale**	**Ecotoxicological endpoint: [%] field soil litter degradation**
Field Soil Litter Degradation	Bayfidan EC 250 4.95 g a.s./ha + 2x 125 g a.s./ha	126 d	no adverse effects on the degradation of straw in the litter bags

[1] It was not relevant to relate this toxicity end-point to typical soil exposure levels and so it was not used.

[2].*Folsomia* endpoints corrected due to OM content of test soil (10%) and log Kow of triadimenol >2.

Appendix 1 – List of endpoints

Risk to soil macro-organisms using lowest effect endpoints (both foliar spray and seed treatment uses)

Substance	Species	NOEC (mg/kg d.w. soil)	PEC (mg/kg d.w. soil)[2]	TER	Trigger value
Cereals (foliar application):					
Triadimenol	*Folsomia candida*	500[1]	0.112	4464	5
Bayfidan EC 250	*Folsomia candida*	203.5[1]	0.112	1816	10
Bayfidan EC 250	*Hypoaspis aculeifer*	100	0.112	893	5
Vines (N MS):					
Triadimenol	*Folsomia candida*	500[1]	0.134	3731	5
Bayfidan EC 250	*Folsomia candida*	203.5[1]	0.134	1518	10
Bayfidan EC 250	*Hypoaspis aculeifer*	100	0.134	746	5
Vines (S MS):					
Triadimenol	*Folsomia candida*	500[1]	0.161	3105	5
Bayfidan EC 250	*Folsomia candida*	203.5[1]	0.161	1263	10
Bayfidan EC 250	*Hypoaspis aculeifer*	100	0.161	621	5
Cereal seed treatment:					
Triadimenol	*Folsomia candida*	500[1]	0.139	3597	5
Baytan FS 094	*Folsomia candida*	130 mg product/kg soil	1.85 mg product/kg soil	70.3	5

[1] The *Folsomia* endpoints are divided by two to take account of the log Kow of triadimenol.
[2] The chosen PEC is the calculated maximum accumulated PECsoil for triadimenol assuming the proposed use pattern and successive years application.

Appendix 1 – List of endpoints

The chronic risk to soil macrofauna (*F. candida*)from M04 (both foliar and seed treatment uses):

Crop scenario	NOEC (mg/kg d.w. soil)	PEC (mg/kg d.w. soil)	TER	Trigger value
Cereals (foliar treatment)	1.8	0.023	78	5
Vines (Northern MS)	1.8	0.039	46	5
Vines (Southern MS)	1.8	0.039	46	5
Cereal seed treatment	1.8	0.028	64	5
Field studies: The litter bag study was conducted at rates which cover typical concentrations in soil resulting from foliar spray and seed treatment uses of tridimenol. There were no significant differences >10% (EPFES proposed trigger) in organic matter breakdown between control and treated plots. Based also on the low risk to earthworms, soil non-target arthropods, soil macro-invertebrates and microbial processes, the risk to organic matter breakdown is considered to be low.				

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

'Bayfidan EC 250' - Foliar spray use on cereals/grapes and cereal seed treatment

Test type, duration	Test substance	Endpoint	Trigger value
C-cycle, 28 d	a.s.	No stat. sig. adverse effect after 28 days at up to 1.71 mg a.s./kg d.w. soil[1]	≥25% effect after 100 days
N-cycle, 28 d	a.s.	No stat. sig. adverse effect after 28 days at up to 1.71 mg a.s./kg d.w. soil[1, 2]	≥25% effect after 100 days
C-cycle, 28 d	EC 250	No stat. sig. adverse effect after 28 days at up to 6.7 mg/kg d.w. soil[1]	≥25% effect after 100 days
N-cycle, 28 d	EC 250	No stat. sig. adverse effect after 28 days at up to 6.7 mg/kg d.w. soil[1, 2]	≥25% effect after 100 days

[1] Concentration approximately equal to 10 times the maximum accumulated PECsoil for all the proposed uses (0.161 mg a.s./kg d.w. soil for foliar applications to vines in Southern Member States)
[2] See section B.9.8.1 for available information, data are based on total nitrogen transformation rates

Soil metabolite M04 (1,2,4-triazole - risk from all proposed uses

Test type, duration	Test substance	Endpoint	Trigger value
C-cycle, 28 d	M04	No stat. sig. adverse effect after 28 days at up to 0.353 mg a.s./kg d.w. soil[1]	≥25% effect after 100 days
N-cycle, 28 d	M04	No stat. sig. adverse effect after 28 days at up to 0.353 mg a.s./kg d.w. soil[1, 2]	≥25% effect after 100 days

[1] Concentration approximately equal to nine times the maximum accumulated PECsoil for all the proposed uses (0.039 mg M04/kg d.w. soil for foliar applications to vines in Southern Member States)
[2] See section B.9.8.1 for available information on nitrogen transformation rates

Appendix 1 – List of endpoints

Effects on non target plants (Annex IIA, point 8.6, Annex IIIA, point 10.8)

Rate:response data

Studies conducted on various monocotyledonous and dicotyledonous crop plants with a formulation equivalent to 'Bayfidan 250 EC' show no visual damage pre- or post-emergence at drift rates relevant to the proposed maximum individual application rate of 125 g a.s./ha (see DAR Section B.9.9.2). This indicates that the risk posed to non-target plants by the EC formulation will be acceptable. Non-target plants are not considered likely to be exposed or at risk from the seed treatment use of triadimenol.

Effects on biological methods for sewage treatment (Annex IIA 8.7)

Test type/organism	end point
Activated sludge	EC50 >10000 mg a.s./l

Ecotoxicologically relevant compounds (consider parent and all relevant metabolites requiring further assessment from the fate section)

Compartment	
soil	Parent (triadimenol), Metabolite (M04 (1,2,4-triazole))
water	Parent (triadimenol), Metabolite (M04 (1,2,4-triazole))
sediment	Parent (triadimenol), Metabolite (M04 (1,2,4-triazole))
groundwater	Parent (triadimenol), Metabolite (M04 (1,2,4-triazole))

Classification and proposed labelling with regard to ecotoxicological data (Annex IIA, point 10 and Annex IIIA, point 12.3)

	RMS/peer review proposal
Active substance	R51/R53, N, S61

	RMS/peer review proposal
Preparation	'Bayfidan 250 EC': R52/R53, S57

Appendix 2 – abbreviations

APPENDIX 2 – ABBREVIATIONS

ADE	actual dermal exposure
ADI	acceptable daily intake
AOEL	acceptable operator exposure level
AR	applied radioactivity
ARfD	acute reference dose
a.s.	active substance
BCF	bioconcentration factor
bw	body weight
°C	degree Celsius (centigrade)
CAS	Chemical Abstract Service
CIPAC	Collaborative International Pesticide Analytical Council Limited
d	day
DAR	draft assessment report
DFR	dislodgeable foliar residue
DM	dry matter
DMI	demethylation inhibitor
DT_{50}	period required for 50 percent dissipation (define method of estimation)
DT_{90}	period required for 90 percent dissipation (define method of estimation)
dw	dry weight
ε	decadic molar extinction coefficient
EChA	European Chemical Agency
EC_{50}	effective concentration
EbC_{50}	effective concentration (biomass)
ErC_{50}	effective concentration (growth rate)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELF	early life stage
EMDI	estimated maximum daily intake
ER50	emergence rate, median
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FID	flame ionisation detector
FIR	food intake rate
FOCUS	Forum for the Co-ordination of Pesticide Fate Models and their Use
FSA	fish screening assay
f(twa)	time weighted average factor
g	gram

Appendix 2 – abbreviations

GAP	good agricultural practice
GC	gas chromatography
GC-FID	gas chromatography with flame ionisation detector
GC-NPD	gas chromatography with nitrogen-phosphorus detection
GCPF	Global Crop Protection Federation (formerly known as GIFAP)
GLC	gas liquid chromatography
GLP	good laboratory practice
GM	geometric mean
GS	growth stage
h	hour(s)
H	Henry's Law constant (calculated as a unitless value) (see also K)
ha	hectare
hL	hectolitre
HPLC	high pressure liquid chromatography or high performance liquid chromatography
HPLC-MS	high pressure liquid chromatography – mass spectrometry
HQ	hazard quotient
I	indoor
I_{50}	inhibitory dose, 50 %
IC_{50}	median immobilisation concentration
IESTI	International Estimated Short Term Intake
ILV	inter laboratory validation
ISO	International Organisation for Standardisation
IUPAC	International Union of Pure and Applied Chemistry
k	kilo
K	Kelvin or Henry's Law constant (in atmospheres per cubic meter per mole) (see also H)13
K_{ads}	adsorption constant
K_{des}	apparent desorption coefficient
K_{oc}	organic carbon adsorption coefficient
K_{om}	organic matter adsorption coefficient
kg	kilogram
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

Appendix 2 – abbreviations

LOAEC	lowest observable adverse effect concentration
LOAEL	lowest observable adverse effect level
LOD	limit of detection
LOEC	lowest observable effect concentration
LOEL	lowest observable effect level
LOQ	limit of quantification (determination)
LR	lethal rate
m	metre
M	molar
MAF	multiple application factor
µm	micrometer (micron)
µg	microgram
mg	milligram
min	minute(s)
mL	millilitre
mm	millimetre
mN	milli-Newton
mo	month(s)
mol	Mol
MOS	margin of safety
mp	melting point
MRL	maximum residue limit or level
MS	mass spectrometry
MSDS	material safety data sheet
MWHC	maximum water holding capacity
NAEL	no adverse effect level
nd	not detected
NEDI	no effect daily intake (mg/kg body wt/day)
NEL	no effect level
NERL	no effect residue level
NESTI	national estimated short term intake
NEU	North Europe
ng	nanogram
NIR	near-infrared-(spectroscopy)
nm	nanometer
NMR	nuclear magnetic resonance
no	number
NOAEC	no observed adverse effect concentration

Appendix 2 – abbreviations

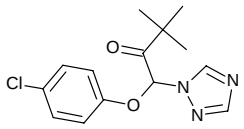
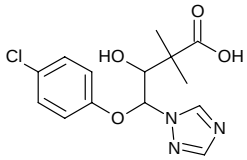
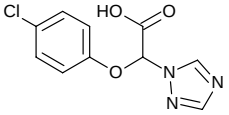
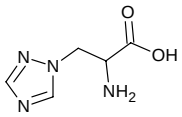
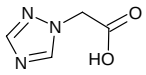
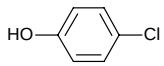
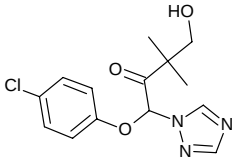
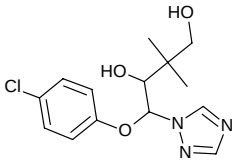
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
NPD	nitrogen-phosphorus detector or detection
OC	organic carbon content
OM	organic matter content
Pa	Pascal
PD	proportion of different food types
PEC	predicted environmental concentration
PEC_A	predicted environmental concentration in air
PEC_S	predicted environmental concentration in soil
PEC_{SED}	predicted environmental concentration in sediment
PEC_{SW}	predicted environmental concentration in surface water
PEC_{GW}	predicted environmental concentration in ground water
pH	pH-value
PHI	pre-harvest interval
PIE	potential inhalation exposure
pK_a	negative logarithm (to the base 10) of the dissociation constant
PNEC	predicted no effect concentration
P_{ow}	partition coefficient between n-octanol and water
ppb	parts per billion (10^{-9})
PPE	personal protective equipment
ppm	parts per million (10^{-6})
ppp	plant protection product
PT	proportion of diet obtained in the treated area
r	correlation coefficient
r^2	coefficient of determination
RfD	reference dose
RMS	rapporteur member state
RPE	respiratory protective equipment
RUD	residue per unit dose
s	second
SD	standard deviation
SE	standard error
SEU	South Europe
SF	safety factor
SFO	single first order
SOP	standard operating procedure

Appendix 2 – abbreviations

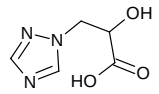
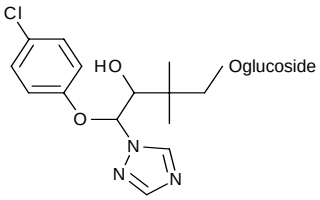
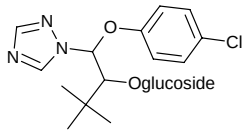
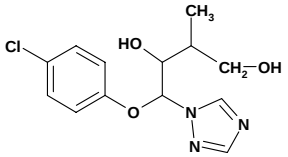
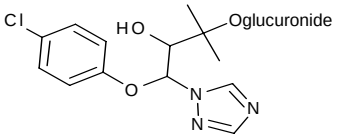
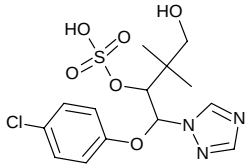
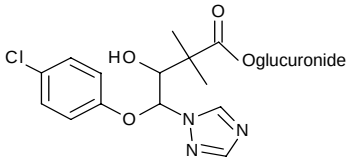
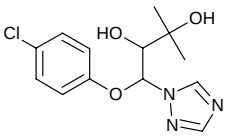
sp	species (only after a generic name)
sq	square
STMR	supervised trials median residue
t	tonne (metric ton)
$t_{1/2}$	half-life (define method of estimation)
TDMs	Triazole Derivative Metabolites
TER	toxicity exposure ratio
TER_I	toxicity exposure ratio for initial exposure
TER_{ST}	toxicity exposure ratio following repeated (short-term) exposure
TER_{LT}	toxicity exposure ratio following chronic (long-term) exposure
TLC	thin layer chromatography
TMDI	theoretical maximum daily intake
TRR	Total Radioactive Residues
TWA	time weighted average
UV	ultraviolet
WHO	World Health Organisation
WG	water dispersible granule
wk	week
wt	weight
yr	year

Appendix 3 – used compound code(s)

APPENDIX 3 – USED COMPOUND CODE(S)

Code/Trivial name	Chemical name	Structural formula
M01 triadimefon	1-(4-chlorophenoxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-one	
M02 KWG1640	4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butanoic acid	
M03 KWG 1732 chlorophenoxytriazole acetic acid	(4-chlorophenoxy)(1*H*-1,2,4-triazol-1-yl)acetic acid	
M04 1,2,4-triazole	1*H*-1,2,4-triazole	
M05 TA (triazole alanine)	(*R,S*)-2-amino-3-(1*H*-1,2,4-triazol-1-yl)propanoic acid 3-(1*H*-1,2,4-triazol-1-yl)-D,L-alanine	
M06 TAA (triazole acetic acid)	1*H*-1,2,4-triazol-1-ylacetic acid	
M07 p-chlorophenol	4-chlorophenol	
M09 KWG 1323 Triadimefon-hydroxy	1-(4-chlorophenoxy)-4-hydroxy-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-one	
M10 KWG1342 Triadimenol-hydroxy	4-(4-chlorophenoxy)-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butane-1,3-diol	

Appendix 3 – used compound code(s)

Code/Trivial name	Chemical name	Structural formula
M11 Triazole hydxroxypropionic acid Triazole lactic acid	2-hydroxy-3-(1*H*-1,2,4-triazol-1-yl)propanoic acid	
M12 KWG1342 glucoside	4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butyl glucoside	
M15	1-(4-chlorophenoxy)-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-yl glucoside	
M18 Desmethyl KWG1342	4-(4-chlorophenoxy)-2-methyl-4-(1*H*-1,2,4-triazol-1-yl)butane-1,3-diol	
M23 KWG1342-glucuronide	4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butyl glucuronide	
M28 KWG 1342-sulfate	1-(4-chlorophenoxy)-4-hydroxy-3,3-dimethyl-1-(1*H*-1,2,4-triazol-1-yl)butan-2-yl hydrogen sulfate	
M30 Triadimenol acid glucuronide	1-*O*-[4-(4-chlorophenoxy)-3-hydroxy-2,2-dimethyl-4-(1*H*-1,2,4-triazol-1-yl)butanoyl] glucuronide	
M31 Desmethyl hydroxy triadimenol	1-(4-chlorophenoxy)-3-methyl-1-(1*H*-1,2,4-triazol-1-yl)butane-2,3-diol	

Appendix 3 – used compound code(s)

Code/Trivial name	Chemical name	Structural formula
M38	1,2-dihydro-1,2,4-triazol-3-one 1*H*-1,2,4-triazol-3-ol