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

fludioxonil

finalised: 27 July 2007

SUMMARY

Fludioxonil 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 a peer review of the initial evaluation, i.e. the draft assessment report (DAR), provided by the designated rapporteur Member State and to provide within one year a conclusion on the risk assessment to the EU-Commission.

Denmark being the designated rapporteur Member State submitted the DAR on fludioxonil in accordance with the provisions of Article 10(1) of the Regulation (EC) No 1490/2002, which was received by the EFSA on 5 April 2005. Following a quality check on the DAR, the peer review was initiated on 15 August 2005 by dispatching the DAR for consultation of the Member States and the sole applicant Syngenta. Subsequently, the comments received on the DAR were examined by the rapporteur Member State and the need for additional data was agreed during a written procedure in May 2006. Remaining issues as well as further data made available by the notifier upon request were evaluated in a series of scientific meetings with Member State experts in November 2006.

A final discussion of the outcome of the consultation of experts took place with representatives from the Member States on 26 June 2007 leading to the conclusions as laid down in this report.

The conclusion was reached on the basis of the evaluation of the use as fungicide as proposed by the applicant which comprise foliar spraying to control *Botrytis cinerea and Aspergillus carbonarius* in wine and table grapes at a maximum rate of 2x250 g as/ha per year, and seed treatment against *Microdochium nivale Fusarium spp., Tiletia carie, Septoria sp.* and *Helminthosporium sp.* in wheat with 5.0 g as/100 kg seed (a maximum rate of 8.75 g as/ha).
The representative formulated products for the evaluation were "Switch 62.5 WG", a water dispersible granule (WG), and "Celest 025 FS", a suspension concentrate for seed treatment (FS). The dispersible granule formulation contains also cyprodinil as active substance.

Adequate methods are available to monitor all compounds given in the respective residue definition.

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

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.

Fludioxonil is not acutely toxic via oral, dermal and inhalation route (LD_{50}>5000 mg/kg/bw, LD_{50} >2000 mg/kg bw and LC_{50} >2.6 mg/L, respectively). It is not a skin and eye irritant. Fludioxonil is not a skin sensitiser. Target organs after repeated oral administration are liver in rats, mice and dogs (increased weight, hepatocyte hypertrophy, bile duct proliferation) and kidneys in rats and mice (increased weight, nephropathy). The relevant oral NOAEL is 58.5 mg/kg bw/day from the 90-day study in dog. The NOAEL from the repeated dose dermal study in rats is 200 mg/kg bw/day. Fludioxonil does not show any genotoxic, teratogenic and carcinogenic potential. The relevant NOAEL for chronic toxicity is 37 mg/kg bw/day. The ADI of fludioxonil is 0.37 mg/kg bw/day from the relevant long term/carcinogenicity NOAEL applying a safety factor of 100. The proposed AOEL is 0.59 mg/kg bw/day from the NOAEL of the 90-day study in dogs with a safety factor of 100. The allocation of an ARfD was not considered necessary.
Fludioxonil is intended to be used on wine and table grapes (WG formulation) and on wheat (FS formulation). The systemic exposure of operators, workers and bystanders to fludioxonil formulated as WG was estimated to be below the established AOEL, as well as for the FS formulation.

The behaviour of fludioxonil residues applied according to the representative uses is fully understood and no further data is necessary. The plant metabolism of the compound proceeds through oxidative processes of the pyrrole ring. The metabolic pattern is clearly dominated by the parent compound after foliar application. Seed treatment of cereals leads to extremely low residue levels in straw and grains. The proposed residue definition for monitoring is fludioxonil. For risk assessment the residue definition should include all metabolites containing the 2,2-difluoro-benzo[1,3]dioxole-4-carboxylic moiety, to cover potential uses of fludioxonil in other commodities not addressed during the peer-review. MRLs can be proposed to be set at 3 mg/kg, 2 mg/kg and 0.05* mg/kg in wine grapes, table grapes and wheat respectively. The transfer of residues from soil to rotational crops and from feeding stuffs to livestock is very low and does not result in detectable or quantifiable levels in food items. The expected chronic consumer exposure is far below the ADI.

Photolysis plays a major role for the degradation pathway and degradation rate of fludioxonil in soil. Major metabolites are formed in light but not in the dark. As the intended uses of fludioxonil is both foliar spray and seed treatment the pronounced role of photolysis on degradation of fludioxonil and formation of metabolites results in major differences in the fate and behaviour for the two different intended uses.
Aerobic degradation in the laboratory studies in the dark resulted in the formation of CO_2 and bound residues. Only few fractions of metabolites in small amounts were detected. In field soil dissipation studies without light exposure no significant amounts of metabolites was found. Fludioxonil is rated as highly to very highly persistent in laboratory studies in the dark, with first order half-life under

typical environmental conditions (20 ºC) ranging from 119 days to 559 days. There was no effect due concentration of active in the soils.

The field studies where fludioxonil as a WP formulation was applied to bare ground or vine, reported reliable first order half-lives in a range of 8 to 43 days.

In soil photolysis studies conducted using either phenyl or pyrrole ring labelled fludioxonil, the photo-degradation was faster, indicating that fludioxonil is very lowly to lowly persistent in soil when directly exposed to light. There were a number of degradates noted, three of which were identified, CGA 192155 (max. 11.7% AR), CGA 265378 (max. 12.3% AR) and CGA 339833 (max. 9.1% AR). A field study with radiolabelled fludioxonil confirmed the presence of metabolites CGA 192155 and CGA 339833 in amounts of 13% and 8%, respectively, of the total soil residues.

In the dark, photolysis metabolites CGA 192155 and CGA 339833 exhibited low to moderate persistence in soil. Similar degradation rate for CGA 265378 was estimated under light exposed conditions.

The ecotoxicological risk assessment for fludioxonil and its soil photolysis metabolites CGA 192155 and CGA 265378 was based on worst case initial PECsoil values.

The calculated adsorption K_{oc} values give fludioxonil a classification of non mobile, whilst soil photolysis metabolites CGA 339833 and CGA 192155 showed very low adsorption capacity and can be classified as very high mobile in soil. A rough estimates of K_d for soil photolysis metabolites CGA 265378 indicated a very high to high mobility also for this metabolite.

Photolysis represents the most important pathway for the degradation of fludioxonil in water. As with photolysis on soil, a large number of photoproducts were formed. Three major (> 10% AR) metabolites, CGA 339833, CGA 344623 and A5, were found in still increasing concentrations at the end of the study. Fludioxonil is stable to hydrolysis at pH 5-9.

In the absence of light, fludioxonil rapidly disappeared from the water phase in laboratory water/sediment systems due to strong adsorption to the sediment, but the degradation in the whole system was very slow, with half-lives > 365 days. Several minor degradation products were extracted, although none accounted for more than 6.2% AR. Laboratory studies to investigate the degradation of fludioxonil in water/sediment systems exposed to artificial light, showed a faster dissipation in the irradiated water, with a DT_{50} of 2 days in the water phase and 19-25 days in the whole system. The only major metabolite was CGA 192155 in the water phase. The endpoints derived by the applicant by extrapolating the measured values to natural light were not considered acceptable.

After the experts' meeting a new surface water exposure assessment has been presented based on FOCUS scheme and the recommendations of Member State experts. Values obtained for PECsw are similar to the estimations presented in the DAR and are considered acceptable to complete the risk assessment.

Appropriate FOCUS groundwater modelling is not available for the applied for use on vine. This is required. Based on current information it is likely that soil photolysis metabolites CGA 339833 and CGA 192155 will exceeds the trigger of 0.1 µg/L in minimum 3 and 2 FOCUSgw scenarios, respectively. A full assessment of the toxicological relevance of these metabolites has not been performed.

The risk to birds and mammals was considered to be low. The first tier long-term TER for granivorous birds was below the Annex VI trigger but based on the fast photolytic degradation in soil assuming also fast dissipation from remaining seeds on the soil surface, germination within 10-14 days and low uptake from the seed into the shoots a limited exposure and therefore low risk was concluded. The risk to aquatic organisms is considered to be low from the use as seed treatment, while the foliar application in vine requires risk mitigation measures comparable to 10 m spray-free zones for fludioxonil. It should however be kept in mind that the mesocosm study was conducted with fludioxonil and therefore may not address the full risk of SWITCH 62.5 to aquatic invertebrates, since the representative formulation contains also cyprodinil. The risk to bees, non-target arthropods, earthworms and other soil macro- and micro-organisms, non-target plants and biological methods of sewage treatment is considered to be low from both evaluated uses.

Key words: fludioxonil, peer review, risk assessment, pesticide, fungicide

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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, regulates for the European Food Safety Authority (EFSA) the procedure of evaluation of the draft assessment reports provided by the designated rapporteur Member State. Fludioxonil is one of the 79 substances of the third stage, part A, covered by the Regulation (EC) No 1490/2002 designating Sweden as rapporteur Member State.

In accordance with the provisions of Article 10(1) of the Regulation (EC) No 1490/2002, Denmark submitted the report of its initial evaluation of the dossier on fludioxonil, hereafter referred to as the draft assessment report, to the EFSA on 5 April 2005. Following an administrative evaluation, the EFSA communicated to the rapporteur Member State some comments regarding the format and/or recommendations for editorial revisions and the rapporteur Member State submitted a revised version of the draft assessment report. In accordance with Article 11(2) of the Regulation (EC) No 1490/2002 the revised version of the draft assessment report was distributed for consultation on 15 August 2005 to the Member States and the main applicant Syngenta as identified by the rapporteur Member State.

The comments received on the draft assessment report were evaluated and addressed by the rapporteur Member State. Based on this evaluation, representatives from Member States identified and agreed during a written procedure in May 2006 on data requirements to be addressed by the notifier as well as issues for further detailed discussion at expert level.

Taking into account the information received from the notifier addressing the request for further data, a scientific discussion of the identified data requirements and/or issues took place in expert meetings organised by EFSA in November 2006. The reports of these meetings have been made available to the Member States electronically.

A final discussion of the outcome of the consultation of experts took place with representatives from Member States on 26 June 2007 leading to the conclusions as laid down in this report.

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

In accordance with Article 11(4) of the 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 3 July 2006)

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 29 June 2007).

Given the importance of the draft assessment report including its addendum (compiled version of June 2007 containing all individually submitted addenda) and the peer review report with respect to the examination of the active substance, both documents are considered respectively as background documents A and B to this conclusion.

By the time of the presentation of this conclusion to the EU-Commission, the rapporteur Member State has made available amended parts of the draft assessment report (Vol. B1-B2, B5) which take into account mostly editorial changes. Since these revised documents still contain confidential information, the documents cannot be made publicly available. However, the information given can basically be found in the original draft assessment report together with the peer review report which both is publicly available.

THE ACTIVE SUBSTANCE AND THE FORMULATED PRODUCT

Fludioxonil is the ISO common name for 4-(2,2-difluoro-1,3-benzodioxol-4-yl)-1*H*-pyrrole-3-carbonitrile (IUPAC).

Fludioxonil belongs to the phenylpyrrole class of fungicides. The mode of action of fludioxonil is by inhibition of a mitogen-activated protein (MAP) kinase in signal transduction of osmo-regulation (glycerol synthesis). Fludioxonil is used as foliar and seed treatment application to control diseases caused by fungi in the class of Ascomycetes, Basidiomycetes and Fungi imperfecti.

The representative formulated products for the evaluation were "Switch 62.5 WG", a water dispersible granule (WG), and "Celest 025 FS", a suspension concentrate for seed treatment (FS), registered under different trade names in Europe.

The representative uses evaluated comprise foliar spraying to control *Botrytis cinerea and Aspergillus carbonarius* in wine and table grapes, and seed treatment against *Microdochium nivale, Fusarium spp., Tiletia carie, Septoria.sp.* and *Helminthosporium sp.* in wheat.

SPECIFIC CONCLUSIONS OF THE EVALUATION

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

The minimum purity of fludioxonil as manufactured is 950 g/kg. No FAO specifications exist.

The manufacturing site of the technical material has been changed and a new specification was proposed with lower maximum limits for the impurities and higher minimum active substance content. The five batch data resulting from the old manufacturing site are in compliance with the new specification. Quality control data and justification were provided to support the new proposed technical material specification following the change in the manufacturing site and were evaluated in an addendum to vol. 4, (February 2007), however these data were not peer reviewed. EFSA is on the opinion that these data do not support unequivocally the specification and considers the specification still open.
Information on the equivalence of the batches used in the toxicological and ecotoxicological studies with the new specification was presented in an addendum to vol.4 and in the evaluation reports on the equivalence of the technical materials for the active substance (Tier 1-Part 2 and Tier 2), however these newly submitted data were not peer reviewed.
A data gap was set by the experts of the PRAPeR 06 meeting to prove that no nitrosamines can be formed. The applicant carried out a study proving that nitrosamines are not formed, however it was not evaluated nor peer reviewed.
RMS and the experts of the PRAPeR 06 meeting required justification on the auto-flammability of the WG formulation and set a data gap.
Besides the specification, 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 fludioxonil or the respective formulations.

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

Sufficient test methods and data relating to physical, chemical and technical properties are available. Also adequate analytical methods are available for the determination of fludioxonil in the technical material and in the representative formulations, as well as for the determination of the respective impurities in the technical material.
Therefore, enough data are available to ensure that quality control measurements of the plant protection products are possible.

Adequate analytical methods are available for the determination of fludioxonil residues in food of plant origin (grapes and wheat), soil, water, air.

Recently submitted studies, regarding the validation of multi-residue method DFG S19 as the enforcement method for the determination of residues of fludioxonil in different plant matrices with LC-MS/MS detection and the independent laboratory validation of the DFG S19 method for the determination of residues of fludioxonil in plant matrices were summarised and accepted by the RMS in an addendum to the DAR (October 2006, B.5) and discussed in the PRAPeR 06 expert meeting.
A confirmatory method for the determination of residues in soil by LC-MS/MS has also been evaluated by the RMS and discussed in the PRAPeR 06 expert meeting.
An analytical method for food of animal origin is not required due to the fact that no residue definition is proposed. Analytical methods for the determination of residues in body fluids and tissues are not required

2. Mammalian toxicology

Fludioxonil toxicity to mammals was discussed in November 2006 (Round 2, PRAPeR experts' meeting 9).

The experts commented that it is not clear whether the batches used in the tox section comply with the specification proposed in the Annex C of the DAR. Furthermore, in the meantime the old production plant has been closed. Therefore a new specification has been proposed by the notifier, which has been reported in the revised Volume 4. The specification is still under development, but the values seem to be at lower levels compared to the old specification. It has not been checked whether the batches used in the tox studies comply with this new specification. A data gap was proposed for the applicant to present information on the equivalence of the batches used in the toxicological studies with the new specification. The RMS submitted in March 2007 an addendum on the equivalence of the batches used in the toxicological studies with the proposed specification. It was not peer reviewed.

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

The experts confirmed that more than 80% of Fludioxonil is absorbed after oral administration of a low single oral dose. It is uniformly distributed (with the highest residues found in liver, kidneys and lungs) and does not show any potential for accumulation. It is excreted via urine (15 %) and faeces (about 70 %) within 24 hours from administration. It is extensively metabolised (fludioxonil was detected in faeces but not in the urine). The major metabolic pathway is oxidation at position 2 of the pyrrole ring; two minor pathways are oxidation at position 5 of the pyrrole ring and hydroxylation of the phenyl ring.

2.2. Acute toxicity

Fludioxonil is not acutely toxic via oral, dermal and inhalation route (LD_{50}>5000 mg/kg bw, LD_{50} >2000 mg/kg bw and LC_{50} >2.6 mg/L, respectively). It is not a skin and eye irritant. The RMS considered that fludioxonil is not a skin sensitiser. Some Member States commented with regard to

the study in guinea pigs, using a challenge concentration of 10% in Vaseline. The concentration was regarded to be too low. The RMS considered the study acceptable, but the OECD guideline was not fulfilled referring to the levels of doses selected. This might partially invalidate the study. However, a study is available with a formulation containing the active substance only, showing negative results. The RMS accepted this study as well. Taking into account all evidences, the meeting concluded that no sensitising potential is expected.

2.3. SHORT TERM TOXICITY

Target organs of fludioxonil after repeated oral administration are liver in rats, mice and dogs (increased weight, hepatocyte hypertrophy, bile duct proliferation) and kidneys in rats and mice (increased weight, nephropathy).

The NOAELs from the 90-day studies in rat and dog were discussed.

In particular, a discussion for the dog study was held with regard to the relevance of the effect "diarrhoea". The RMS concluded that the NOAEL in this study was 2000 ppm, despite the episodic occurrence of diarrhoea at this dose. Concerns were raised with regard to this effect, which was concluded substance related, but not regarded as adverse. In the 1 year dog study this effect was not observed up to dose levels of 8000 ppm. The meeting confirmed the evaluation already presented in the DAR. The RMS was asked to summarise in an addendum the position paper prepared by the company and distributed during the meeting.

The relevant NOAEL is 58.5 mg/kg bw/day from the 90-day study in dog.

The NOAEL from the repeated dose dermal study in rats was discussed in the meeting.

The RMS set the values at 1000 mg/kg bw/day for males and at 200 mg/kg bw/day for females. The effects observed at these dose levels were considered non adverse. An argumentation was presented in the evaluation table. The clinical parameters, observed in the mid and high dose in the female rats, are not statistically significant at the highest dose. The findings were considered weak and without dose relation and therefore not adverse at lower doses.

2.4. GENOTOXICITY

Fludioxonil showed a clastogenic potential *in vitro* and an equivocal result in 1 of the 5 chromosome aberration tests *in vivo*. However this test was not well performed and a new test was submitted which was negative. On the basis of the available information it was concluded that fludioxonil is not genotoxic.

2.5. LONG TERM TOXICITY

In rats administered dietary doses of Fludioxonil technical for up to 24 months effects were present at the highest dose level and included reduced body weight and body weight gain, mild anaemia in females, gross necropsy and histopathological findings in the liver (both sexes) and the kidneys (males only). In mice, nephropathy was identified in both sexes from 5000 ppm (glomerular atrophy,

hyaline change, tubular dilation, protein cast formation and tubular basement membrane thickening). The relevant NOAEL for chronic toxicity is 37 mg/kg bw/day from the rat study.

An increased incidence of hepatocellular tumours was present in rats. However, for male rats the incidences did not exhibit a dose-response relationship. For female rats the increased incidence in high-dose females was not statistically significantly different from that in the control group. Therefore the hepatocellular tumours observed were not considered treatment-related.

The incidences of lymphomas, metastatic multicentric neoplasms and total neoplasms were high in female mice at 3000 ppm but were similar to the incidences in the control group at 5000 and 7000 ppm. As there is no clear dose response it was concluded they were not related to the treatment. Overall, Fludioxonil was considered not to be carcinogenic to both rats and mice.

2.6. REPRODUCTIVE TOXICITY

Fludioxonil did not show reproductive and developmental toxicity potential.

The overall relevant NOAEL for parents and offspring from the 2 generation study is 21 mg/kg bw/day based on decreased body weight of parental rats and pups at 212 mg/kg bw/day, which represents the reproductive NOAEL. In the developmental toxicity study in rabbits the NOAEL for maternal toxicity is 10 mg/kg bw/day and for developmental toxicity 300 mg/kg bw/day.

2.7. NEUROTOXICITY

No studies were submitted and there is no evidence of neurotoxic potential in the toxicological studies.

2.8. FURTHER STUDIES

In the DAR some studies on metabolites were summarised.

CGA 192155[2], **CGA 265378**[3] and **CGA 308565**[4] oral LD_{50} exceeded 2000 mg/kg bw in both sexes of rats and did not exhibit mutagenic activity in the Salmonella and Escherichia gene mutation assays.

CGA 308103[5] oral LD_{50} was 1140 mg/kg bw; the metabolite did not exhibit mutagenic activity in the Salmonella and Escherichia gene mutation assays.

For **CGA 339833**[6] the oral LD_{50} exceeded 2000 mg/kg bw. The NOAEL in a 90-day dietary study is 58 mg/kg bw/day based on effects on liver and kidneys. The metabolite did not exhibit mutagenic activity in the Salmonella and Escherichia gene mutation assays but gave an equivocal response with respect to mutations in the mouse lymphoma cells L5178Y gene mutation assay, showed a clastogenic potential in an *in vitro* chromosomal aberration test in Chinese hamster V79 cells, but did not show a clastogenic or aneugenic potential in an *in vivo* micronucleus test in rat bone marrow. The experts agreed that this metabolite is not genotoxic based on the *in vivo* study.

[2] CGA 192155: (2,2-difluoro-benzo[1,3]dioxol-4-carbocyclic acid.
[3] CGA 265378: 4-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-2,5-dioxo-2,5-dihydro-1H-pyrrole-3-carbonitrile.
[4] CGA 308565: 4-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-5-hydroxy-2-oxo-2,5-dihydro-1H-pyrrole-3-carbonitrile.
[5] CGA 308103: 2-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-2-hydroxy-acetamide
[6] CGA 339833: 3-carbamoyl-2-cyano-3-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-oxirane-2-carbocyclic acid.

EFSA notes that pending on the results of PEC_{GW} calculations (see data gap in environmental fate section) a complete assessment of the relevance of metabolites CGA 265378, CGA 339833 and CGA 192155 might be needed.

2.9. MEDICAL DATA

No adverse effects have been observed in employed personnel in any of the production or formulation sites. No cases of poisoning have been reported to the company and no cases of poisoning by exposure to Fludioxonil were found in the public literature.

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

ADI

The ADI of fludioxonil is 0.37 mg kg bw/day from the relevant long term/carcinogenicity NOAEL (37 mg/kg bw/day) applying a safety factor of 100.

AOEL

The AOEL was derived from the NOAEL of 58.5 mg/kg bw/day from the 90-day study in dogs applying a safety factor of 100. The proposed AOEL is = 0.59 mg/kg bw/day.

ARfD

Based on the toxicological profile of fludioxonil, the allocation of an ARfD was not considered necessary.

2.11. DERMAL ABSORPTION

Newly submitted dermal absorption studies were presented in an addendum. The RMS introduced the evaluation during the meeting. The overall dermal absorption for the WG formulation (Switch) was considered to be 0.3% for the concentrate and 1.7% for the dilution. The experts discussed whether these values could be used for the FS formulation (Celest) as well. The content of active substance in the formulation 'Celest' is 10 x less compared to the formulation 'Switch'. After checking the composition of the formulation 'Celest' a value of 1.7% was agreed by the experts, taking into account the seed-treatment use and a worst case scenario.

2.12. EXPOSURE TO OPERATORS, WORKERS AND BYSTANDERS

Fludioxonil is intended to be used on wine and table grapes (Switch 62.5 WG formulation) through foliar spraying and on wheat (Celest 0.25 FS formulation) with seed treatment.

During the experts' meeting, exposure assessments with respect to handheld application with the WG formulation was requested to be performed for operators, bystanders and workers, as well as operator and worker exposure for seed-treatment on the basis of the new dermal absorption values for operator, worker and bystander with the FS formulation.

Switch 62.6 WG

Operator exposure

	% of AOEL	
	no PPE	PPE
German model, tractor mounted	1.1	---
German model, hand held	0.65	---
Revised UK-POEM – 100 litres water/ha (low volume application)	12.6	---
Revised UK-POEM – 1000 litres water/ha (high volume application)	4.5	---

The systemic exposure of operators to fludioxonil in Switch 62.5 WG based on both the German and the UK model both with and without PPE was below the established AOEL.

Worker exposure

Estimated exposure for re-entry activities in wine was calculated to be below the AOEL (2.5%) even without PPE.

Bystander exposure

Exposure for bystander was estimated to be 0.14% of the AOEL.

Celest 025 FS

Operator exposure

According to the Seed Tropex model the systemic operator exposure to fludioxonil is within the AOEL both with and without PPE for all seed treatment related activities (<10% of the AOEL).

Worker exposure

Worker exposure to fludioxonil during sowing treated seed is estimated to be less than 1% of the AOEL.

Bystander exposure

In stationary seed treatment facilities the presence of bystanders can be excluded by technical management measures. If occurring, exposure of bystanders would be of short duration and normally lower than that of seed treatment operators who are occupationally exposed all day long.

3. Residues

The risk assessment of fludioxonil residues for consumers was discussed in November 2006 (Round 2, PRAPeR experts' meeting 10).

3.1. NATURE AND MAGNITUDE OF RESIDUES IN PLANT

3.1.1. PRIMARY CROPS

The metabolism of fludioxonil has been investigated after foliar application in grapes, lettuce, tomatoes and green onions as well as after seed treatment in potatoes, wheat, rice, cotton and soybean. These studies cover the proposed representative uses supported by the applicant, in particular as far as the PHI proposed for foliar applications is concerned.

After foliar treatment, at plant maturity, parent fludioxonil represents by far the major constituent of the residue even for PHIs up to 35 days. The metabolic pattern includes a large number of metabolites. In grapes, 70 % of the Total Radioactive Residues (TRR) consist of parent fludioxonil and up to 16 further components are formed, none of which accounting for more than 2.4 % of the TRR. In grapes, lettuce and tomatoes, the total amount of generated metabolites is one order of magnitude lower than that of parent compound. In green onions, the burden of metabolites was higher. An experiment in peaches indicated a low translocation of residues from leaves to fruits.

The metabolic pattern is similar in all crops and proceeds mainly through oxidation with subsequent conjugation of metabolites with sugars. Additionally, cleavage of the pyrrole ring results in the formation of 2,2-difluoro-benzo[1,3]dioxole metabolites.

After seed treatment uptake and translocation of fludioxonil from the treated seed is low. In wheat grain, TRR are 0.003 mg/kg after seed application of radiolabelled fludioxonil at a rate exceeding by 50 % the proposed representative use rate. In straw, TRR are below 0.02 mg/kg. Therefore, no significant residue in cereal food and feed items resulting from seed treatment is expected.

Despite the low TRR levels, characterisation and/or identification of metabolites present in new potato tubers and in soybeans, as well as after stem injection of fludioxonil in wheat indicate that seed treatment results in similar metabolic pathways as after foliar treatment, but no compound was identified as major constituent of the residue pattern.

The proposed residue definition for monitoring is parent fludioxonil. Metabolism in fruit crops and leafy vegetables after foliar application does not result in metabolite formation adding a significant contribution to the toxicological burden. As this may be different in other commodities such as green onions, the expert meeting agreed that the residue definition for risk assessment should include the parent compound and all metabolites containing the 2,2-difluoro-benzo[1,3]dioxole-4-carboxylic moiety, to cover potential uses of fludioxonil in other commodities not addressed during the peer-review. A specific residue definition for the use of fludioxonil as seed treatment is not considered necessary given the extremely low residue level generated by this mode of application and considering the low toxicity of the parent compound.

For the considered representative uses, the conversion factor between residue definitions for monitoring and risk assessment is 1.

A sufficient number of supervised residue trials were submitted in support of the representative uses in wine and table grapes as well as in wheat. In grapes, some data for the supported PHIs were interpolated from decay curves. For wine grapes, 11 trials are valid for Northern region, while 9 trials are available for Southern region. The highest residues (HR) and the supervised trial median residues (STMR) were 2.37 mg/kg and 0.42 mg/kg, and 1.07 mg/kg and 0.43 mg/kg for Northern and

Southern regions respectively. For table grapes, 9 trials are available with HR and STMR values amounting to 1.32 mg/kg and 0.51 mg/kg respectively. For wheat, more than 50 trials were submitted with residues consistently below the limit of quantification (LOQ) in grains and straw. These results can be considered as reliable on the basis of storage stability studies demonstrating that fludioxonyl residues are stable in various matrices including water-, oil-, protein-, and starch-containing materials, under deep freeze storage conditions for up to 24 months.

The effects of processing on the nature of residues were investigated under representative hydrolytic conditions, simulating pasteurisation, baking, brewing, boiling and sterilisation and formation of breakdown or reaction products was not observed. Processing studies are available allowing determining transfer factors for raisins, grape juice and mature wine (1.1, 0.8 and 0.04 respectively).

3.1.2. SUCCEEDING AND ROTATIONAL CROPS

Studies investigating the potential for residues being present in rotational crops are not necessary as vineyards are permanent crops and considering that residues in any part of seed treated wheat plant are below the LOQ. Nevertheless, data were submitted by the applicant.

These data indicate that the uptake from soil of fludioxonil and related compounds is minimal and that the metabolic pathway is similar to that observed in primary crops. Plant-back restrictions and MRLs for rotational crops do not need to be established.

3.2. NATURE AND MAGNITUDE OF RESIDUES IN LIVESTOCK

Metabolism studies in livestock are not required because residues in wheat grain and straw are below the LOQ (0.02 and 0.04 mg/kg respectively) and grapes are not used for production of feed items.

However, metabolism studies were conducted in lactating goats and laying hens and were submitted by the applicant.

Identification of metabolites indicated that the major metabolic pathways were similar in both species, and based on the hydroxylation of the pyrrole and benzodioxol rings followed by conjugation reactions. In hens, further reactions involve the opening of the pyrrole ring.

In the goat study, parent fludioxonil was identified as the major component of the TRR in liver and fat. In kidneys the major components were identified as the glucuronide conjugates of the mono-hydroxylated fludioxonil.

In the hen study, the sulphate conjugate of the N-hydroxylated fludioxonil was the major component of the residue in egg yolks and thigh muscle. In egg whites and liver, the major metabolites resulted from the opening of the oxidised pyrrole ring. Parent compound was major in breast muscle.

Although not required, a residue definition is proposed by the RMS for monitoring and risk assessment consisting in the sum of fludioxonil and all metabolites containing the 2,2-difluoro-benzo[1,3]dioxole-4-carboxylic moiety, expressed as fludioxonil. This proposal is acceptable in terms of consumer protection and can be adopted in case of use extension leading to significant livestock exposure.

A feeding study was submitted in dairy cattle, with analysis of residues according to the proposed residue definition. The results of this study were not commented given that there is no significant animal exposure in practice. The setting of MRLs in animal products is not necessary.

3.3. CONSUMER RISK ASSESSMENT

Based on the calculations reported below no risk for the consumer resulting from the use of fludioxonil according to the representative uses in wheat, table and wine grapes has been identified.

Chronic exposure

The chronic dietary exposure assessment has been calculated using the Theoretical Maximum Daily Intake (TMDI) calculation model of WHO using the WHO typical European diet for adult consumers, the UK national diet for 10 population subgroups including infants, toddlers, children and adults, taking into consideration high individual consumption levels (at the 97.5th percentile of the distribution of consumptions in the respective populations) as well as the German national diet for the 4-6 year old girl. Residues in table grapes, wine grapes and wheat were considered to be at the level of the respective proposed MRLs. Processing factors mentioned under point 3.1.1 were used for grape processed products. Under these conditions the calculated TMDI were below 5 % of the ADI for all considered populations.

Acute exposure

The potential consumer acute exposure does not need to be assessed as no ARfD was allocated to the compound.

3.4. PROPOSED MRLS

Based on the results of supervised residue trials and, where relevant, their analysis according to the statistical methods recommended by the current guidelines MRLs of 3 mg/kg, 2 mg/kg and 0.05* mg/kg in wine grapes, table grapes and wheat respectively are proposed to accommodate the representative uses supported by the applicant.

4. Environmental fate and behaviour

Fludioxonil was discussed in the meeting of Member State experts on fate and behaviour in the environment PRAPeR 07 (November 2006) on basis of the DAR, the addendum 1 Vol. 3 (October 2006) and the updated list of end points.

4.1. FATE AND BEHAVIOUR IN SOIL

4.1.1. ROUTE OF DEGRADATION IN SOIL

Eight aerobic soil degradation studies were performed in the dark with both [^{14}C]-pyrrole and [U-^{14}C]-phenyl labelled fludioxonil. Nine different soils were incubated under various conditions with respect to temperature (10ºC, 20ºC, 25ºC and 30ºC), moisture (30%, 60% and 75% of FC or 40% MWHC), and initial concentration of pesticide (0.048 – 10 mg/kg), with incubation periods between 84 days and 1 year. Fludioxonil was slightly degradable in soil, with CO_2 (0.6 to 11.1% AR (pyrrole-labeled) and 10.8 to 20.5% AR (phenyl-labelled) after 90 days at 20ºC) and bound residues (2.4 to

18.0% AR (pyrrole-labeled) and 17.3 to 19.4% AR (phenyl-labelled) after 90 days at 20ºC) as the principal degradates in all these studies. Only few fractions of metabolites in small amounts (total amount of metabolites: 0.3-8.4% AR) were detected.

Sterile and anaerobic conditions resulted in negligible degradation of fludioxonil demonstrating that the decline of soil incorporated fludioxonil in the dark is mediated by aerobic soil microorganisms.

Two studies on photolysis in soil were performed using the pyrrole or phenyl ring labelled fludioxonil. Photodegradation studies revealed a large number of degradation products in minor amounts around 2% AR and three photoproducts in a range around 10% AR, which were further characterized. Both studies using differently radiolabelled material showed the same principal metabolites and no degradation products were observed under the experimental conditions of soil photolysis in the dark control. The major metabolites were identified as **CGA 265378** (max. 12.3% AR), **CGA 192155** (max. 11.7% AR) **CGA 339833** (max. 9.1% AR). A field study conducted in Switzerland on bare soil with ^{14}C-pyrrole labelled fludioxonil confirmed the presence of metabolites CGA 192155 and CGA 339833 in amounts of 13% AR and 8% AR, respectively, of the total soil residues. Metabolite CGA 265378 was not identified in this study.

Two additional laboratory degradation studies were performed with two of the major soil photolysis degradation products of fludioxonil. In each study, the same 3 soils were treated with ^{14}C-carbonyl labelled CGA 192155 or oxirane-3-^{14}C-labelled CGA 339833 and incubated in the dark under aerobic conditions at 20 ºC and 40% MWHC soil moisture for 73 days and 50 days, respectively. In both studies mineralization was very high (69-90% AR after 73 days for CGA 192155, 63-83% AR after 50 days for CGA 339833). In the study with CGA 192155, no degradation products were identified. In the other study, besides CGA 339833, two transitory metabolites were extracted form the soils, but were not further identified due to low concentrations and short presence.
The degradation of the dioxopyrrol metabolite CGA 265378 has not been performed in laboratory studies in the dark, but there is some information about the rate of degradation (see section 4.1.2).
The driving process of photodegradation is oxidation on carbon 2 and 5 of the pyrrole ring, leading to the dioxo pyrrole CGA 265378, followed by opening of the pyrrole-ring and resulting in the epoxide CGA 339833, which is further degraded to the carbocyclic acid CGA 192155.
As the intended use if fludioxonil is both foliar spray and seed treatment, the major role of photolysis regarding degradation of fludioxonil and formation of metabolites makes a big difference in the fate and behaviour between the two different uses.

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

Rate of degradation of fludioxonil in soil under dark aerobic conditions was investigated in the same studies employed to investigate the route of degradation.
In the original DAR the degradation of fludioxonil was considered to follow biphasic kinetics and degradation rates were therefore calculated in most cases by a “best fit” function using a two-

compartment first order model, resulting in estimated DT_{50} in the range of 143 days to > 1 year (median of 313 days, n= 7). For modelling use the half-lives were recalculated by first-order one compartment kinetics (see section 4.2.2) and confirmed that fludioxonil is high to very high persistent in soil ($DT_{50\ lab\ 20^oC}$ = 119 – 599 days). The Member State experts at PRAPeR 07 meeting agreed that a clear dose-dependency on soil degradation rates for fludioxonil, as proposed in the DAR and in addendum 1, can not be drawn and should not be considered in the exposure assessment.

As indicated under point 4.1.1, light exposure and the resulting photolysis represents the major pathway of degradation of fludioxonil in soil in foliar application. Therefore, degradation rate for fludioxonil in light exposed soil and half-lives of photodegradates were calculated. In thin layer soil plates in laboratory, fludioxonil was degraded with half-lives (two-compartment first order model) of 0.9 and 2 days equivalent of natural sunlight in the directly exposed compartment, but the degradation was slower in the deeper (below 0.5 mm) soil compartment: 50 and 98 days.
Aerobic laboratory soil degradation in the dark at 20ºC and 40% MWHC with the major photochemical metabolite CGA 192155 revealed 1st order DT_{50} in the range of 16 and 24 days, indicating that CGA 192155 is moderate persistent in soil. A similar rapid degradation (1st order DT_{50} = 9-16 days) was demonstrated for the photodegradate CGA 339833 in the same soils, under the same conditions.
The degradation of the major photometabolite CGA 265378 has not been determined in laboratory studies in the dark, but the applicant modelled the degradation of CGA 265378 under the conditions of laboratory soil photolysis with the parent. This model resulted in an estimated 1st order DT_{50} of 19 days and should probably regard as a worst case value that could be used as guidance.

Field dissipation of fludioxonil has been investigated in field studies under various conditions. The reliability of some of these studies was discussed at the meeting of experts. It was concluded that $DT_{50\ field}$ obtained from trials with lack of sufficient data points and/or climatic pattern during the study for a comparison with the European conditions (i.e. studies performed in South-Africa and Canada) can not be considered acceptable and should not be used in the exposure assessment. After foliar or bare ground application, most soil dissipation studies exhibit biphasic degradation kinetics, with a fast initial phase and a subsequent slower, more steady phase; this was attributed to a fast initial photolysis of fludioxonil in the upper soil layer, accompanied by a slower biotic degradation or remaining fludioxonil. The recalculated first order $DT_{50\ field}$ values from trials in France, Germany, Switzerland and Italy ranged from 8 to 43 days (n = 9).

Soil residues accumulation studies performed over 5-8 years in vineyards in Switzerland (foliar spray use) showed that fludioxonil levels in the 0-10 cm top soil layer reached a maximum after about 2-4 to 6 years and decrease in later years to levels seen the first 2 years of application. The final reports of the long-term residues studies were summarised and evaluated by the RMS in addendum 2. The results from the last approximately 2 years have been reported, but were not peer reviewed. According to the rapporteur the new results do not change the original conclusion, as the

concentrations for the last 2 years were lower than the maximum concentrations in the second year of the study.

PEC soil for fludioxonil presented in the DAR were based on worst case half-life of 52 days from the field studies in the foliar application to grape vine scenario with the critical GAP of two applications of 0.25 kg a.s./ha with 21 days interval and 50% crop interception. However, at the meeting of experts it was agreed that the DT_{50} value was not reliable as it was derived from a non-European field study for which the available information on the field conditions were considered insufficient for a comparison with the EU conditions. As the original value for the spray use was more conservative respect the new reliable field DT_{50} (43 days), new PECsoil calculations would not have been necessary. Despite this, new calculations were provided and evaluated in addendum 2. It is the EFSA opinion that PECsoil calculations with the realistic worst case field DT_{50}, a 50% crop interception and multiple applications into a soil depth of 5 cm should be considered acceptable as they were based on agreed input parameters. It should be noted that the risk assessment for soil organisms (see section 5) was based assuming a worse initial PEC value calculated following a single application of 500 g a.s./ha and 100% soil deposition (acute risk) and 50% soil deposition (chronic risk) for the foliar spray use in vine. For the same use, worst case initial PECs in soil for photolysis metabolites CGA 192155, CGA 265378 and CGA 339833 were also estimated.
The worst case initial PEC soil for seed treatment at the highest application rate of 8.75 g a.s./ha assuming a uniform distribution to 5 cm depth was used in the risk assessment for soil organisms.

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

In batch adsorption/desorption studies performed with 5 different soils from UK, fludioxonil exhibited a low potential for mobility in soil (K_{foc} = 12000-385000 mL/g). Generally a good correlation between the adsorption constants and the organic carbon content of the soils was observed. No significant influence of the pH was observed.

Adsorption and desorption studies were also performed in four soils for the three soil photolysis metabolites CGA 192155, CGA 265378 and CGA 339833 and for one minor aquatic photolysis metabolite **CGA 308565** (see 4.2.1). Metabolites CGA 192155 and CGA 339833 were rated as very high mobile in soil (K_{foc} = 11.7-42.4 mL/g and 1.94-5.79 mL/g, respectively). The soil photolysis metabolite CGA 265378 was unstable under the conditions of the adsorption/desorption study and no exact K_f values could be calculated. As rough estimates from the concentrations at time 0 of the test, the K_{oc} were in the range 36-111 mL/g, indicating that this metabolite is high to very high mobile. The aquatic photolysis metabolite CGA 308565 degraded very fast under the conditions of the adsorption/desorption study and hence no reliable K_{oc} values could be determined. The log P_{ow} is reported to be about 0.3.

Standard soil columns with four different soils with unaged fludioxonil eluted with 200 mm artificial rain showed a leaching of 0.02-0.1% AR, confirming that fludioxonil is immobile in soil.

The leaching of aged ^{14}C-fludioxonil in standard soil columns was studied in two soils. In both cases the soil residues were mainly in the top 2 cm or top 4 cm of the soil profile. The leachates contained up to 3.6% AR. The radioactivity in the leachate was not identified.

4.2. FATE AND BEHAVIOUR IN WATER

4.2.1. SURFACE WATER AND SEDIMENT

Fludioxonil is stable to hydrolysis at environmentally relevant pH values (5, 7 and 9) and temperature (25 ºC). Hydrolysis is therefore not expected to be a significant degradation route for fludioxonil.
The major aquatic photoproduct of fludioxonil, the epoxide CGA 339833 (see below), is stable to hydrolysis at pH 4 and 7 and 25 ºC, being the extrapolated DT_{50} values > 3 months and 597 days, respectively. CGA 339833 is more rapidly hydrolysed at pH 9, with an extrapolated DT_{50} at 25 ºC of 53 days.

Aqueous photolysis was investigated and quantum yield calculated with artificial light. Results demonstrated that photolysis may contribute to the dissipation of fludioxonil in water with a first order half-life equivalent to 10 days of natural sunlight at latitude 30 ºN, assuming 12 hours of daylight. In addition to a number of minor photoproducts (CGA 308565 at 6-7% AR), three metabolites were found in still increasing concentrations until the end of the study (day 30). These major photodegradates were further investigated in a separate study and were identified as CGA 339833 (max. 30.5% AR), **CGA 344623**[7] (max. 12.4% AR) and **A5**[8] at 11.5% AR.

Fludioxonil was not found to be readily biodegradable in the required special test system for biodegradation and mineralisation.

In absence of light, fludioxonil rapidly disappeared from the water phase in two laboratory water/sediment systems at 20 ºC ($DT_{50\ water}$ = 1-2 days) due to adsorption to the sediment (max 94.5% AR at 30d) but degradation in the whole system was greatly slower, with first order $DT_{50\ system}$ = 451-699 days. A few minor metabolite fractions, accounting for 0.1 to 5% of the radioactivity applied were observed in the sediment and water extracts, but they were not identified. $^{14}CO_2$ accounted for 1.6 and 1.9% AR.
In another study the influence of light (artificial sunlight 290-400 nm, 12 hours per day) on degradation in water/sediment systems was investigated for up to 100 days. Fludioxonil was rapidly partitioned to the sediment in both the irradiated systems (max. 53% AR at 7d) and the dark controls (about 70% AR after 15 days and increasing up to 83.5-85.6% AR at the end of the study). The calculated $DT_{50\ water}$ values by 2-compartment first order kinetics for fludioxonil were 6-7 days in the dark control and less than 2 days in the light exposed systems. As fludioxonil concentrations in sediment increased during the test, no degradation rates could be calculated. The dissipation of

[7] CGA 344623 = 2-cyano-3-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-succinamic acid
[8] A5 = 2-cyano-3-(2,2-difluorobenzo[d][1,3]dioxol-4-yl)propanoic acid or 3-cyano-2-(2,2-difluorobenzo[d][1,3]dioxol-4-yl)propanoic acid

fludioxonil in the total irradiated system was estimated to be 19-25 days. The only major metabolite was CGA 192155, which amounted to a maximum of 10.2-11.9% AR in the water phase under light/dark conditions.
In an outdoor aquatic microcosm study water and sediment phases were analysed for fludioxonil residues for up to 112 days after the application. Fludioxonil dissipated with an estimated half-life of 10 days (whole system). Only low sediment residues of fludioxonil were observed, with estimated first-order $DT_{50\ system}$ ranging from 51 to 154 days.

FOCUS surface water calculations for foliar spray use in vine were submitted by the applicant, but were not fully accepted by the RMS due to the use of a DT_{50} of 14 days for water and sediment for fludioxonil. The experts at PRAPeR 07 confirmed the unacceptability of this extrapolation from the $DT_{50\ sediment}$ value (obtained in the irradiated water/sediment system in the outdoor microcosm study) to natural sunlight conditions as it was beyond the range of wavelengths in which fludioxonil absorbs light. Therefore, a new data gap for surface water exposure assessment was identified for fludioxonil. It was agreed by the experts that the mean of the $DT_{50\ system}$ values (25.2d and 18.8d) obtained in the artificial light exposed water/sediment systems should be used for degradation in water of fludioxonil in PEC_{sw} calculations. It was also recommended to set the $DT_{50\ sed}$ at 1000 days, in line with FOCUS references and also representing the experimental values of the studies without light. A new fate assessment for fludioxonil using the FOCUS surface water scenarios at Steps 1-4 following foliar application to vines is available in addendum 2. From step 3 to step 4 the spray-drift buffer zone is increased from the default value of 3 meters to 5 meters and 10 meters. EFSA may confirm that the input parameters regarding $DT_{50\ water}$ $DT_{50\ sed}$ for fludioxonil have changed according the recommendations of the experts' meeting. The new modelling included a small change in the degradation rate in the water phase and a significant longer degradation in the sediment, to which fludioxonil is strongly adsorbed. As a result, the new PEC_{SW} values are identical (except a very small differences for R1 pond scenario in both Steps) to the values originally reported in the DAR. The significant increase in the revised predicted concentrations in sediment at Step 3 and Step 4, does not affect the assessment, as a low risk to sediment dwelling organisms was based on FOCUS Step 1 values. Therefore, it is the EFSA opinion that the available surface water exposure assessment for the use of fludioxonil on vines can be considered acceptable and useful to complete the risk assessment. It should be noted that the use of the soil DT_{50} value of 218 days is not in agreement with the revised value as required by the Member State experts (see section 4.2.2) but can be considered as worst case for the parent compound.
New FOCUS Step 1 and 2 surface water calculations following application to vines were conducted furthermore for the metabolites CGA 265378, CGA 192155 and CGA 339833 and reported in addendum 2. Metabolites were simulated using the built-in Steps 1-2 metabolite paradigm, and therefore the soil DT_{50} value of the parent compound did not affect the results for the metabolites. The maximum calculated PEC at Step 1 resulted equal to the values reported in the DAR and used in the ecotoxicological risk assessment.
FOCUS Step 3 surface water modelling to examine the potential of fludioxonil to reach surface water following applications to winter cereals as a seed treatment is included in addendum 2. EFSA agrees

with the preliminary risk assessment provided by the RMS, based on extrapolated PEC_{SW} values for the use in vine to seed treatment by adjusting the values according to the difference in applied dose (i.e. 250/8.75 g a.s./ha).

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

In the DAR PEC_{GW} calculations for fludioxonil and two photolysis metabolites CGA 339833 and CGA 192155 were conducted with FOCUS groundwater scenarios, using FOCUS PELMO model. To simulate the degradation of fludioxonil in soil, the parent compound was instantaneously partitioned into two compartments, F_light (48%) and F_dark (52%), degraded by photolysis and microbial processes respectively. The modelling submitted concerned scenarios for vine. Half-lives from aerobic soil degradation studies in the dark were recalculated by first-order one compartment kinetics using ModelManager and normalized to 20 ºC and a standard moisture content of 100% at pF2 (normalized DT_{50} values ranged from 100 days to > 1 year). However, during the peer review, concerns raised on the reliability of these DT_{50} values and on the method for selection of the appropriate value for modelling use. These issues were extensively discussed at the meeting of experts and some indications and recommendations were given in order to re-calculate the appropriate individual laboratory DT_{50}soil values for fludioxonil and the resulting median/mean value to be used in FOCUS modelling. Therefore, a new calculation of the median (if the reliable values are ≥ 6) or the mean value (n <6) of soil $DT_{50\ (dark)}$ was required for modelling purposes by the experts. It was also agreed that soil metabolite CGA 265378 should be included in the route of degradation scheme of the modelling and that a potential groundwater contamination assessment should be performed for this metabolite. In addition, the experts considered that, in line with the opinion[9] of the Panel on PPR, PECgw calculations with a second model (i.e. FOCUS PEARL) for metabolites CGA 339833 and CGA 192155 are necessary.

Re-calculations of degradation rates in soil of fludioxonil following the recommendations of the Member State experts became available in addendum 2, March 2007. Most of the re-calculated DT_{50} values ($DT_{50\ lab\ 20ºC}$ = 119 – 599 days, n=15) are higher than the timeframe of the data used for the calculation (< 120 days), meaning that the results are uncertain. However, the revised mean and median values for fludioxonil (DT_{50} at pF2 and 20ºC: mean = 200 days, median = 164 days, n=9) result in shorter degradation rate compared to the values reported and assessed in the DAR (a median of 218 days was used for PECsw and PECgw calculations to simulate aerobic soil degradation of fludioxonil in the dark).

New modelling with both FOCUS PELMO and FOCUS PEARL for fludioxonil and its major soil photolysis metabolite CGA 265378, CGA 339833 and CGA 192155 when the parent is applied to vines is available in addendum 2 to Annex B8. Calculations are not peer reviewed. Results showed that fludioxonil seems to be practically immobile and metabolite CGA 265378 low mobile, whilst the

[9] Opinion of the Scientific Panel on Plant Health, Plant Protection Products and their Residues on a request from EFSA on the FOCUS groundwater models comparability and the consistency of this risk assessment of ground water contamination *(The EFSA Journal (2004) 93, 1-20).*

limit value of 0.1 µg/L was exceeded in 2 (1 with FOCUS PELMO) of 7 scenarios for metabolite CGA 339833 and in 3 scenarios (for both models) for metabolite CGA 192155.

EFSA does not consider the new modelling acceptable, as the same old DT_{50} value (218 days) for fludioxonil was used in the new calculations in place of the revised value of 164 days. It is clear that if this represents a worst case for the degradation of the parent, on the other hand it is very likely that the results for PEC_{GW} for metabolites would be higher if the appropriate value of 164 days for fludioxonil had been used. As regard metabolite CGA 265378, it should be noted that the reported hydrolytical instability (hydrolytic half-life of 12 hours) is not substantiated by data neither in fate section nor in the physical-chemical section. Some deviations for the exponent of the Freundlich isotherm (1/n) were also introduced for metabolites CGA 192155 and CGA 339833. EFSA would like also to highlight that the method of selection of the application dates it is not completely clear. Because it is well known that the most sensitive parameters of PEARL model are the soil DT_{50}, the K_{om} and the 1/n values, it is the opinion of EFSA that a sound assessment of potential groundwater contamination by the soil photolysis metabolites of fludioxonil can not be concluded for the use on vine. Member states should be aware that it is very likely that metabolites CGA 33983 and CGA 192155 will exceed the trigger of 0.1 µg/L in some FOCUS scenarios. A full assessment of the toxicological relevance of these metabolites has not been performed in line with the Guidance document[10].

As regard the seed treatment, the Member State experts agreed that FOCUSgw modelling is not required because the assessment with foliar spray use can be considered as a worst case due to application rate and that soil photolysis metabolites are not relevant for this use.

4.3. FATE AND BEHAVIOUR IN AIR

Fludioxonil has a low vapour pressure of 3.9×10^{-7} Pa (at 25 ºC) and a low Henry's law constant of ca. 5.4×10^{-5} m^3 Pa mol^{-1}. Therefore, volatilisation from soil or water is not expected to be a significant entry route into air after foliar application of fludioxonil. This was confirmed in an experiment where the loss from wet soil was 1.6% over 24 hours. The same low volatility can be expected for the major degradates as they have low vapour pressures too.

Based on Atkinson calculation, standard conditions, 1.5×10^6 OH radicals/cm^3, 12 hour day, the photochemical oxidative degradation in air would proceed with a half-live of 3.6 hours. Overall, it is not expected that fludioxonil would be present in air for extended time periods or be transported over long distances or into the stratosphere.

5. Ecotoxicology

Fludioxonil was discussed at the experts' meeting for ecotoxicology (PRAPeR 08) in November 2006.

[10] Guidance document on the assessment of the relevance of metabolites in groundwater of substances regulated under Council Directive 91/414/EEC (Sanco/221/2000 rev. 10).

Based on the available information in the DAR it was not clear whether the batches used in the ecotoxicological studies comply with the specification proposed for the technical material. A Tier 2 assessment of equivalence was provided by the RMS in an addendum to Volume 4 in February 2007 but has not been peer reviewed.

5.1. RISK TO TERRESTRIAL VERTEBRATES

The risk to insectivorous birds and small herbivorous mammals was assessed for the use of 2 × 0.250 kg/ha fludioxonil in vine, and for granivorous birds and mammals for the use as a seed treatment in accordance with the Guidance Document on Risk assessment for Birds and Mammals (SANCO/4145/2000). The first tier assessment indicates a low acute and long-term risk to mammals in both uses. For birds the acute and short-term risk from exposure to fludioxonil in both uses is low. The endpoint from the reproductive study with bobwhite quail was discussed by the member State experts and it was agreed to use the NOAEL of 62.8 mg/kg bw as proposed by the RMS. The resulting TER values are 8.3 and 3.3 for vine and seed treatment, respectively, as reported in addendum 1. The long-term risk to granivorous birds was discussed and it was agreed that the risk can be considered to be low based on the following arguments.

- Photolytic degradation of fludioxonil occurs in soil with a DT_{50} of 1-2 days and hence degradation will probably also occur on seeds remaining on the soil surface.
- The seeds will germinate within 10-14 days, thus exposure time is limited.
- The uptake into plants is limited and hence exposure via intake of young shoots will be limited.

The meeting agreed to use a DT_{50} of 10 days for degradation of fludioxonil from seeds on the soil surface. This resulted in a TER of 6.2 which is above the Annex VI trigger.

No studies of toxicity to birds with the formulations are available. Since the TER_a values for fludioxonil are >100 no further studies are required for CELEST 025 FS, that only contains fludioxonil as active substance. The acute oral toxicity to mammals from exposure to SWITCH 62.5 WG is low, and the acute toxicity of birds to cyprodinil is known to be low. Therefore no further studies of acute toxicity with SWITCH 62.5 WG were considered necessary.

No risk assessment based on exposure via contaminated drinking water was presented in the DAR. An argumentation was provided by the RMS in the reporting table why exposure via this route would be unlikely. EFSA calculated the acute risk from intake of spray solution using the allometric equation in the Guidance Document and based on the TER values being significantly above the Annex VI trigger, the risk is considered to be low.

The risk for secondary poisoning of earthworm- and fish-eating birds and mammals is low.

5.2. RISK TO AQUATIC ORGANISMS

Fludioxonil is toxic to aquatic organisms and the acute TER values for fish and invertebrates that were calculated for the use in vine did not meet the Annex VI trigger when based on PEC values

obtained with FOCUS Step, 1, 2 and 3 except for the relevant pond scenario. FOCUS step 4 calculations indicate low acute risks to fish if a 10 m buffer zone is applied to reduce the input from spray drift. For the use as seed treatment the acute risk was considered low since the TER values met the Annex VI trigger based on extrapolated FOCUS step 1 PEC calculations.

Five studies on chronic toxicity to fish were evaluated in the DAR, four juvenile growth studies with *Oncorhynchus mykiss* and one early life stage study with *Pimephales promelas*. None of the juvenile growth studies were fully valid due to problems with the analytical test concentrations. One study gave a much lower NOEC (0.0000046 mg a.s./L) than the others (0.0066 – 0.014 mg a.s./L). A new valid study with *O. mykiss* was evaluated in addendum 1, in which a NOEC of 0.040 mg a.s./L was obtained. This value is in accordance with the NOEC of 0.039 mg a.s./L from the early life stage study with *Pimephales promela.* The different chronic toxicity studies were discussed by the Member State experts and it was agreed to use the NOEC of 0.039 mg a.s./L for the long-term risk assessment for fish. The long-term TER derived using this endpoint and the available FOCUS Step 3 PEC_{sw} for the worst case scenario R3 stream is 9.8, hence just below the Annex VI trigger of 10.

Two studies with *Chironimus riparius* are available to address the risk to sediment dwelling organisms, one with fludioxonil and one with SWITCH 62.5 WG. The risk assessment based on the derived endpoint and FOCUS step 1 PEC values indicates a low risk from both evaluated uses.

An outdoor microcosm study which included fish, juvenile *Lepomis macrochirus*, was available to refine the assessment to aquatic organisms. The study was discussed in the experts' meeting and a NOAEC of 0.0164 mg a.s./L for invertebrates based on possible transient effects on *Keratella* and apparent but not significant effects on most taxa of benthic invertebrates at the highest treatment level of 0.0328 mg a.s./L was agreed. A slight (5%) but not statistically significant effect on fish growth was observed at the two highest test concentrations in the microcosm study. The microcosm study was not considered valid to assess the risk to fish. Due to low frequency of phytoplankton and periphyton sampling in the microcosm study, the risk assessment for algae was proposed to be based on the single species laboratory studies. An assessment factor of 5 for the microcosm study was agreed by the experts since it was a microcosm and not a mesocosm, the findings were very variable and the presence of fish might have influenced the ability to detect effects on invertebrates. The TER values for aquatic invertebrates are in the range of 16 to 22 for the ditch and stream scenarios using FOCUS Step 4 PEC values with 10 m buffer zones that are required to protect fish from acute risk. It should however be kept in mind that the study was conducted with fludioxonil and therefore doesn't address the full risk of SWITCH 62.5 which contains also cyprodinil.

The bioconcentration factor for whole fish was determined to 366. However, the clearance was rapid with a CT_{50} of 0.6 days and a CT_{90} of 1.8 days.

One major metabolite (CGA 192155) was detected in the water/sediment study under light conditions. Studies with fish, Daphnia and algae evaluated in addendum 1 showed a low acute

toxicity of this metabolite. For the photolysis metabolite CGA 339833 studies were available that indicated a low acute toxicity to fish, invertebrates and algae. The metabolites CGA 344623 and M5 were not considered as major metabolites under natural environmental conditions since they were not detected above 10% in the water/sediment study conducted under light conditions, but only in the sterile photolysis study. However, an acute toxicity study with *Daphnia* is available for CGA 344623 that shows a low acute toxicity. The TER_a derived based on FOCUS Step1 PEC are far above the Annex VI trigger for the tested metabolites and a low risk can be concluded. In the experts' meeting a data gap was identified for the soil metabolite CGA 265378. This metabolite was found to be unstable in range finding test with *Daphnia* and therefore no toxicity values are available. The RMS states that due to the instability a low exposure and consequently a low risk is expected for CGA 265378 (see addendum 2 of February 2007). The addendum 2 has not been peer reviewed but EFSA agrees with the RMS and finds that the risk mitigation measures proposed for fludioxonil would cover the risk of potential exposure from the metabolite if a similar toxicity to fludioxonil is assumed and worst case PEC_{sw} FOCUS Step 1values are used.

In conclusion, the risk to aquatic organisms from the use of fludioxonil as seed treatment is considered to be low, while the use as foliar application in vine requires risk mitigation measures comparable to 10 m spray free zones to protect fish from acute risk. Buffer zones of 10 m would also cover the risk to invertebrates from the risk to fludioxonil. It should however be kept in mind that the mesocosm study was conducted with fludioxonil and therefore it is not known whether it covers the full risk of SWITCH 62.5 which contains also cyprodinil.

5.3. RISK TO BEES

Bees may be exposed to fludioxonil by over spraying, by ingestion of contaminated nectar and honey dew and by contact with residues on plants from the use of SWITCH 62.5 WG. No exposure is expected from the use as a seed treatment. The HQ values obtained from the first tier oral and contact toxicity studies with fludioxonil are <5, and <10.8 based on endpoints derived in studies with SWITCH 62.5 WG. These values are clearly below the Annex VI trigger of 50 and hence the risk to bees is considered to be low.

5.4. RISK TO OTHER ARTHROPOD SPECIES

The in-field and off-field risk to non-target arthropods from the use of SWITCH 62.5 WG in vine is considered to be low based on HQ calculations using ER_{50} values from glass plate studies with the two standard species *Typhlodromus pyri* and *Aphidius rhopalosiphi,* a multiple application factor of 1.7 and an application rate of 2 × 250 g a.s./ha. In-field HQ values are between 1.3 and 1.9 and off-field values 0.63-0.98 (without using a vegetation distribution factor). However, effects larger than the Annex VI trigger of 30% were observed at 300 g a.s./ha. Furthermore, for *A. rhopalosiphi* two semi-field studies are available. In the first one no effect was observed on mortality after application of 2 × 296 g a.s/ha with an interval of 14 days. However, a 91% reduction in number of mummies/female was observed. Reduced fecundity was still apparent after 2 weeks of residue ageing (84%). The overall reproduction in the study was low and the results were not considered robust. In

the second study a 24% increase in fecundity was observed following 2 × 248 g a.s./ha on wheat leaves. After a third application a 67% reduction was observed which was still apparent with 2 weeks aged residues (77%). With 28 days ageing after the third application no effect was observed. A significant reduction in fecundity at 300 g a.s./ha on bean leaves in the laboratory was also observed for *Orius insidiosus*. However, effects were below the trigger of 50% in a semi-field study. No significant effects were observed on *Amblyseius cucumeris, Poecilius cupreus, Aleochara bilineata* or *Coccinella septempunctata*. The overall conclusion is that for the proposed use of SWITCH 62.5 on vine the risk to non-target arthropods is low.

Tests on soil dwelling species (*Aleochara bilineata, Poecilus cupreus, Bembidion tetracolum, Pardosa amentata*) are available with CELEST 025 FS at a higher dose rate than the one proposed for the evaluated use as seed treatment. Effects were below the Annex VI trigger of 30% and hence the risk is considered to be low.

5.5. RISK TO EARTHWORMS

Acute toxicity studies are available with fludioxonil, the soil metabolites CGA 192155 and CGA 265378 and the formulation SWITCH 62.5 WG. Reproduction studies are available with fludioxonil and the two formulations. In the reproduction study with SWITCH 62.5 WG 5% reduction in biomass compared to the control was observed at an application rate of 3.8 kg a.s./kg and the NOEC from the study was set to 1.3 kg a.s./ha. No effects on survival and reproduction was however observed at application rates up to 3.8 kg a.s/ha and the RMS therefore suggested to use an overall NOAEL of 2.5 kg a.s./ha since the biomass effect was not considered biologically relevant.

TER values were calculated based on worst case PEC for soil assuming 2 combined applications of 0.250 g fludioxonil/ha and 50% deposition in vine, and one application of 0.00875 kg fludioxonil/ha as a seed treatment in wheat. All acute TER values are far above the Annex VI trigger of 10 indicating a low risk. The long-term TER for fludioxonil is above the trigger indicating a low risk. For SWITCH 62.5 WG the TER_{lt} based on mortality and reproduction effects is 3.8, based on 100% deposition to soil. Assuming 50% deposition results in a TER of 7.7. For biomass effects the TER_{lt} is 5, which is just at the Annex VI trigger. For seed treatment the TER_{lt} value based on the endpoint from the fludioxonil study is 833. If the endpoint from the study with seeds treated with CELEST 025 FS is used the TER_{lt} is 0.4. However, no significant effect was observed at the highest application rate (43 mg a.s./kg seed at 175 kg seed/ha) in the study, and no negative effects on mortality, growth or reproduction was observed in a study where CELEST 025 was mixed into the soil at concentrations up to 0.243 mg a.s./kg soil.

Acute toxicity studies with the soil metabolites CGA 192155 and CGA 265378 indicate a slightly higher toxicity for CGA 192155 compared to fludioxonil. However, the DT_{90} in soil is below 100 days and the acute TER values are far above the Annex VI trigger for both metabolites. No study is available with the metabolite CGA 339833 (max 8% in field studies). This metabolite is an intermediate between the two others and a toxicity study was not considered necessary.

Overall the risk to earthworms from the evaluated uses of fludioxonil is considered to be low.

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

Studies with the Collembola *Folsomia candida* are available for both formulations. The TER values obtained are 11 for vine, based on 2 x 250 g a.s./ha applied once and assuming 100% deposition, and 5208 for seed treatment. Hence the Annex VI trigger is met and the risk is considered to be low.

5.7. RISK TO SOIL NON-TARGET MICRO-ORGANISMS

The effects on soil respiration and nitrification were tested with fludioxonil, the formulation SWITCH 62.5 WG and the soil metabolites CGA 192155 and CGA 265378. No deviations of more than 25% after 28 days were observed. The test concentration of fludioxonil did not cover the predicted soil concentration with 100% deposition, but was in the range of 50% deposition which is considered relevant for vine. SWITCH 62.5WG was applied at a concentration corresponding to 2 x 250 g fludioxonil and the metabolites at concentrations above the expected PEC. Hence the Annex VI trigger was met indicating a low risk to soil micro-organisms. The metabolite CGA 339833 degrades relatively rapidly and is an intermediate between the other two metabolites that were tested. Therefore a study with this metabolite was not considered necessary.

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

CELEST 025 FS had no effect on seedling emergence or growth of *Triticum aestivum*, *Lactuca sativa* or *Raphanus sativa* following soil incorporation at concentrations above the proposed dose rate for seed treatment. The EC_{50} of 10 mg/kg obtained in the study with CELEST 025 FS also indicates that the risk to non-target plants from the presence of fludioxonil from the use of SWITCH 62.5 WG (max PEC 0.67 mg/kg soil) is low. Slight effects were observed on seedling emergence and vegetative vigour in a spray application study with SWITCH 62.5 WG using *Beta vulgaris*, *Zea mays*, *Brassica napus*, *Avena fatua*, *Glycine max* and *Allium cepa*. However, the phytotoxic effect was less than 50% at 500 g/ha and the risk is therefore considered to be low.

5.9. RISK TO BIOLOGICAL METHODS OF SEWAGE TREATMENT

Data from a test with fludioxonil on effects on activated sludge respiration rate are available and indicate that the risk to biological methods of sewage treatment is low.

6. Residue definitions

Soil

Definitions for risk assessment: fludioxonil and soil photolysis metabolites CGA 265378, CGA 192155

Definitions for monitoring: fludioxonil

Water

Ground water

Definitions for exposure assessment: fludioxonil and soil photolysis metabolites CGA 265378, CGA 339833, CGA 192155

Definitions for monitoring: fludioxonil.

Based on the available information: CGA 339833 and CGA 192155 (to be confirmed by new modelling)

Surface water

Definitions for risk assessment: fludioxonil, CGA 192155, CGA 265378 and aqueous photolysis metabolite CGA 339833

Definitions for monitoring: fludioxonil

Air

Definitions for risk assessment: fludioxonil

Definitions for monitoring: fludioxonil

Food of plant origin

Definitions for risk assessment: Sum of fludioxonil and all metabolites containing the 2,2-difluoro-benzo[1,3]dioxole-4-carboxylic moiety

Definitions for monitoring: Fludioxonil

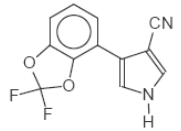
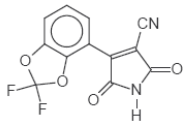
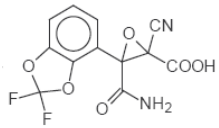
Food of animal origin

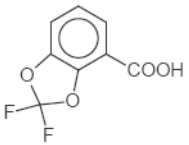
Definitions for risk assessment: Not required (In case of use extension leading to significant livestock exposure, sum of fludioxonil and all metabolites containing the 2,2-difluoro-benzo[1,3]dioxole-4-carboxylic moiety)

Definitions for monitoring: Not required (In case of use extension leading to significant livestock exposure, sum of fludioxonil and all metabolites containing the 2,2-difluoro-benzo[1,3]dioxole-4-carboxylic moiety)

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

Soil

Compound (name and/or code)	**Persistence**	**Ecotoxicology**
Fludioxonil 	High to very high persistence (in the dark) (DT_{50lab} = 119 – 599 d at 20ºC and different soil moisture conditions) Very low to low persistence (in the light, "sun exposed" soil compartment, see 4.1.2) (DT_{50lab} in thin layer soil plates -= 0.86 - 2 d)	See 5.5 -7.
CGA 265378 (soil photolysis metabolite) 	DT_{50} not been determined in laboratory studies in the dark From laboratory soil photolysis study with parent fludioxonil: DT_{50lab} = 19 d (in the light)	Low toxicity and low risk.
CGA 339833 (soil photolysis metabolite) 	Low to moderate persistence (in the dark) (DT_{50lab} = 9 – 16 d at 20ºC and 40% MWHC)	Intermediate between the two other photolysis metabolites, therefore no studies were considered necessary and the risk is considered to be low.

Compound (name and/or code)	Persistence	Ecotoxicology
CGA 192155 (soil photolysis metabolite) 	Moderate persistence (in the dark) (DT_{50lab} = 16 – 24 d at 20ºC and 40% MWHC)	Low toxicity and low risk.

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
Fludioxonil	immobile (K_{foc} = 12000 - 385000 mL/g)	FOCUS PELMO and FOCUS PEARL: trigger of 0.1 µg/L not exceeded.	Yes	Yes	Relevant
CGA 265378 (soil photolysis metabolite)	Very high to high mobile (K_{oc} = 36 - 111 mL/g, estimated at time point 0 from K_d = C_{soil}/C_{water})	Satisfactory modelling not available, data required. Based on current information it is unlikely that the trigger of 0.1 µg/L will be exceeded in FOCUS scenarios	No information available.	To be assessed pending on the results of satisfactory fate modelling. Available information shows low acute toxicity and no genotoxic potential	To be assessed pending on the results of satisfactory ground water modelling.

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
CGA 339833 (soil photolysis metabolite)	Very high mobile (K_{foc} = 1.94 – 5.79 mL/g)	Satisfactory modelling not available, data required. Based on current information it is likely that the trigger of 0.1 µg/L will be exceeded in some FOCUS scenarios	No information available.	To be assessed pending on the results of satisfactory fate modelling. Available information shows low acute toxicity, NOAEL in a 90-day rat study of 58/66 mg/kg bw/day and no genotoxic potential	Low toxicity to aquatic organisms and low risk.
CGA 192155 (soil photolysis metabolite)	Very high mobile (K_{foc} = 11.7 – 42.4 mL/g)	Satisfactory modelling not available, data required. Based on current information it is likely that the trigger of 0.1 µg/L will be exceeded in some FOCUS scenarios	No information available.	To be assessed pending on the results of satisfactory fate modelling. Available information shows low acute toxicity and no genotoxic potential	Low toxicity to aquatic organisms and low risk.

Surface water and sediment

Compound (name and/or code)	Ecotoxicology
Fludioxonil (water and sediment)	See 5.2.

Compound (name and/or code)	Ecotoxicology
CGA 192155 (water; soil photolysis metabolite)	Low toxicity to aquatic organisms and low risk.
CGA 265378 (soil photolysis metabolite)	No toxicity results available due to instability in water. Assuming the same toxicity as for fludioxonil, the risk would be covered by the mitigation measures proposed for fludioxonil.
CGA 339833 (soil photolysis metabolite)	Low toxicity to aquatic organisms and low risk.

Air

Compound (name and/or code)	Toxicology
Fludioxonil	Not acutely toxic via inhalation; no information on repeated exposure

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

- Justification for the proposed technical material specification following the change in the manufacturing site was presented in addendum to vol. 4 (February 2007), however was not peer reviewed. EFSA is on the opinion that these data do not support unequivocally the specification and considers the specification still open. A new specification was submitted but was not evaluated.
- A new test using EEC A16 is required for the auto-flammability of the WG formulation or a justification why this test would not have been appropriate.
- A data gap was proposed for the applicant to present information on the equivalence of the batches used in the toxicological and ecotoxicological studies with the proposed technical specification (relevant for all representative uses evaluated; submitted in March 2007, not peer reviewed).
- Pending on the results of PEC_{GW} calculations (see data gap below) a complete assessment of the relevance of metabolites CGA 265378, CGA 339833 and CGA 192155 might be needed.
- PEC_{GW} calculations with adequate input parameters should be provided for soil photolysis metabolites CGA 265378, CGA 339833 and CGA 192155 (relevant for foliar spray use on vines; available FOCUS GW calculations submitted in March 2007 considered not valid by EFSA, submission date proposed by the notifier for new assessment: unknown; data gap identified by EFSA after the experts' meeting, refer to point 4.2.2).

CONCLUSIONS AND RECOMMENDATIONS

Overall conclusions

The conclusion was reached on the basis of the evaluation of the representative uses as proposed by the applicant which comprise foliar spraying to control *Botrytis cinerea and Aspergillus carbonarius* in wine and table grapes, and seed treatment against *Microdochium nivale, Fusarium spp., Tiletia carie, Septoria sp.* and *Helminthosporium sp.* in wheat.

The representative formulated products for the evaluation were "Switch 62.5 WG", a water dispersible granule (WG), and "Celest 025 FS", a suspension concentrate for seed treatment (FS). The dispersible granule formulation contains also cyprodinil as active substance.

Adequate methods are available to monitor fludioxonil residues in food of plant origin (grapes and wheat).

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.

Fludioxonil is not acutely toxic via oral, dermal and inhalation route. It is not a skin and eye irritant, nor a skin sensitiser. The relevant short term NOAEL is 58.5 mg/kg bw/day while the relevant NOAEL for chronic toxicity is 37 mg/kg bw/day. Fludioxonil does not show any genotoxic, teratogenic and carcinogenic potential. The ADI of fludioxonil is 0.37 mg/kg bw/day based on the relevant long term/carcinogenicity NOAEL of 37 mg/kg bw/day (SF 100), the AOEL is 0.59 mg/kg bw/day from the NOAEL of the 90-day study in dogs with a safety factor of 100. The ARfD was not allocated because of the toxicological profile of fludioxonil. The systemic exposure of operators, workers and bystanders to fludioxonil formulated as WG was estimated to be below the established AOEL, as well as for the FS formulation.

The behaviour of fludioxonil residues applied according to the representative uses is fully understood and no further data is necessary. The plant metabolism of the compound proceeds through oxidative processes of the pyrrole ring. The metabolic pattern is clearly dominated by the parent compound after foliar application. Seed treatment of cereals leads to extremely low residue levels in straw and grains. The proposed residue definition for monitoring is fludioxonil. For risk assessment the residue definition should include all metabolites containing the 2,2-difluoro-benzo[1,3]dioxole-4-carboxylic moiety, to cover potential uses of fludioxonil in other commodities not addressed during the peer-review. MRLs can be proposed to be set at 3 mg/kg, 2 mg/kg and 0.05* mg/kg in wine grapes, table grapes and wheat respectively. The transfer of residues from soil to rotational crops and from feeding stuffs to livestock is very low and does not result in detectable or quantifiable levels in food items. The expected chronic consumer exposure is far below the ADI.

With the exception of the groundwater exposure assessment for the applied for use on vine, the available information on the fate and behaviour of fludioxonil in the environment is considered sufficient to complete an appropriate EU level environmental exposure assessment. Even taking into account the available groundwater modelling that use favourable input parameter for the degradation rates in soil, it is clear that the soil photolysis metabolites CGA 339833 and CGA 192155 have the potential to leach to groundwater under vulnerable situations above the trigger of 0.1 µg/L and therefore required non relevance assessments. A full assessment of the relevance has not been performed.

The risk to birds and mammals was considered to be low. The first tier long-term TER for granivorous birds was below the Annex VI trigger but based on the fast photolytic degradation in soil assuming also fast dissipation from remaining seeds on the soil surface, germination within 10-14 days and low uptake from the seed into the shoots a limited exposure and therefore low risk was concluded. The risk to aquatic organisms is considered to be low from the use as seed treatment, while the foliar application in vine requires risk mitigation measures comparable to 10 m spray-free zones for fludioxonil. It should however be kept in mind that the mesocosm study was conducted with fludioxonil and therefore may not address the full risk of SWITCH 62.5 to aquatic invertebrates, since the representative formulation contains also cyprodinil. The risk to bees, non-target arthropods,

earthworms and other soil macro- and micro-organisms, non-target plants and biological methods of sewage treatment is considered to be low from both evaluated uses.

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

- Risk mitigation comparable to 10 m spray-free zones is required to protect fish and aquatic invertebrates for the foliar use in vine.

Critical areas of concern

- The risk to fish and aquatic invertebrates is high and risk mitigation measures are required for the foliar use in vine.
- Based on the available information, soil photolysis metabolites CGA 339833 and CGA 192155 (relevant for foliar spray use only) have the potential to leach to groundwater above the trigger of 0.1 µg/L under vulnerable conditions (to be confirmed by new modelling). A full assessment of the toxicological relevance of these metabolites has not been performed in line with the Guidance document.

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

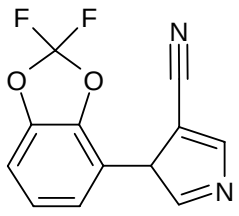
(Abbreviations used in this list are explained in appendix 2)

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

Active substance (ISO Common Name) ‡	Fludioxonil
Function (*e.g.* fungicide)	Fungicide

Rapporteur Member State	Denmark
Co-rapporteur Member State	None

Identity (Annex IIA, point 1)

Chemical name (IUPAC) ‡	4-(2,2-difluoro-1,3-benzodioxol-4-yl)-1*H*-pyrrole-3-carbonitrile
Chemical name (CA) ‡	4-(2,2-difluoro-1,3-benzodioxol-4-yl)-1*H*-pyrrole-3-carbonitrile
CIPAC No ‡	522
CAS No ‡	131341-86-1
EC No (EINECS or ELINCS) ‡	Not allocated
FAO Specification (including year of publication) ‡	None
Minimum purity of the active substance as manufactured ‡	950 g/kg fludioxonil
Identity of relevant impurities (of toxicological, ecotoxicological and/or environmental concern) in the active substance as manufactured	None
Molecular formula ‡	$C_{12}H_6F_2N_2O_2$
Molecular mass ‡	248.2 g/mol
Structural formula ‡	

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

Physical and chemical properties (Annex IIA, point 2)

Melting point (state purity) ‡	199.8°C (98.8%)
Boiling point (state purity) ‡	Decompose before boiling
Temperature of decomposition (state purity)	Thermal decomposition starts at about 306°C (99.8%)
Appearance (state purity) ‡	Pure material: faintly yellow powder (98.9 %) Technical material: e.g. yellow powdered solid (88.4 %)
Vapour pressure (state temperature, state purity) ‡	3.9 x 10^{-7} Pa at 25 °C (extrapolated)
Henry's law constant ‡	5.4 x 10^{-5} Pa m3 mol^{-1}
Solubility in water (state temperature, state purity and pH) ‡	1.8 mg/L (25°C, 99.8%) The solubility has not been carried out at different pHs as the molecule does not dissociate within the range pH 2 to pH 12.
Solubility in organic solvents ‡ (state temperature, state purity)	The solubility in different organic solvents at 25°C was determined to be : acetone: 190 g / L dichloromethane: 7.3 g / L ethyl acetate 86 g / L hexane 10^{-3} g / L methanol 42 g / L octanol 20 g / L toluene 2.7 g / L
Surface tension ‡ (state concentration and temperature, state purity)	σ = 47.7 - 48.5 mN/m (measured at 100% saturated solution 1.8 mg/L) Fludioxonil has to be regarded as a surface active substance.
Partition co-efficient ‡ (state temperature, pH and purity)	log P_{OW} = 4.12 at 25°C Effect of pH was not investigated since there is no dissociation in water in the environmentally relevant pH-range
Dissociation constant (state purity) ‡	The estimated dissociation constants of fludioxonil in water were found to be (purity 99.8%): pK_{a1} = < 0 (basic) pK_{a2} = ~14.1 (acidic)

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

UV/VIS absorption (max.) incl. ε ‡ (state purity, pH)	Purity: 99.9% solution / wavelength [nm] / molar extinction coefficient [L / mol · cm] neutral / 266 / 12384 acidic / 265 / 12327 basic / 271 / 11790 No ε for absorbency > 290 nm, but this is acceptable as quantum yield is determined (In cases where no absorption above 290 nm is observed the ε value at 290 nm should be given.
Flammability ‡ (state purity)	Not highly flammable (96.8 %)
Explosive properties ‡ (state purity)	Not explosive (96.8 %)
Oxidising properties ‡ (state purity)	Not oxidising (96.8 %)

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

Summary of representative uses evaluated fludioxonil*

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)	kg as/hL min – max (l)	water L/ha min – max	kg as/ha min – max (l)		
Wine grapes	Southern and Northern Europe	Switch 62.5 WG	F	*Botrytis cinerea, Aspergillus carbonarius*	WG	250 g fludioxonil /kg	Foliar spray	BBCH 55-81	2	21	0.025-0.25	100 - 1000	0.250	21	[1]
Table grapes	Southern Europe		F					BBCH 60-85						7	[1]
Wheat	Southern and Northern Europe	Celest 025 FS	F	*Microdochium nivale Fusarium spp. Tiletia carie, Septoria sp. Helmintho-sporium sp.*	FS	25 g fludioxonil /L	Seed treat-ment	Not relevant	1	-	5.0 g as/100 kg seed	Undiluted - max. 1.5 L/per 100 kg of seed	0.005-0.00875	Not relevant	Sowing rate: 100- 175 kg/ha

[1] The risk assessment could not be concluded due to a data gap identified in section 4.

* 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

(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

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(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	(m) PHI - minimum pre-harvest interval

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Appendix 1.2: Methods of Analysis

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

Technical as (analytical technique)	RP-HPLC-UV
Impurities in technical as (analytical technique)	RP-HPLC-UV
Plant protection product (analytical technique)	RP-HPLC-UV

Analytical methods for residues (Annex IIA, point 4.2)

Residue definitions for monitoring purposes

Food of plant origin		Fludioxonil
Food of animal origin		Sum of fludioxonil and its metabolites, which can be oxidised to metabolite CGA 192155 (2,2-difluro-benzo[1,3]dioxole-4-carboxylic acid)
Soil		Fludioxonil
Water	surface	Fludioxonil
	drinking/ground	Fludioxonil
Air		Fludioxonil (by default)

Monitoring/Enforcement methods

Food/feed of plant origin (analytical technique and LOQ for methods for monitoring purposes)	Method DFG-S19 (multi residue method), LC-MS/MS LOQ: 0.01 mg/kg (grapes and wheat grain)
Food/feed of animal origin (analytical technique and LOQ for methods for monitoring purposes)	No analytical method is required, since no MRL are proposed.
Soil (analytical technique and LOQ)	HPLC-UV 0.02 mg/kg HPLC-MS-MS 0.01 mg/kg
Water (analytical technique and LOQ)	HPLC-UV 0.05 µg/L (drinking water) HPLC-UV 0.1 µg/L (drinking water)
Air (analytical technique and LOQ)	HPLC-UV 2 µg/m³
Body fluids and tissues (analytical technique and LOQ)	Not required [substance is not classified as toxic (T) or very toxic (T^+)]

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

	RMS/peer review proposal
Active substance	No classification required

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Appendix 1.3: Impact on Human and Animal Health

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

Rate and extent of oral absorption ‡	80% based on urinary and biliary excretion after low dose rat study
Distribution ‡	Uniformly distributed (highest residues found in liver kidney and lungs)
Potential for accumulation ‡	No potential
Rate and extent of excretion ‡	15 % in the urine and about 70 % in the faeces within 24 hours. The excretion was mainly via the bile.
Metabolism in animals ‡	No parent compound in urine, approx. 10% parent in faeces. In bile approx. 56% of glucuronide conjugate of metabolite SYN 518577
Toxicologically relevant compounds ‡ (animals and plants)	Fludioxonil
Toxicologically relevant compounds ‡ (environment)	Fludioxonil

Acute toxicity (Annex IIA, point 5.2)

Rat LD_{50} oral ‡	>5000 mg/kg bw	
Rat LD_{50} dermal ‡	>2000 mg/kg bw	
Rat LC_{50} inhalation ‡	>2.6 mg/L (4 h, nose only)	
Skin irritation ‡	Non-irritant	
Eye irritation ‡	Non-irritant	
Skin sensitisation ‡	Non-sensitiser (M&K test)	

Short term toxicity (Annex IIA, point 5.3)

Target / critical effect ‡	Liver; rat, mice, dog (increased weight, hepatocyte hypertrophy, bile duct proliferation) Kidney; rat, mice (increased weight, nephropathy)	
Relevant oral NOAEL ‡	58.5 mg/kg bw/day (90-day dog) 64 mg/kg bw/day (90-day rat)	
Relevant dermal NOAEL ‡	200 mg/kg bw/day, females (3 weeks rat)	
Relevant inhalation NOAEL ‡	No studies submitted, not required	

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Genotoxicity ‡ (Annex IIA, point 5.4)

……..	No genotoxic potential	

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

Target/critical effect ‡	Liver; rat, mice (increased weight, hepatocyte hypertrophy, bile duct proliferation) Kidney; rat, mice (increased weight, nephropathy)	
Relevant NOAEL ‡	37 mg/kg bw/day (2-y rat)	
Carcinogenicity ‡	Not carcinogenic	

Reproductive toxicity (Annex IIA, point 5.6)

Reproduction toxicity

Reproduction target / critical effect ‡	Decreased bodyweight parental and pups. No reproductive effects	
Relevant parental NOAEL ‡	21 mg/kg bw/day (parental and offspring)	
Relevant reproductive NOAEL ‡	212mg/kg bw/day (reproductive)	
Relevant offspring NOAEL ‡	21 mg/kg bw/day (parental and offspring)	

Developmental toxicity

Developmental target / critical effect ‡	Reduced bodyweight gain in dams. No developmental effects	
Relevant maternal NOAEL ‡	10 mg/kg bw/day (maternal, rabbit) 100 mg/kg bw/day (maternal, rat)	
Relevant developmental NOAEL ‡	300 mg/kg bw/day (foetuses, rabbit) 1000 mg kg/bw/day (foetuses, rat)	

Neurotoxicity (Annex IIA, point 5.7)

Acute neurotoxicity ‡	No studies submitted, no concern from other studies	
Repeated neurotoxicity ‡	No studies submitted, no concern from other studies	
Delayed neurotoxicity ‡	No studies submitted, no concern from other studies	

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Other toxicological studies (Annex IIA, point 5.8)

Mechanism studies ‡	No studies submitted
Studies performed on metabolites or impurities ‡	Metabolites CGA 192155, 265378, 308103, 308565 and 339833 are tested for acute toxicity and genotoxicity in Ames test. Rat, $LD_{50,}$ oral 1140 mg/kg bw for CGA 308103 and >2000 mg/kg bw for the other metabolites. Ames test negative for all metabolites. For CGA 339833 (metabolite in plants, soil and water) NOAEL 90-d rat is 58/66 mg/kg bw/day males/females. No genotoxic potential.

Medical data ‡ (Annex IIA, point 5.9)

……..	No adverse effects on health in manufacturing personnel. No cases of poisoning are reported. No epidemiological studies are available

Summary (Annex IIA, point 5.10)

	Value	Study	Safety factor
ADI ‡	0.37 mg/kg bw/day	2-y rat	100
AOEL ‡	0.59 mg/kg bw/day	90-d dog	100
ARfD ‡	Not allocated - not necessary		

Dermal absorption ‡ (Annex IIIA, point 7.3)

Switch 62.5 WG	0.3% for mixing/loading and 1.7% for application based on *in-vivo* rat study and comparative *in-vitro* study in rat and human skin
Celest 025 FS	1.7%

Exposure scenarios (Annex IIIA, point 7.2)

Operator	Foliar application with Switch 62.5 WG on grapes with tractor mounted equipment at a maximum of 2 applications per season at a maximum rate of 2 x 250 g fludioxonil per ha: 1.1% of the AOEL (German model, no PPE) 12.6% and 4.5 % of the AOEL (UK-POEM with low volume application and high volume application respectively, no PPE).

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	Handheld application equipment: 0.65% of the AOEL (German model, no PPE) Seed treatment with Celest 025 FS: <10% of the AOEL (Seed Tropex)
Workers	Exposure after foliar application with Switch 62.5 WG on grapes: 2.5% of AOEL (German re-entry model after application with both tractor mounted and hand-held equipment, no PPE) Sowing treated seed: 0.9% of the AOEL.
Bystanders	Foliar application with Switch 62.5 WG on grapes: 0.14% of the AOEL based on drift data from the Ganzelmeier model (distance of 10 m from the source, application with tractor mounted equipment. The exposure is expected to be less after application with hand-held equipment).

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

	RMS/peer review proposal
Substance classified (name)	No classification

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Appendix 1.4: Residues

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

Plant groups covered	Seed treatment : Cereals (wheat) Foliar treatment : Fruits (grapes and peach); Fruiting vegetables (tomatoes); Bulb vegetables (onion); Leafy vegetables (lettuce)
Rotational crops	Leafy vegetables: lettuce and mustard Cereals: wheat and corn Root/tuber: turnips, sugar beet and radish
Metabolism in rotational crops similar to metabolism in primary crops?	Yes
Processed commodities	Studies conducted under representative hydrolytic conditions, simulating pasteurization, baking, brewing, boiling and sterilization
Residue pattern in processed commodities similar to residue pattern in raw commodities?	Yes
Plant residue definition for monitoring	Fludioxonil
Plant residue definition for risk assessment	Sum of fludioxonil and its metabolites, which can be oxidised to metabolite CGA 192155 (2,2-difluro-benzo[1,3]dioxole-4-carboxylic acid)
Conversion factor (monitoring to risk assessment)	1 for cereals after seed treatment, fruits and leafy vegetables

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

Animals covered	Goat and hen
Time needed to reach a plateau concentration in milk and eggs	Milk: 14 days Eggs: 5 days
Animal residue definition for monitoring	Not required (In case of use extension leading to significant livestock exposure, sum of fludioxonil and its metabolites, which can be oxidised to metabolite CGA 192155 (2,2-difluro-benzo[1,3]dioxole-4-carboxylic acid))
Animal residue definition for risk assessment	Not required (In case of use extension leading to significant livestock exposure, sum of fludioxonil and its metabolites, which can be oxidised to metabolite CGA 192155 (2,2-difluro-benzo[1,3]dioxole-4-carboxylic acid))
Conversion factor (monitoring to risk assessment)	None
Metabolism in rat and ruminant similar (yes/no)	Yes

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Fat soluble residue: (yes/no)	Not assessed

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

…….	Lettuce, wheat (forage, hay, straw, and grain), turnip (tops and roots) planted/sowed 30 DAT: <0.01 mg/kg

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

…….	Fludioxonil residues in plant samples are stable for at least 24 months when stored at ≤–16° C. Fludioxonil residues in animal product samples, determined as CGA 192155, are stable for at least 12 months when stored at ≤–16° C.

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)	No	No	No
Potential for accumulation (yes/no):	No	No	No
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 required	Not required	Not required
Liver			
Kidney			
Fat			
Milk			
Eggs		Not required	

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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 Mediterranean Region, field or glasshouse, and any other useful information	Trials results relevant to the representative uses (mg fludioxonyl/kg)	Recommendation/comments	MRL estimated from trials according to the representative use	HR (c)	STMR (b)
Wine grapes	Northern	11 trials: 0.16, 0.26, 0.30, 0.39, 0.42 (2), 0.97, 1.32, 1.33, 1.76 and 2.37 mg/kg	Used application rate: 2 x 0.250-0.300 kg a.s./ha; PHI: 21 days	3	2.37	0.42
Wine grapes	Southern	9 trials: 0.22, 0.31, 0.38, 0.41, 0.43, 0.53 (2), 0.61 and 1.07 mg/kg	Used application rate: 2 x 0.250-0.300 kg a.s./ha; PHI: 15-21 days	3	1.07	0.43
Table grapes	Southern	9 trials: 0.37, 0.41, 0.42, 0.49, 0.51, 0.55, 0.94, 0.95 and 1.32 mg/kg	Used application rate: 2 x 0.250-0.300 kg a.s./ha; PHI: 7 days	2	1.32	0.51
Wheat grain	Northern/Southern	51 trials: <0.02 (35) and <0.04 (16) mg/kg	Used application rate: 5.00-6.07 g/100 kg seed; PHI: 95-243 days	0.05*	0.04	0.02

(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

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

ADI	0.37 mg/kg bw/day
TMDI (% ADI) according to WHO European diet	< 5 % of ADI for adults. Calculations are based on WHO consumption model.
TMDI (% ADI) according to national (to be specified) diets	< 5 % of ADI for adults, children and infants. Calculations are based on German and UK consumption models.
IEDI (WHO European Diet) (% ADI)	Not required
NEDI (specify diet) (% ADI)	Not required
Factors included in IEDI and NEDI	Not required
ARfD	Not applicable
IESTI (% ARfD)	Not applicable
NESTI (% ARfD) according to national (to be specified) large portion consumption data	Not applicable
Factors included in IESTI and NESTI	Not applicable

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

Crop/ process/ processed product	Number of studies	Processing factors		Amount transferred (%) (Optional)
		Transfer factor	Yield factor	
Grapes (Juice)	18	0.80	Not relevant	Not calculated
Grapes (Raisins)	15	1.08		Not calculated
Grapes (Young wine < 56 days storage)	9	0.19		Not calculated
Grapes (Mature wine > 170 days storage)	6	0.04		Not calculated

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

Grapes (wine):	3 mg/kg
Grapes (table):	2 mg/kg
Wheat grain:	0.05* mg/kg

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

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Appendix 1.5: Fate and behaviour in the Environment

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

Mineralization after 100 days ‡	0.6-11.1% AR after 90 d [^{14}C-pyrrole]-label. n=11 10.8-20.5% AR after 90 d [U-^{14}C-phenyl]-label n=4 Sterile conditions: No mineralisation after 90 days
Non-extractable residues after 100 days ‡	2.4-18.0% AR after 90/84 d [^{14}C-pyrrole]-label. n=11 17.3-19.4% AR after 90 d [U-^{14}C-phenyl]-label n=4
Metabolites requiring further consideration ‡ - name and/or code, % of applied (range and maximum)	No relevant metabolites (10% or more) were formed under laboratory conditions in the dark. (By soil photolysis 3 metabolites above or close to 10% are formed – see below)

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

Anaerobic degradation ‡

Mineralization after 100 days	Mineralisation 0.08-1.6% AR after 30 d aerobic + 0.0-1.3% AR after 60 d anaerobic incubation [^{14}C-pyrrole]-label. n=2 Mineralisation 0.61% AR after 30 d aerobic + 0.19% AR after 60 d anaerobic incubation [U-^{14}C-phenyl]-label n=1
Non-extractable residues after 100 days	Non extractable residues 0.6-1.9% AR after 30 d aerobic + 0.2-2.3% AR after 60 d anaerobic incubation [^{14}C-pyrrole]-label. n=2 Non extractable residues 4.2% AR after 30 d + 0.0% AR after 60 d anaerobic incubation [U-^{14}C-phenyl]-label n=1
Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	No major metabolites were formed

Soil photolysis ‡

Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	Mineralisation 9% AR after 44 days of sun light eqv. [^{14}C-pyrrole]-label. n=1 Non-extractable residues 7% AR after 44 days of sun light eqv. [^{14}C-pyrrole]-label. n=1 Mineralisation 8% AR after 44 d. [U-^{14}C-phenyl]-label n=1 Non-extractable residues 16% AR after 44 d of sun light. [U-^{14}C-phenyl]-label n=1 <u>Irradiated soils:</u>

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	Max amount of metabolites in laboratory photolysis studies (latitude of 40 °N ≈ Naples South Italy): CGA 339833 9.1%; 18.8 days summer sunlight eqv. CGA 192155 11.7%; 19.7 days summer sunlight eqv CGA 265378 12.3%; 19.7 days summer sunlight eqv. <u>Dark controls</u> Max amount of metabolites: 4.9 % AR day 0 (sum of all metabolites – no single compounds identified). Max amount of metabolites in field photolysis study in Switzerland (latitude of 47 °N) on bare soil: CGA 339833 8% CGA 192155 13% CGA 265378 not detected

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

Method of calculation	simple first order kinetic
Laboratory studies (range or median, with n value, with r^2 value)	<u>Fludioxonil (degradation in the dark)</u>: DT_{50lab} (20°C, aerobic): 119 – > 365 days, median 239 d, n= 13. In details the results were as follow: Sandy loam: DT_{50} 236 days, r^2 = 0.857 Sandy loam: DT_{50} 292 days, r^2 = 0.813 Sandy loam: DT_{50} 272 days, r^2 = 0.865 Sandy loam: DT_{50} 272 days, r^2 = 0.795 Sand: DT_{50} >365 days, r^2 = 0.846 Sandy loam: DT_{50} = 150 days, r^2 = 0.983 Sandy loam: DT_{50} = 253 days, r^2 = 0.921 Loamy sand: DT_{50} = 250 days, r^2 = 0.941 Silt loam: DT_{50} = 239 days, r^2 = 0.977 Silt loam: DT_{50} = 119 days, r^2 = 0.983 Silt loam: DT_{50} = 175 days, r^2 = 0.991 Silt loam: DT_{50} = 148 days, r^2 = 0.991 Silt loam: DT_{50} = 200 days, r^2 = 0.980 For FOCUS modelling, DT_{50} values normalised to

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standard conditions ie. 20ºC and 100 % field capacity using ModelManager v1. 01:

DT_{50} = 100 – 569 days, median 164 days, n = 9

In details the results were as follow (some of the values are averages why r^2 values are specified as an interval):

Sandy loam; 160 days; r^2 = 0.813-865, n = 3

Sandy loam; 186 days; r^2 = 0.795

Sand; 569 days; r^2 = 0.846

Sandy loam; 100 days; r^2 = 0.983

Sandy loam; 169 days; r^2 = 0.921

Loamy sand; 177 days; r^2 = 0.941

Silt loam; 151 days; r^2 = 0.977

Silt loam; 120 days r^2 = 0.983 –0.991, n = 3

Silt loam; 164 days; r^2 = 0.980

DT_{50lab} (30°C, aerobic): 84 days, r^2 = 0.968

Fludioxonil (degradation in the light):

In thin layer soil plates in lab using a two-compartment first order model: light intensity was equal to summer sunlight at latitude 30° N (corresponding to north Africa).

Above 0.5 mm: DT_{50}: 0.86 and 2 d, n=2

Below 0.5 mm: DT_{50}: 50 and 98 d, n=2

Combined one-compartment 1. order: DT_{50}: 10 and 14 d, n=2.

Photometabolites (degradation in the dark):

CGA 192155: first order DT_{50lab} 16, 16 and 24 d, n=3, r^2 = 0.955 – 0.985. Mean value 19 d.

CGA 339833: first order DT_{50lab} 9, 12 and 16 d, n=3, r^2 = 0.992 – 0.994. Mean value 12 d.

(degradation in the light):

CGA 265378 DT_{50} was not studied as it is unstable in soil/water slurry in adsorption study. From a soil photolysis study a worst case DT_{50} was estimated to be 19 d.

For FOCUS modelling, DT_{50} was normalised to standard conditions ie. 20ºC and 100 % field capacity

Mean DT_{50} (1. order kinetic) were:

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	CGA 192155: 12.9 d. CGA 339833: 8.7 d. CGA 265378 DT_{50} could not be normalized, worst case value of 19d is used. In details the results were as follow: CGA 192155: 8.56 d., 18.3 d., 10.8 d. CGA 339833: 5.66 d., 12.4 d., 8.15 d.
	DT_{90lab} (20°C, aerobic in the dark): Fludioxonil: 3.3 * 365 d, n=7. CGA 192155: DT_{90lab} 52, 54 and 79 d, n=3, r^2 = 0.955 – 0.985. Mean value 62 d. CGA 339833: DT_{90lab} 31, 40 and 53 d, n=3, , r^2 = 0.992 – 0.994. Mean value 41 d.
	DT_{50lab} (10°C, aerobic): Fludioxonil >365 d, n=1. 80.6% AR remained after 362 d.
	DT_{50lab} (20°C, anaerobic): Fludioxonil: Practically no degradation.
	Degradation in the saturated zone: No data submitted; not required.
Field studies (state location, range or median with n value)	<u>Spray on bare ground</u> (first order kinetic): France: DT_{50f} = 15 d, DT_{90f} = 49 d; n=1; r^2 = 0.81 Germany: DT_{50f} = 8-43 d, DT_{90f} = 28-142 d; n=6; r^2 = 0.71-0.85 Germany in details: Sandy loam; DT_{50f} = 28; r^2 = 0.85 Sand; DT_{50f} = 9; r^2 = 0.78 sand to silt loam; DT_{50f} = 8; r^2 = 0.81 Loam; DT_{50f} = 43; r^2 = 0.78 silt loam; DT_{50f} = 14; r^2 = 0.71 silt loam; DT_{50f} = 14; r^2 = 0.82 Switzerland: DT_{50f} = 16 d; n=1; r^2 not stated Photolysis field study on bare ground using a two-compartment first order model: Above 0.5 mm soil: DT_{50}: 0.1 d, n=1 Below 0.5 mm soil: DT_{50}: 60 d, n=1 Using combined one-compartment 1. order kinetic: DT_{50}: 16 d, n=1.
	<u>Spray in grape vine</u> (first order kinetic): Italy: DT_{50f} = 10 d, DT_{90f} = 34 d; n=1; r^2 = 0.99

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	DT_{50f} in vine and bareground (first order kinetic): Median DT_{50} = 14 d, n=9 90^{th} percentile DT_{50} = 31 d, n=9 Worst case DT_{50} = 43 d
Soil accumulation and plateau concentration	Does not accumulate continuously after repeated use over 8 years, foliar use in grape vine. Plateau reached after 4-6 years with a max concentration of 0.7 and 1.1 mg/ kg in 0-10 cm soil layer after application of 2x300 or 2x500 g as/ha/year respectively, declining to 0.23 - 0.37 mg/kg in the following years. In two 5 year accumulation studies on grapevine (foliar use 2 x 300 g as/ha/year or 1-2x 500 gas/ha/year), the concentration reached a maximum of 2.0 mg/kg and 0.78 mg/kg in the year 3 and 4 respectively, and was declining to 1.35 mg/kg and 0.63 mg/kg within 5 and 3 years, respectively. The foliar use scenario is considered a worst case and covers for seed treatment use

Soil adsorption/desorption (Annex IIA, point 7.1.2)

K_f /K_{oc} K_d	Fludioxonil $K_{foc\ (ads)}$ = 12000-385000, mean 145600, median 75000 mL/g OC, n=5 $K_{f\ ads}$= 290-61000, mean 14292, median 2100 mL/g soil, n=5 $1/n_{\ ads}$ = 0.81-1.19, mean 1.00, median 0.95, n=5 CGA 192155, n=4 $K_{foc(ads)}$ = 11.7-42.4, mean 23.5, median19.9 mL/g OC K_{Fads}= 0.06-0.28, mean 0.21, median 0,26 mL /g soil $1/n_{\ ads}$ = 0.769-0.841, mean 0.803, median 0.800 CGA-339833, n=4 $K_{foc(ads)}$ = 1.94-5.79, mean 4.03[1], median 4.2 mL/g OC K_{Fads}= 0.011-0.109, mean 0.06, median 0.06 mL /g soil $1/n_{ads}$ = 0.072-1.08, mean 0.730[2], median 0.884

[1] For FOCUS modelling the appropriate value should be: mean K_{foc} = 4.7 L/kg (n=3, excluding the valued for Hanford sandy loam soil with 1/n value of 0.0728).

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

	CGA 265378, unstable, rough estimates, n=4 K_{oc} = 36-111, mean 68.3, median 80 mL /g OC K_{Fads} = 0.646-0.829, mean 0.749 mL/g soil Due to fast degradation of CGA 265378 only the ratio of concentrations were determined and the adsorption koefficients were calculated from Kd = Csoil/Cwater.
pH dependence (yes / no) (if yes type of dependence)	No

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

Column leaching ‡	Guideline: BBA Richtlinie Part IV, 4-2, 1986; US-EPA Subdiv. N, 163-1, 1982. Total leachate residues: 0.02 – 0.1% of applied dose after 200 mm artificial rain in 2 days, n=4 different soils
Aged residues leaching ‡	Guideline: BBA Richtlinie Part IV, 4-2, 1986; US-EPA Subdiv. N, 163-1, 1982. Two different set-up:
	Total leachate residues: 1.1-3.6% of applied AR after 200 mm artificial rain in 2 days after 321 days of ageing, n=2 different soils. Total leachate residues: 0.02% of applied AR after 508 mm artificial rain in 45 days after 32 days of ageing, n=2 different soils. Radioactivity in leachates not identified.
Lysimeter/ field leaching studies ‡	No studies. No indication of pronounced leaching in field degradation studies.

PEC (soil) (Annex IIIA, point 9.1.3)

Parent	
Method of calculation	Worst-case soil concentrations. The assumptions are even distribution in the top 5 cm layer and a bulk density of 1.5 g/cm^3. Plant interception is assumed to be 50%. No losses due to surface runoff, leaching or volatilisation. DT_{50} = 43 days (worst case field study).
Application data	**Foliar application**: 2 x 0.25 kg as/ha with 21 days interval

[2] For FOCUS modelling the appropriate value should be: mean 1/n = 0.95 (n=3, excluding the valued for Hanford sandy loam soil with 1/n value of 0.0728).

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

The worst case DT_{50} has been recalculated to 43 days and therefore PECs has been recalculated in Addendum 2 to Annex B8, March 2007. The new initial PECs after 2 applications (day 0) is 285 µg/kg using 50 % plant interception. It is important to mention that the ecotox risk assessments have been done with a conservative value of 667 µg/kg.

In accordance with the new guidance for LoEP the actual and TWA values have been deleted as they are not used in the risk assessment.

$PEC_{(s)}$ (mg/kg)	Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial	-		285	

Parent Method of calculation	Worst-case soil concentration. The assumptions are even distribution in the top 5 cm layer and a bulk density of 1.5 g/cm^3. No losses due to surface runoff, leaching or volatilisation.
Application data	**Seed dressing**: 1 x 8.75 g as/ha

In accordance with the new guidance for LoEP the actual and TWA values have been deleted as they were not used in the risk assessment.

$PEC_{(s)}$ (mg/kg)	Single application Actual	Single application Time weighted average	Multiple application Actual	Multiple application Time weighted average
Initial	-		11.67	

Metabolites Method of calculation	Worst-case based on the initial concentration of parent (table above) x max % formation x molar weight ratio (parent/metabolite). The peak max % formation of the metabolites are 11.7% (CGA 192155), 12.3% (CGA 265378), and 9.1% (CGA 339833).
Application rate	Foliar application: 2 x 0.25 kg as/ha with 21 days interval Seed dressing: 1 x 8.75 g as/ha

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

$PEC_{(s)}$ (µg/kg) Initial	0 d	Foliar application: 2 x 0.25 kg as/ha with 21 days interval	
		CGA 192155	28
		CGA 265378	40
		CGA 339833	35

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

Hydrolytic degradation of the active substance and metabolites > 10 % ‡	pH 5: no significant hydrolysis at 25 °C Hydrolysis metabolite CGA 339833 (metabolite from aqueous photolysis): from a hypothetical quantum yield equal to one, maximum photolysis rates in the environment were estimated for latitudes 30°N, 40°N and 50°N in summer. With the inclusion of epsilon values $\varepsilon \geq 2$ the program GCSOLAR estimated minimum half-lives of 265-907 days. Metabolite CGA 339833 is judged to be hydrolytically stable from aqueous photolysis.
	pH 7: no significant hydrolysis at 25 °C No relevant metabolites. Hydrolysis metabolite CGA 339833 at pH 7 and 50°C: DT50 = 126 days, no major metabolites.
	Fludioxonil at pH 9 and 25°C: no significant hydrolysis, no relevant metabolites. Hydrolysis metabolite CGA 339833 at pH 9 and 50°C: DT50 = 20 days, one major unidentified metabolite (M4) max at 62% AR day 41.
Photolytic degradation of active substance and metabolites above 10 % ‡	DT50, aqu. photolysis (fludioxonil) = 10 days (30°N summer sunlight equivalents). 3 major metabolites were found in still increasing concentrations until end of study day 30 sunlight eqv: CGA 339833 at 30.5% AR, CGA 344623 at 12.4% AR and A5 at 11.3% AR. Proposed structure of A5 is presented in Annex B.8 figure B.8.4.2-1.
Quantum yield of direct phototransformation in water at $\Sigma > 290$ nm	2.6×10^{-3} mol $Einstein^{-1}$
Readily biodegradable ‡ (yes/no)	No data submitted, substance considered not ready biodegradable.

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

Degradation in water/sediment <u>in dark</u>	Laboratory study (aerobic, 20ºC, dark, n=2), first order kinetics:	Microcosm study (n=4 different concentrations), first order kinetics:
- DT_{50} water	1-2 days (due to adsorption)	10 days
- DT_{90} water	-	-
- DT_{50} whole system	451-699 days	51-154 days
- DT_{90} whole system	> 1000 days	-
- DT_{50} sediment	-	-
- DT_{90} sediment	-	-
Mineralization	1.6-1.9 % of AR after 177 days	
Non-extractable residues	14.4-16.8 % of AR after 177 days	
Distribution in water / sediment systems (active substance)	water: 3.4-7.4% AR day 177 sediment extractable: 77-83.5% AR day 177	Max 3% in sediment
Distribution in water / sediment systems (metabolites)	Unidentified metabolite fractions in sediment and water accounted for 0.1-6.2% AR	No metabolites detected

Degradation in water/sediment, <u>light exposed</u>	Laboratory study (aerobic, 20ºC, light, n=2), 2-compartment first order kinetics:	Dark control, n=2
- DT_{50} water	1.7-1.8 d	6.4-6.7 d (adsorption)
- DT_{90} water	9.8-14.5d	21.3-22.3 d
- DT_{50} whole system	18.8-25.2 d	> 1000 d
- DT_{90} whole system	133-148 d	> 1000 d
- DT_{50} sediment	57.8-65.4 d	-
- DT_{90} sediment	192-217 d	-
Mineralization	6.4-10.4% AR after 100 days (light exposed) < 0.1% AR day 100 in the dark	
Non-extractable residues	36.5-42.68% AR after 100 days (light exposed) 6.5-7.3% AR day 100 in the dark	

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

Distribution in water / sediment systems (active substance)	water: 63.5-64.2% of AR day 1, 16.3-21.2% AR day 7 0.1-0.2% AR day 100. sediment: 28.5-29.0% of AR day 1, 53.4-53.5% AR day 7 16.6-20.0% AR day 100.	water: 19.3-20.0% AR day 15 2.2-2.7% AR day 100 sediment: 69.7-69.8% AR day 15 83.5-85.6% AR day 100
Distribution in water / sediment systems (metabolites)	The only major metabolite was CGA 192155 with max water: 10.2-11.9% AR day 71/100 and max sediment: 5.4-5.5% AR day 100. At max 24% AR at up to 45 unidentified metabolite fractions, no fraction > 5.1% AR.	-

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

PEC (surface water)

Updated PECsw values have been presented in Addendum 2 to Vol. B8.

Parent and metabolites	**Wine grapes application**
Parameters used in FOCUSsw step 1-3	Values are given for: Fludioxonil; CGA265378; CGA 192155; CGA 339833 respectively Molecular weight (g/mol): 248.20; 278.20; 202.10; 312.20 Water solubility (mg/L): 1.80; 120; 4900; 31000 Vapour pressure (Pa): 2.9x10-7; <8.4x10-6; 3.7x10-5; <4.3x10-6 Koc (L/kg): 145000; 68; 23.5; 4 1/n: 1.0: 0.9; 1.0; 0.84 Max % in soil: 100; 12; 12; 9 DT_{50} soil (d): 218[3];19; 12.9;8.7 days Max % in water/sed: 100: 3.8; 17.3; $1x10^{-6}$ DT_{50} water/sediment system (d): 14; 1000; 1000; 1000 DT_{50} water (d): 22; 1000; 1000; 1000 DT_{50} sediment (d): 1000; 1000; 1000; 1000

[3] The median value of 164 days recalculated (addendum 2, March 2007) in line with the recommendations and indications provided by MS experts' in PRAPeR 07 meeting should be used in the modelling.

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

Parameters used in FOCUSsw step 4	10 m buffer zone
Application rate	Crop: Vine Crop interception: 50% Number of applications: 2 Interval (d): 21 days Application rate(s): 250 g as/ha
Main routes of entry	Default % drift Step1-3, 10 m buffer Step 4 10 % runoff/drainage (at FOCUSsw Step 1 and 2)

In accordance with the new guidance for LoEP values that have not been used in the risk assessment been deleted.

Step 4 values for 5 m (parenthesis) and 10 m buffer zones are given

Simulation	Compound	Scenario	Maximum PEC_{SW} (µg/L)
Step 1	Fludioxonil	Late	14.2
	CGA 265378	Late	20.6
	CGA 339833	Late	19.4
	CGA 192155	Late	17.7
Step 2	Fludioxonil	S. Europe, Late, 1 appl.	6.69
Step 3	Fludioxonil	D6 Ditch, 1. appl.	3.85
	Fludioxonil	R1 Pond, 1. appl.	0.144
	Fludioxonil	R1 Stream, 1. appl.	2.83
	Fludioxonil	R2 Stream, 1. appl.	3.79
	Fludioxonil	R3 Stream, 1. appl.	3.98*
	Fludioxonil	R4 Stream, 1. appl.	2.83
Step 4	Fludioxonil	D6 Ditch, 1. appl.	(2.33) 0.843
	Fludioxonil	R1 Pond, 1. appl.	(0.16) 0.092
	Fludioxonil	R1 Stream, 1. appl.	(2.06) 0.746
	Fludioxonil	R2 Stream, 1. appl.	(2.76) 1.00
	Fludioxonil	R3 Stream, 1. appl.	(2.90) 1.05
	Fludioxonil	R4 Stream, 1. appl.	(2.06) 0.746

* This change is due to a typing error in the DAR – and not due to change in results in the new modelling

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

PEC (sediment)

In accordance with the new guidance for LoEP Step 2-4 and TWA values have been deleted as they are not needed for the risk assessment (updated PECsed values have been presented in Addendum 2 to B8).See input values under PEC (surface water)

Simulation	Compound	Scenario	Maximum PEC_{SED} (µg/kg)
Step 1	Fludioxonil	Late	1280
	CGA 265378	Late	14.0
	CGA 339833	Late	0.770
	CGA 192155	Late	4.13

Seed treatment

For the sake of providing a preliminary risk assessment the RMS has extrapolated the values for the use in vine to seed treatment by adjusting the values according to the difference in applied dose (i.e. 250/8.75). This approach constitutes a worst case because a spray drift contribution is included, which is not relevant for seed treatment.

as PECsw = 0.000497 mg/L, Step 1 Late.

as PECsed = 0.045 mg/kg sed, Step 1 late $PEC_{SED-max}$

CGA339833 PECsw = 0.0194 mg/kg, Step 1 late

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

Updated PECgw values have been presented in Addendum 2 to B8. **For soil photolysis metabolites CGA 339833, CGA 192155 and CGA 265378: satisfactory calculations not available, data required for foliar spray use (both FOCUS PELMO and FOCUS PEARL).**

Method of calculation and type of study (*e.g.* modelling, field leaching, lysimeter)	Modelling using FOCUS model(s), with appropriate FOCUS gw scenarios, according to FOCUS guidance. Model used: FOCUS PELMO 3.3.2 and FOCUS PEARL 3.3.3. Scenarios (list of names): Châteaudun, Hamburg, Kremsmünster, Piacenza, Porto, Sevilla, Thiva. Crop: Vine Kinetic assumption: To simulate the biphasic degradation of fludioxonil the parent compound was instantaneously (DT_{50} = 0.1 days) partitioned into two compartments, F_light (48%) and F_dark (52%), degraded by photolysis and microbial processes respectively.

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

	Degradation in light: DT_{50lab} = 2 days (highest measured value, 1. order kinetic). Degradation in dark: median parent DT_{50lab} = 218[3] days (1. order kinetic, normalisation to 10kPa or pF2, 20°C with Q10 of 2.2). K_{foc} fludioxonil: 145000 mL/g (average), $^1/_n$ = 1 (mean).
Application rate	2 x 250 g as/ha SWITCH 62.5 WG, grapevine, spray interval of 14 days. First application: Châteaudun; 30th July, Hamburg; 11th August, Kremsmünster; 11th August, Porto; 5th July, Piacenza; 30th July, Sevilla; 15th August, Thiva; 16th July), crop interception: 70 %

$PEC_{(gw)}$	
Maximum concentration	No data available
Average annual concentration (Results quoted for modelling with FOCUS gw scenarios, according to FOCUS guidance)	FOCUS PELMO 3.3.2: Fludioxonil: <0.001 µg/L FOCUS PEARL 3.3.3: Fludioxonil: <0.001 µg/L

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

	Scenario	Fludioxonil (µg/L)	Metabolite (µg/L)		
			1	2	3
FOCUS PEARL 3.3.3/grapevine	Châteaudun, application 1 July	< 0.001			
	Hamburg, application 1 July	< 0.001			
	Kremsmünster, application 1 July	< 0.001			
	Piacenza, application 1 July	< 0.001			
	Porto, application 1 June	< 0.001			
	Sevilla, application 1 June	< 0.001			
	Thiva, application 1 June	< 0.001			

[3] The median value of 164 days recalculated (addendum 2, March 2007) in line with the recommendations and indications provided by MS experts' in PRAPeR 07 meeting should be used in the modelling.

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

	Scenario	Fludioxonil (µg/L)	Metabolite (µg/L)		
			1	2	3
FOCUS PELMO 3.2.2 /grapevine	Châteaudun, application 1 July	< 0.001			
	Hamburg, application 1 July	< 0.001			
	Kremsmünster, application 1 July	< 0.001			
	Piacenza, application 1 July	< 0.001			
	Porto, application 1 June	< 0.001			
	Sevilla, application 1 June	< 0.001			
	Thiva, application 1 June	< 0.001			

$PEC_{(gw)}$ From lysimeter / field studies

Not applicable

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

Direct photolysis in air ‡	Not relevant
Quantum yield of direct phototransformation	Not relevant
Photochemical oxidative degradation in air ‡	Latitude: standard season: standard Atkinson, $1.5x10^6$ OH radicals/cm^3, 12 h day DT_{50} 3.6 h
Volatilisation ‡	From plant surfaces: 7% of soil deposit over 24 h
	from soil: 1.6% of AR after 24 h (indirect method) 0.04% of AR after 24 h (direct method) < 2.6 ng/cm^2/h
Metabolites	No potentially volatile metabolites

PEC (air)

Method of calculation	Not calculated, not relevant low Henrys law constant and low volatility
$PEC_{(a)}$	
Maximum concentration	Not calculated, not relevant

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

Residues requiring further assessment

Environmental occurring metabolite requiring further assessment by other disciplines (toxicology and ecotoxicology).	Soil: fludioxonil, and soil photolysis metabolites CGA192155, and CGA265378 surface water: fludioxonil, CGA192155, CGA 265378 and CGA339833 sediment: fludioxonil ground water: fludioxonil, CGA 265378, CGA192155 and CGA339833 air: fludioxonil (by default)

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

Soil (indicate location and type of study)	No data available
Surface water (indicate location and type of study)	No data available
Ground water (indicate location and type of study)	No data available
Air (indicate location and type of study)	No data available

Points pertinent to the classification and proposed labelling with regard to fate and behaviour data

……..	R53 Not readily biodegradable

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

Appendix 1.6: Effects on non-target Species

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

Acute toxicity to mammals	LD_{50} > 5000 mg as/kg bw for fludioxonil LD_{50} > 5000 mg as/kg bw for SWITCH 62.5 WG[14] LD_{50} > 3000 mg as/kg bw for CELESTE 025 FS[152]
Chronic toxicity to mammals	NOAEL = 200 mg as/kg bw day (2-generation study in rats)
Acute toxicity to birds	LD_{50} = >2000 mg as/kg bw
Dietary toxicity to birds	LC_{50} > 5200 ppm ~ 833 mg as/kg bw day (Bobwhite quail)
Reproductive toxicity to birds	NOEC = 125 mg as/kg (~11.1 mg as/kg bw day) NOAEC = 700 mg as/kg (~62.8 mg as/kg bw day)

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

Based on the standard scenarios for vine and seed treatment in the Guidance document for birds and mammals for details see section 2.6.1 or B. 9.1 and B.9.4

Application rate (kg as/ha)	Crop	Category (*e.g.* insectivorous bird)	Time-scale	TER	Annex VI Trigger
0.25	Vine	Small herbivorous mammal	acute	169	10
0.25	Vine	Small herbivorous mammal	chronic	19	5
0.25	Vine	Insectivorous bird	acute	148	10
0.25	Vine	Insectivorous bird	short term	110	10
0.25	Vine	Insectivorous bird	long term	8.3	5
0.00875	Seed treatment	Granivorous mammal	acute	435	10
0.00875	Seed treatment	Granivorous mammal	chronic	17	5
0.00875	Seed treatment	Granivorous bird	acute	105	10
0.00875	Seed treatment	Granivorous bird	short term	44	10

[14] SWITCH 62.5 WG contains 25.1% fludioxonil & 37.6% cyprodinil
[15] CELESTE 025 FS contains 2.5% fludioxonil

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

Application rate (kg as/ha)	Crop	Category (*e.g.* insectivorous bird)	Time-scale	TER	Annex VI Trigger
0.00875	Seed treatment	Granivorous bird	chronic Tier 1 Tier 2	 **3.3** 6.2[2]	5
0.25	Vine	Fish eating mammal	chronic	296[1]	5
0.25	Vine	Fish eating bird	chronic	57[1]	5

[1] Based on whole body BCF for fish
[2] Refined based on reduced exposure using Ftwa factor of 0.53

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

Endpoints for products are expressed in mg fludioxonil/L

Group	Test substance	Time-scale	Endpoint	Toxicity (mg/L)
Oncorhynchus mykiss	Fludioxonil (CGA173506)	96 hr (flow-through)	Mortality (LC_{50})	0.23 mg as/L
Oncorhynchus mykiss	CGA339833	96 hr (Static)	Mortality (LC_{50})	>100 mg/L
Oncorhynchus mykiss *Lepomis macrochirus*	CGA 192155 SWITCH 62.5 WG[1]	96 h (static) 96 hr (static)	Mortality (LC_{50}) Mortality (LC_{50})	>100 mg/L 1.8 mg as /L
Oncorhynchus mykiss	CELESTE 025 FS[2]	96 hr (flow-through)	Mortality (LC_{50})	0.583 mg as/L
Oncorhynchus mykiss	Fludioxonil (CGA173506)	28 d (flow-through)	Growth (NOEC)	0.040 mg as/L
Pimephales promelas	Fludioxonil (CGA173506)	28 d (flow-through)	Mortality and growth (NOEC)	0.039 mg as/L
Oncorhynchus mykiss	SWITCH 62.5 WG[1]	21 d (flow-through)	Mortality and sublethal (NOEC)	0.08 mg as/L
Daphnia magna	Fludioxonil (CGA173506)	48 hr (flow-through)	Immobilisation (EC_{50})	0.4 mg as/L
Mysidopsis bahia	Fludioxonil (CGA173506)	96 hr (flow-through)	Mortality (LC_{50})	0.27 mg as/L
Daphnia magna	CGA339833	48 hr (flow-through)	Immobilisation (EC_{50})	>100 mg/L

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

Group	Test substance	Time-scale	Endpoint	Toxicity (mg/L)
Daphnia magna	CGA 192155	48 hr (static)	Immobilisation (EC_{50})	>100 mg/L
Daphnia magna	CGA 344623	48 hr (static)	Immobilisation (EC_{50})	>100 mg/L
Daphnia magna	SWITCH 62.5 WG	48 hr (semistatic)	Immobilisation (EC_{50})	0.035 mg as/L
Daphnia magna	CELESTE 025 FS	48 hr (semistatic)	Immobilisation (EC_{50})	0.97 mg as/L
Daphnia magna	Fludioxonil (CGA173506)	21 d (semistatic)	Reproduction NOEC	0.005 mg as/L
Daphnia magna	SWITCH 62.5 WG[1]	22 d (semistatic)	Reproduction (NOEC)	0.0025 mg as/L
Selenastrum capricornutum	Fludioxonil (CGA173506)	120 hr	Biomass E_bC_{50} ErC_{50}	0.024 mg as/L 0.33 mg as/L
Selenastrum capricornutum	CGA339833	72 hr	Biomass E_bC_{50} ErC_{50}	95.8 mg/L 104.7 mg/L
Scenedesmus subspicatus	CGA 192155	96 h	E_bC_{50} ErC_{50}	>100 mg/L > 100 mg/L
Scenedesmus subspicatus	SWITCH 62.5 WG[1]	72 hr	E_bC_{50} ErC_{50}	0.11 mg as/L Not avail.
Pseudokirchneriella subcapitata	CELESTE 025 FS[2]	72 hr	E_bC_{50} ErC_{50}	0.52 mg as/L 0.74 mg as/L
Lemna gibba	SWITCH 62.5 WG[1]	7 d (static)	Biomass E_bC_{50} ErC_{50}	0.92 mg as/L 2.41 mg as/L
Chironomus riparius	Fludioxonil (CGA173506)	28 d	Emer. midg. (NOEC)	40 mg as/ kg sed 0.2 mg as/L
Chironomus riparius	SWITCH 62.5 WG[1]	28 d	Emer/dev (NOEC)	1.61 mg as/L
Microcosm or mesocosm tests				
Outdoor aquatic microcosm	Fludioxonil (CGA173506)	112 d	Ecological effects (NOAEC)	0.0164 mg as/L

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

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

Use in vine. Based on FOCUSsw PEC values Step 1-4 (at step 4 a buffer-zone of 10 m is included). An updated risk assessment based on new PECsw values is presented in Addendum 2 to B9.

Application rate (kg as/ha)	Crop	Organism	Time-scale	Endpoint	TER	Annex VI Trigger
2 x 0.25	Vine	**Fish**	96 h	0.23 mg as/L		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**16**	100
	Step 2 S. Europe, Late 1. appl (PEC 0.00669 mg/L)				**34**	100
	Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L)				**58**	100
	Step 3 D6 Ditch, 1. appl. (PEC 0.00385 mg/L)				**60**	100
	Step 3 R2 Stream, 1. appl. (PEC 0.00379 mg/L)				**61**	100
	Step 3 R1 & R4 Stream, 1. appl. (PEC 0.00283 mg/L)				**81**	100
	Step 3 R1 Pond, 2. appl. (PEC 0.000144 mg/L)				1597	100
	Step 4 R3 Stream, 1. appl. (PEC 0.00105 mg/L)				219	100
	Step 4 R2 Stream, 1. appl, (PEC 0.00100 mg/L)				230	100
	Step 4 D6 Ditch, 1. appl. (PEC 0.000843 mg/L)				273	100
	Step 4 R1 & R4 Stream, 1. appl. (PEC 0.000746 mg/L)				308	100
	Step 4 R1 Pond, 1 appl. (PEC 0.000092 mg/L)				2500	100
2 x 0.25	Vine	**Fish**	96 h	1.8 SWITCH 62.5 WG		
	Step 1 Late appl. (PEC 0.0142 mg/L)				127	100
	Step 1 Late appl. (PEC 0.0005[#] mg/L)				1166	100
2 x 0.25	Vine	**Fish**	28 d	0.039		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**2.7**	10
	Step 2 S. Europe, Late 1. appl. (PEC 0.00669 mg/L)				43.8	10
	Worst case Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L) All other Step 3 scenarios give TER > 10				9.8	10
2 x 0.25	Vine	**Fish**	21 d	0.08 SWITCH 62.5 WG		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**5.6**	10
	Step 2 S. Europe, Late 1. appl. (PEC 0.00669 mg/L)				12	10
2 x 0.25	Vine	**Invertebrate**	48 h	0.4		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**28**	100
	Step 2 S. Europe, Late 1. Appl. (PEC 0.00669 mg/L)				**60**	100
	Step 3 R3 Stream, 1. appl. (PEC 0.00389 mg/L)				103	100

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

Application rate (kg as/ha)	Crop	Organism	Time-scale	Endpoint	TER	Annex VI Trigger
2 x 0.25	Vine	**Invertebrate**	96 h	0.27		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**19**	100
	Step 2 S. Europe, Late 1. Appl. (PEC 0.00669 mg/L)				**40**	100
	Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L)				**68**	100
	Step 3 R2 Stream, 1. appl. (PEC 0.00385 mg/L)				**70**	100
	Step 3 D6 Ditch, 1. appl. (PEC 0.00379 mg/L)				**71**	100
	Step 3 R1 & R4 Stream, 1. appl. (PEC 0.00283 mg/L)				**95**	100
	Step 3 R1 Pond,2. appl. (PEC 0.000144 mg/L)				1875	100
	Step 4 R3 Stream, 1. appl. (PEC 0.00105 mg/L)				257	100
2 x 0.25	Vine	**Invertebrate**	48 h	0.035 mg as/L SWITCH 62.5 WG		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**2.5**	100
	Step 2 S. Europe, Late 1. appl. (PEC 0.00669 mg/L)				**5.2**	100
	Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L)				**8.9**	100
	Step 3 D6 Ditch, 1. appl. (PEC 0.00385 mg/L)				**9.1**	100
	Step 3 R2 Stream, 1. appl. (PEC 0.00379 mg/L)				**9.2**	100
	Step 3 R1 & R4 Stream, 1. appl. (PEC 0.00283 mg/L)				**12**	100
	Step 3 R1 Pond, 2. appl. (PEC 0.000144 mg/L)				243	100
	Step 4 R3 Stream, 1. appl. (PEC 0.00105 mg/L)				**33**	100
	Step 4 R2 Stream, 1. appl. (PEC 0.00100 mg/L)				**35**	100
	Step 4 D6 Ditch, 1. appl. (PEC 0.000843 mg/L)				**42**	100
	Step 4 R1 & R4 Stream, 1. appl. (PEC 0.000746 mg/L)				**47**	100
	Step 4 R1 Pond, 2. appl. (PEC 0.000092 mg/L)				380	100
	Step 1 Late appl. (PEC 0.0005[#] mg/L)				19401	100
2 x 0.25	Vine	**Invertebrate**	21 d	0.005 mg as/L		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**0.4**	10
	Step 2 S. Europe, Late 1. appl. (PEC 0.00669 mg/L)				**0.7**	10
	Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L)				**1.3**	10
	Step 3 D6 Ditch, 1. appl. (PEC 0.00385 mg/L)				**1.3**	10
	Step 3 R2 Stream, 1. appl. (PEC 0.00379 mg/L)				**1.3**	10
	Step 3 R1 & R4 Stream, 1. appl. (PEC 0.00283 mg/L)				**1.8**	10
	Step 3 R1 Pond, 2. appl. (PEC 0.000144 mg/L)				35	10

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

Application rate (kg as/ha)	Crop	Organism	Time-scale	Endpoint	TER	Annex VI Trigger
	Step 4 R3 Stream, 1. appl. (PEC 0.00105 mg/L)				**4.8**	10
	Step 4 R2 Stream, 1. appl. (PEC 0.00100 mg/L)				**5.0**	10
	Step 4 D6 Ditch, 1. appl. (PEC 0.000843 mg/L)				**5.9**	10
	Step 4 R1 & R4 Stream, 1. appl. (PEC 0.000746 mg/L)				**6.7**	10
	Step 4 R1 Pond, 2. appl. (PEC 0.000092 mg/L)				54	10
2 x 0.25	Vine	**Invertebrate**	21 d	0.0025 mg as/L SWITCH 62.5 WG		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**0.2**	10
	Step 2 S. Europe, Late 1. appl. (PEC 0.00669 mg/L)				**0.4**	10
	Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L)				**0.6**	10
	Step 3 D6 Ditch, 1. appl. (PEC 0.00385 mg/L)				**0.6**	10
	Step 3 R2 Stream, 1. appl. (PEC 0.00379 mg/L)				**0.7**	10
	Step 3 R1 & R4 Stream, 1. appl. (PEC 0.00283 mg/L)				**0.9**	10
	Step 3 R1 Pond, 2. appl. (PEC 0.000144 mg/L)				17	10
	Step 4 R3 Stream, 1. appl. (PEC 0.00105 mg/L)				**2.4**	10
	Step 4 R2 Stream, 1. appl. (PEC 0.00100 mg/L)				**2.5**	10
	Step 4 D6 Ditch, 1. appl. (PEC 0.000843 mg/L)				**3.0**	10
	Step 4 R1 & R4 Stream, 1. appl. (PEC 0.000746 mg/L)				**3.4**	10
	Step 4 R1 Pond, 2. appl. (PEC 0.000092 mg/L)				27	10
	Step 1 Late 21-day (PEC_{TWA} 0.00089)				**2.8**	10
	Step 2 S. Europe, Late 1. appl. (PEC_{TWA} 0.00036)				**6.9**	10
2 x 0.25	Vine	**Algae**	120 h	0.024 mg as/L		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**1.7**	10
	Step 2 S. Europe, Late 1. appl (PEC 0.00669 mg/L)				**3.6**	10
	Worst case Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L)				**6.0**	10
	Step 3 D6 Ditch, 1. appl. (PEC 0.00385 mg/L)				**6.2**	10
	Step 3 R2 Stream, 1. appl. (PEC 0.00379 mg/L)				**6.3**	10
	Step 3 R1 & R4 Stream, 1. appl. (PEC 0.00283 mg/L)				**8.4**	10
	Step 3 R1 Pond, 2. appl. (PEC 0.000144 mg/L)				167	10

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

Application rate (kg as/ha)	Crop	Organism	Time-scale	Endpoint	TER	Annex VI Trigger
2 x 0.25	Vine	**Algae**	72 h	0.11 SWITCH 62.5 WG		
	Step 1 Late appl. (PEC 0.0142 mg/L)				**7.7**	10
	Step 2 S. Europe, Late 1. appl. (PEC 0.00669 mg/L)				16	10
	Step 1 Late appl. (PEC 0.000497)				1046	10
0.25	Vine	**Lemna**	7 d	0.92 mg as/L		
	Step 1 Late appl. (PEC 0.0142 mg/L)				65	10
2 x 0.25	Vine	**Sediment dwelling**	21 d	0.2 mg as/L 40 mg/kg sed		
	Step 1 Late appl. (PEC 0.0142 mg/L)				14	10
	Step 1 Late appl. ($PEC_{sed-max}$ 1.28 mg/L)				31	10
2 x 0.25	Vine	**Sediment dwelling**	21 d	1.61 mg as/L SWITCH 62.5 WG		
	Step 1 Late appl. (PEC 0.0142 mg/L)				113	10
2 x 0.25	Vine	**Outdoor aquatic microcosm**	112 d	0.0164	5m/10m	Proposed AF
	Step 1 Late appl. (PEC 0.0142 mg/L)				**1.2**	5
	Step 2 S. Europe, Late 1. appl. (PEC 0.00669 mg/L)				**2.5**	5
	Step 3 R3 Stream, 1. appl. (PEC 0.00398* mg/L)				**4.1**	5
	Step 3 D6 Ditch, 1. appl. (PEC 0.00385 mg/L)				**4.3**	5
	Step 3 R2 Stream, 1. appl. (PEC 0.00379 mg/L)				**4.3**	5
	Step 3 R1 & R4 Stream, 1. appl. (PEC 0.00283 mg/L)				5.8	5
	Step 3 R1 Pond, 2. appl. (PEC 0.000144 mg/L)				114	5
	Step 4 R3 Stream, 1. appl. (PEC 0.00105 mg/L)				5.7/16	5
	Step 4 R2 Stream, 1. appl. (PEC 0.00100 mg/L)				5.9/16	5
	Step 4 D6 Ditch, 1. appl. (PEC 0.000843 mg/L)				7.0/19	5
	Step 4 R1 & R4 Stream, 1. appl. (PEC 0.000746 mg/L)				8.0/22	5
	Step 4 R1 Pond, 2. appl. (PEC 0.000092 mg/L)				102/178	5

* This change is due to a typing error in the DAR – and not due to change in results in the new PECsw values.

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

Metabolites - use in vine

Application rate (kg as/ha)	Crop	Organism	Time-scale	Endpoint	TER	Annex VI Trigger
2 x 0.25	Vine	**Fish**	96 h	>100 mg CGA 192155/L		
	Step 1, CGA 192155 Late appl. (PEC 0.0177)				5650	100
2 x 0.25	Vine	**Fish**	96 h	>100 mg CGA339833/L		
	Step 1, CGA339833 Late appl. (PEC 0.0194)				5154	100
2 x 0.25	Vine	**Invertebrate**	96 h	>100 mg CGA 192155/L		
	Step 1, CGA 192155 Late appl. (PEC 0.0177)				5650	100
2 x 0.25	Vine	**Invertebrate**	48 h	100 mg CGA339833/L		
	Step 1, CGA339833 Late appl. (PEC 0.0194 mg/L)				5154	100
2 x 0.25	Vine	**Algae**	96 h	>100 mg CGA 192155/L		
	Step 1, CGA 192155 Late appl. (PEC 0.0177)				5650	100
2 x 0.25	Vine	**Algae**	72 h	104.7 mg CGA339833/L		
	Step 1 Late appl. (PEC 0.0194 mg/L)				5397	10

Seed treatment use

PEC values calculated by the RMS based on the ratios between doses for SWITCH 62.5 WG and CELEST 025 FS (250/8.75)

Application rate (kg as/ha)	Crop	Organism	Time-scale	Endpoint	TER	Annex VI Trigger
0.00875	Seed tmt.	**Fish**	96 h	0.23 mg as/L		
	Step 1 Late appl. (PEC 0.0005# mg/L)				463	100
0.00875	Seed tmt.	**Fish**	96 h	0.583 CELEST 25 FS		
	Step 1 Late appl. (PEC 0.0005# mg/L)				1166	100
0.00875	Seed tmt.	**Fish**	28 d	0.039		
	Step 1 Late appl. (PEC 0.0005# mg/L)				78	10

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

Application rate (kg as/ha)	Crop	Organism	Time-scale	Endpoint	TER	Annex VI Trigger
0.00875	Seed tmt.	**Fish**	21 d	0.014		
	Step 1 Late appl. (PEC 0.0005# mg/L)				28	10
0.00875	Seed tmt.	Invertebrate	48 h	0.4		
	Step 1 Late appl. (PEC 0.0005# mg/L)				804	100
0.00875	Seed tmt.	**Invertebrate**	96 h	0.27		
	Step 1 Late appl. (PEC 0.0005# mg/L)				453	100
0.00875	Seed tmt.	**Invertebrate**	48 h	0.97 mg as/L CELEST 25 FS		
	Step 1 Late appl. (PEC 0.0005# mg/L)				19401	100
0.00875	Seed tmt.	**Invertebrate**	21 d	0.005 mg as/L		
	Step 1 Late appl. (PEC 0.0005# mg/L)				10	10
0.00875	Seed tmt.	**Algae**	120 h	0.024 mg as/L		
	Step 1 Late appl. (PEC 0.0005# mg/L)				78	10
0.0875	Seed tmt.	**Algae**	72 h	0.52 mg/L CELEST 25 FS		
	Step 1 Late appl. (PEC 0.0005# mg/L)				1046	10
0.00875	Seed tmt.	**Sediment dwelling**	21 d	0.2 mg as/L 40 mg/kg seed		
	Step 1 Late appl. (PEC 0.0005# mg/L)				402	10
	Step 1 Late appl. ($PEC_{sed-max}$ 0.045# mg/L)				892	10
0.00875	Seed tmt.	**Outdoor aquatic microcosm**	112 d	0.0164		
	Step 1 Late appl. (PEC 0.0005# mg/L)				33	10

Bioconcentration

Bioconcentration factor (BCF) ^{14}C-CGA173506 in *Lepomis macrochirus*	whole-body = 366 edible parts = 58 non-edible parts = 741
Annex VI Trigger for the bioconcentration factor	BCF 100
Clearance time (CT_{50}) (CT_{90})	0.6 days (whole fish) 1.8 days (whole fish)

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

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

Test substance	Acute oral toxicity (LD_{50} µg/bee)	Acute contact toxicity (LD_{50} µg/bee)
a.s. ‡	> 100 µg as/bee	> 100 µg as/bee
SWITCH 62.5 WG	> 300 µg /bee (75µg as/bee)	> 200 µg /bee (50 µg as/bee)
Field or semi-field tests Not required		

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

Vine, application rate: 0.5 kg as/ha

Test substance	Route	Hazard quotient	Annex VI Trigger
a.s.	contact	< 5	50
a.s.	oral	< 5	50
SWITCH 62.5 WG	contact	< 10	50
SWITCH 62.5 WG	oral	< 6.7	50

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

Species	Stage	Test Substance	Dose (kg as/ha)	Endpoint	Effect (%)	Trigger (%)
Laboratory tests with standard sensitive species						
Seed treatment formulation CELEST 025 FS1						
Aleochara bilineata	Sand (14 days)	CELEST 025 FS	5 g as/100 kg seed (379 kg seed/ha)	Mortality Fecundity	0 n.e.*	30
Aleochara bilineata	Sand (77 days)	CELEST 025 FS	5 g as/100 kg seed (200 kg seed/ha)	Mortality Parasitiziation	0 10	30
Poecilus cupreus	Sand	CELEST 025 FS	5 g as/100 kg seed (307 kg seed/ha)	Mortality Consumption	0 0	30
Poecilus cupreus	Sand	CELEST 025 FS	5 g as/100 kg seed (200 kg seed/ha)	Mortality Consumption	0 n.e.	30

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

Species	Stage	Test Substance	Dose (kg as/ha)	Endpoint	Effect (%)	Trigger (%)
Bembidion tetracolum	Sand	CELEST 025 FS	5 g as/100 kg seed (200 kg seed/ha)	Mortality Consumption	10 18	30
Bembidion tetracolum	Sand	CELEST 025 FS	5 g as/100 kg seed (450 seed/m^2)	Mortality Consumption	n.e. n.e.	30
Pradosa amentata	Sand	CELEST 025 FS	5 g as/100 kg seed (450 seed/m^2)	Mortality Consumption	n.e. n.e.	30
Spray formulation GEOXE 50 WP (48.9 % as)						
Typhlodromus pyri	Sand	GEOXE 50 WP	1000 g as/ha (2000 g/ha at 200 L/ha)	Mortality Eggs no. Viability	2 25 6	30%
Aphidius rhopalosiphi	Sand	GEOXE 50 WP	112 g as/ha 245 g as/ha 112 g as/ha 245 g as/ha 205 g as/ha	Mortality Mummies no. LR_{50}	14 63 1 16	30%
Spray formulation SWITCH 62.5 WG [2]						
Typhlodromus pyri	Soil	SWITCH 62.5 WG	240 g/ha (61 g as/ha) 1200 g/ha (303 g as/ha) 2400 g/ha (606 g as/ha) 337 g as/ha	Mortality Eggs no. Mortality Eggs no. Mortality Eggs no. LR_{50}	n.e. 1 47 48 70 98	
Typhlodromus pyri	Glass	SWITCH 62.5 WG	1000 g /ha (248 g as/ha) 3000 g/ha (744 g as/ha)	Mortality Mortality Eggs no.	n.e. n.e. 60	
Typhlodromus pyri	Leaf	SWITCH 62.5 WG	1200 g/ha (300 g as/ha)	Mortality Eggs no.	12 n.e.	
Aphidius rhopalosiphi	Glass	SWITCH 62.5 WG	90 g/ha (23 g as/ha) 1200 g/ha (300 g as/ha) 2400 g/ha (600 g as/ha) 300 g as/ha	Mortality Mummies no. Mortality Mummies no. Mortality Mummies no. LR_{50}	3 n.e. 50 70 84 -	

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

Species	Stage	Test Substance	Dose (kg as/ha)	Endpoint	Effect (%)	Trigger (%)
Aphidius rhopalosiph	Glass	SWITCH 62.5 WG	25 g/ha (6 g as/ha) 100 g/ha (25 g as/ha) 500 g/ ha (125 g as/ha) 218 g as/ha	Mortality Mummies no. Mortality Mummies no. Mortality LR_{50}	n.e. 28 28 85 48	
Aphidius rhopalosiph	Leaves (semi-field)	SWITCH 62.5 WG	90 g/ha (23 g as/ha) 1200 g/ha (296 g as/ha)	Mortality Mummies no. Mortality Mummies no. - directly after - 2. week after	n.e. 20 n.e. 91 84	50
Aphidius rhopalosiph	Leaves (semi-field)	SWITCH 62.5 WG	2300 g/ha (570 g as/ha) 3x200g/ha (3x49 g as/ha) 3 x1000 g/ha (3x248 g as/h) at day 14 3x1000 g/ha (3x248 g as/h) at day 28	Mummies no.	43 9 77 n.e.	50
Amblyseius cucumeris	Leaves (semi-field)	SWITCH 62.5 WG	3x1000 g/ha (3x251 g as/ha) 2300 g/ha (577 g as/ha)	Mortality Eggs no. Mortality Eggs no.	5 5 n.e. n.e.	50
Orius insidiosus	Leaves	SWITCH 62.5 WG	1200 g/ha (301 g as/ha)	Mortality Eggs no.	47 77	50
Orius insidiosus	Leaves (semi-field)	SWITCH 62.5 WG	1200 g/ha (301 g as/ha)	Mortality Eggs no.	21 5	50
Poecilus cupreus	Sand	SWITCH 62.5 WG	1000 g/ha (250 g as/ha)	Mortality Consumption	0 9	30
Poecilus cupreus	Sand	SWITCH 62.5 WG	2400 g/ha (607 g as/ha)	Mortality Consumption	0 0	30
Aleochara bilineata	Sand	SWITCH 62.5 WG	2000 g/ha (506 g as/ha)	Mortality Consumption Hatc. rate. Viability	0 n.e. 15 18	30
Aleochara bilineata	Soil	SWITCH 62.5 WG	2000 g/ha (496 g as/ha)	Mortality reproduction	17 7	

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

Species	Stage	Test Substance	Dose (kg as/ha)	Endpoint	Effect (%)	Trigger (%)
Coccinella septempunctata	Leaves (semi-field)	SWITCH 62.5 WG	1200 g/ha 3x (300 g as/ha)	Pupation Mortality Emergence Eggs/female Viability	3 3 3 6 31	
Field						
Typhlodromus pyri	Leaves (Field)	SWITCH 62.5 WG	1200 g/ha (296 g as/ha) -2 weeks after 1.application -1 week after 2. application -4 weeks after 2. application	Density	 17 4 0	
Typhlodromus pyri	Leaves (Field)	SWITCH 62.5 WG	1200 g/ha (296 g as/ha) -2. week after 1 application (appliedx2) -1. week after 2. application (appliedx2) -3. week after 2. application (appliedx3) -6 days after 3. application (appliedx3)	Density	 n.e n.e n.e 35 – not sign.	
Typhlodromus pyri	Leaves (Field)	SWITCH 62.5 WG	1000 g/ha (248 g as/ha) -10 days after 1. application -7 days after 2. application -28 days after 2. application	Density	 11 2 n.e.	

n.e.: no negative effect

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

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)

Acute mortality	
fludioxonil	$EC_{50} \geq 1000$ mg as/kg
CGA 192155 (metabolite)	$EC_{50} = 794$ mg as/kg
CGA 265378 (metabolite)	$EC_{50} \geq 1000$ mg as/kg
SWITCH 62.5 WG	EC_{50}= 380 mg/kg (95 mg as/kg)
Reproductive toxicity	
Fludioxonil	NOEC ≥ 20 mg as/kg
SWITCH 62.5 WG	$NOEC_{reproduction} \geq 15$ kg/ha (>3.8 kg as/ha, equivalent to > 5.1 mg as/kg soil)
	$NOAEC_{biomass}$ = 5 kg/ha (2.5 kg as/ha, equivalent to 3.3 mg as/kg soil)
CELESTE 025 FS (treated seeds)	NOEC ≥ 43 mg as/kg (with 175 kg seeds/ha) (≥ 0.01 mg as/kg soil)
CELESTE 025 FS (soil)	NOEC≥ 183 g as/ha (0.244 mg as/kg soil)

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

Test substance	Time-scale	PECi mg/kg	Endpoint # mg/kg	TER	Annex VI Trigger
Vine: 2*250 g as/ha					
Fludioxonil	Acute	0.667	≥ 500	≥ 750	10
	Chronic	0.667	≥ 10	≥ 15	10
CGA 192155 (mg/kg)	Acute	0.065	794	12215	10
CGA 265378 (mg/kg)	Acute	0.090	500	5556	10
SWITCH 62.5 WG	Acute	0.667	47.5	71	10
biomass	Chronic	0.667	1.65	2.6	5
mortality/repro.	Chronic	0.667	2.55	≥ 3.8	5
50% deposition on soil					
biomass	Chronic	0.333	1.17	5	5
mortality/repro.	Chronic	0.333	2.55	≥ 7.7	5

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

Test substance	Time-scale	PECi mg/kg	Endpoint # mg/kg	TER	Annex VI Trigger
Seed treatment: 8.75 g as/ha					
Fludioxonil	Acute	0.012	≥ 500	≥ 416666	10
Fludioxonil	Chronic	0.012	≥ 10	≥ 833	10
CGA 192155	Acute	0.0012	794	661667	10
CGA 265378	Acute	0.0016	500	312000	10
CELEST 025 FS					
– seed	Chronic	0.012	≥ 0.005	≥ 0.4*	5
– soil incorp.	Chronic	0.012	≥ 0.122	≥ 10	5

All endpoints (except for metabolite CGA 192155) have been divided by 2 because logPow > 2
* Based on maximum tested dose – no effects observed

Effects on other soil non-target macro-organisms (Annex IIIA, point 10.6)

Springtails (*Folsomia candida*)

SWITCH 62.5 WG	NOEC = 57.6 mg/kg soil (14.4 mg as/kg)
CELEST 025 FS	$NOEC_{mortality}$ = 250 mg as/kg $NOEC_{reproduction}$=125 mg as/ha

Toxicity/exposure ratios for soil macro-organisms (Annex IIIA, point 10.6)

Test substance	Time-scale	PECi mg/kg	Endpoint # mg/kg	TER	Annex VI Trigger
Vine: 2*250 g as/ha					
SWITCH 62.5 WG	Chronic	0.667	7.2	11	5
Seed treatment: 8.75 g as/ha					
CELEST 025 FS	Chronic	0.012	62.5	5208	5

Endpoints have been divided by 2 because logPow > 2

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

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

Nitrogen mineralization	
fludioxonil	3% effect at 1.3 mg as/kg (sand soil) 20% effect at 1.3 mg as/kg (sandy silt loam) no negative effect at 0.333 mg as/kg (sandy loam and loam soil)
CGA 192155	no negative effect at 0.353 mg as/kg (sandy loam)
CGA 265378	no negative effect at 0.37 mg as/kg (sandy loam)
SWITCH 62.5 WG	no negative effect at 12 kg as/ha (3 kg as/ha)
Carbon mineralization	
fludioxonil	no negative effect at 1.33 mg as/kg (sand and sandy silt loam) no negative effect at 0.333 mg as/kg (sandy loam and loam)
CGA 192155	no negative effect at 0.353 mg as/kg (Sandy loam)
CGA 265378	9% effect at 0.353 mg as/kg (Sandy loam)
SWITCH 62.5 WG (dehydrogenase)	11% effect at 12 kg/ha (3 kg as/ha) (Cunnersdorf soil) no negative effect at 12 kg/ha (3 kg as/ha) (Kötschau soil)

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

Preliminary screening data

< 50 % phytotoxic effect for SWITCH 62.5 WG and CELEST 025 FS

Laboratory dose response tests

No studies available

Additional studies (e.g. semi-field or field studies)

No studies available

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

Test type/organism	end point
Activated sludge	EC_{50} for respiration > 100 mg fludioxonil/L

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

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

Compartment	Ecologically relevant residue
soil	a.s.
water	a.s.
sediment	a.s.
groundwater	a.s.

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

	RMS/peer review proposal	
Fludioxonil	N,	harmful
	R 50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

	RMS/peer review proposal	
SWITCH 62.5 WG	N,	harmful
	R 50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
CELEST 025 FS	R52/R53	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment

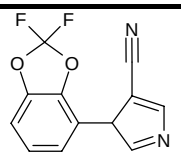
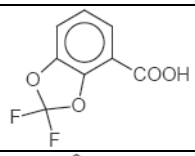
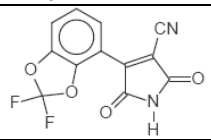
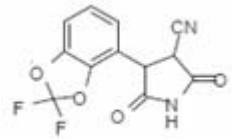
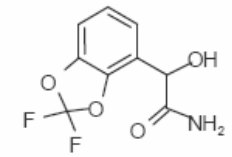
‡ Endpoints identified by EU-Commission as relevant for Member States when applying the Uniform Principles

APPENDIX 2 – ABBREVIATIONS USED IN THE LIST OF ENDPOINTS

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

LC_{50}	lethal concentration, median
LD_{50}	lethal dose, median; dosis letalis media
LOAEL	lowest observable adverse effect level
LOD	limit of detection
LOQ	limit of quantification (determination)
µg	microgram
mN	milli-Newton
MRL	maximum residue limit or level
MS	mass spectrometry
NESTI	national estimated short term intake
NIR	near-infrared-(spectroscopy)
nm	nanometer
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
PEC	predicted environmental concentration
PEC_A	predicted environmental concentration in air
PEC_S	predicted environmental concentration in soil
PEC_{SW}	predicted environmental concentration in surface water
PEC_{GW}	predicted environmental concentration in ground water
PHI	pre-harvest interval
pK_a	negative logarithm (to the base 10) of the dissociation constant
PPE	personal protective equipment
ppm	parts per million (10^{-6})
ppp	plant protection product
r^2	coefficient of determination
RPE	respiratory protective equipment
STMR	supervised trials median residue
TER	toxicity exposure ratio
TMDI	theoretical maximum daily intake
UV	ultraviolet
WHO	World Health Organisation
WG	water dispersible granule
yr	year

APPENDIX 3 – USED COMPOUND CODE(S)

Code/Trivial name	Chemical name	Structural formula
CGA 173506 fludioxonil	4-(2,2-difluoro-1,3-benzodioxol-4-yl)-1*H*-pyrrole-3-carbonitrile	
CGA 192155	(2,2-difluoro-benzo[1,3]dioxol-4-carbocyclic acid	
CGA 265378	4-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-2,5-dioxo-2,5-dihydro-1H-pyrrole-3-carbonitrile	
CGA 308565	4-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-2,5-dioxo-pyrrolidine-3-carbonitrile	
CGA 308103	2-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-2-hydroxy-acetamide	
CGA 339833	3-carbamoyl-2-cyano-3-(2,2-difluoro-benzo[1,3]dioxol-4-yl)-oxirane-2-carbocyclic acid