European Commission

VOLUME 3 – Annex B (AS)

- Flutolanil -

B.3 Data on application

Rapporteur Member State: The Netherlands

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Draft Assessment Report and Proposed decision of the Netherlands prepared in the context of the possible approval of flutolanil under Regulation (EC) 1107/2009

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Data on application

B.3.1 Use of the active substance

Flutolanil is proposed to be used in agricultural situations as a potato tuber treatment and in horticultural situations as a soil treatment for the growing of tulip and iris bulbs.

B.3.2 Function

Flutolanil is a fungicide.

B.3.3 Effects on harmful organisms

Flutolanil is a systemic benzanilide fungicide with protective and curative actions.

Flutolanil acts through the inhibition of succinate dehydrogenase complex of the mitochondrial respiratory chain in susceptible fungi. Flutolanil is in Fungicide Resistance Action Committee group 7.

B.3.4 Field of use envisaged

Flutolanil is a fungicide. For the representative uses please refer to the GAP in volume 3CP (plant protection product) paragraph b.3.3

B.3.5 Harmful organisms controlled and crops or products protected or treated

Flutolanil is a fungicide. For the representative uses please refer to the GAP in volume 3CP (plant protection product) paragraph b.3.3

B.3.6 Mode of action

Flutolanil is an SDHI fungicide and acts through the inhibition of succinate dehydrogenase complex of the mitochondrial respiratory chain in susceptible fungi. Flutolanil is in Fungicide Resistance Action Committee group 7.

B.3.7 Information on the occurrence or possible occurrence of the development of resistance and appropriate management strategies

Flutolanil (chemical group: phenylbenzamides) belongs to the group of succinate dehydrogenase inhibitors (“SDHI”), a fungicide group with a vast number of different active substances (table 3.7-1).

The FRAC code is 7.

The risk for development of resistance of the major target disease was analysed following EPPO guideline PP1/213(4).

Table 3.7-1: Overview of SDHI active substances (source: http://www.frac.info/working-group/sdhi-fungicides)

FRAC Code	Target site of action	Group name	Chemical group	Common name	Comments
7	Complex II; succinate-dehydrogenase	SDHI (Succinate dehydrogenase inhibitors)	Phenyl benzamides	Benodanil Flutolanil Mepronil	Resistance known for several fungal species in field populations and lab mutants. Target site mutations in sdh gene, e.g. H/Y (or H/L) at 257* or P225L**. Medium-high risk. Resistance management required
			phenyl-oxo-ethyl thiophene amide	Isofetamid	
			Pyridinyl-ethyl-benzamide	Fluopyram	
			Furan-carboxamides	Fenfuram	
			Oxathiin-carboxamides	Carboxin Oxycarboxin	
			Thiazole-carboxamides	Thifluzamide	
			Pyrazole-carboxamides	Benzovindiflupyr Bixafen Fluxapyroxad Furametpyr Isopyrazam Penflufen Penthiopyrad Sedaxane	
			Pyridine-carboxamides	Boscalid	

* *Ustilago maydis*, homolog to 267 in *Zymoseptoria tritici* and 272 in *Botrytis cinerea*.

** *B. cinerea*

Basic properties of this group such as persistent activity and single-site mode of action would suggest a medium – high risk of development of resistance. This is also the general conclusion of the FRAC working group on SDHI fungicides (Table 3.7-1). The proposed representative use is control of *Rhizoctonia solani*, this pathogen is not listed among the fungi that have developed resistance against FRAC group 7.

Table 3.7-2: List of cases of SDHI resistant fungal plant pathogen species, their origin, and mutations found conferring SDHI resistance. Table reflects the list published on the FRAC webpage (status July 2014) with some updates based on BASF, unpublished data. (source: http://www.frac.info/working-group/sdhi-fungicides)

Species name		Reported from host	Origin	Resistance mechanism (Subunit-mutation)
Ustilago maydis	a	(Laboratory)	Lab	B-H257L
Aspergillus oryzae	b	(Laboratory)	Lab	B-H249Y/L/N, C-T90I, D-D124E
Zymoseptoria tritici	c	(Laboratory)	Lab	B-N225I, B-H267Y/R/L, B-I269V, C-A84V, C-H152R, C-T79I, C-N86K, C-G90R, D-H129E, and several others
Zymoseptoria tritici	d	Wheat	Field	B-N225T, C-T79N, C-W80S, C-N86S
Pyrenophora teres	e	Barley	Field	B-H277Y, C-N75S, C-G79R, C-H134R, C-S135R, D-D124N/E, D-H134R, D-D145G
Botrytis cinerea	f	Various	Field	B-P225L/T/F, B-H272Y/R/L/V, B-N230I, D-H132R, C-A85V
Botrytis elliptica	g	Lilies	Field	B-H272Y/R
Alternaria alternata	h	Pistachio	Field	B-H277Y/R, C-H134R, D-D123E, D-H133R
Alternaria solani	i	Potatoes	Field	B-H277Y/R, D-H133R
Corynespora cassiicola	j	Cucurbits	Field	B-H278Y/R, C-S73P, D-S89P, D-G109V
Didymella bryoniae	k	Cucurbits	Field	B-H277R/Y
Podosphaera xanthii	l	Cucurbits	Field	B-H->Y (homologous to H272 in *B. cinerea*)
Sclerotinia sclerotiorum	m	Oilseed rape	Field	B-H273Y, C-H146R, D-H132R
Stemphylium vesicarium	n	Asparagus	Field	B-P225L, H272Y/R
Venturia inaequalis	o	Apple	Field	C-H151R

This is confirmed by the practical experience obtained with flutolanil in Europe after more than 20 years of use as a seed/soil treatment vs. *Rhizoctonia solani* in potatoes.

So, the inherent risk of resistance development of *Rhizoctonia solani* to flutolanil may be considered as LOW-MEDIUM . Supporting factors are:

- Typically, only 1 treatment per season vs. the target disease (some exemptions in case of a tuber + soil treatment strategy)
- No significant use of other fungicides with the same mode of action (as of October 2016)
- Significant number of other fungicides with a different mode of action available
- Potatoes (a major host) of *Rhizoctonia solani* is cultivated in a wide crop rotation (at least 3 years). Occurrence of *Rhizoctonia solani* in rotational crops (e.g. cereals, maize, oilseed rape) is much less important respectively there is no (or only limited) use of fungicides to control this disease.
- No known cases of resistance after decades of use

For the representative uses therefore resistance risk is acceptable, with regards to resistance management the proposed gap is found to be realistic.

For uses other than the representative uses, occurrence or possible occurrence of the development of resistance and appropriate management strategies will need to be evaluated in the dossier for product renewal or registration.

B.3.8 References relied on

No studies submitted.

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Data protection claimed Y/N	Justification if data protection is claimed	Owner