REASONED OPINION

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Modification of the existing maximum residue levels for fluazinam in onions, shallots and garlic

European Food Safety Authority (EFSA),
Alba Brancato, Daniela Brocca, Chloé De Lentdecker, Zoltan Erdos, Lucien Ferreira, Luna Greco, Samira Jarrah, Dimitra Kardassi, Renata Leuschner, Christopher Lythgo, Paula Medina, Ileana Miron, Tunde Molnar, Alexandre Nougadere, Ragnor Pedersen, Hermine Reich, Angela Sacchi, Miguel Santos, Alois Stanek, Juergen Sturma, José Tarazona, Anne Theobald, Benedicte Vagenende, Alessia Verani and Laura Villamar-Bouza

Abstract

In accordance with Article 6 of Regulation (EC) No 396/2005, the applicant Adama Makhteshim submitted a request to the competent national authority in the Netherlands to set maximum residue levels (MRL) for the active substance fluazinam in onions, shallots and garlic. The data submitted in support of the request were found to be sufficient to derive MRL proposals for all crops under consideration. An adequate analytical method for enforcement is available to control the residues of fluazinam in plant matrices. Based on the risk assessment results, EFSA concluded that the short-term and long-term intake of residues resulting from the use of fluazinam according to the intended agricultural practices is unlikely to present a risk to consumer health.

Keywords: fluazinam, trifluoroacetic acid, onions, shallots, garlic, pesticide, MRL, consumer risk assessment

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Correspondence: pesticides.mrl@efsa.europa.eu

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Summary

In accordance with Article 6 of Regulation (EC) No 396/2005, Adama Makhteshim submitted an application to the competent national authority in the Netherlands (evaluating Member State (EMS)) to set maximum residue levels (MRL) for the active substance fluazinam in onions, shallots and garlic. The Netherlands drafted an evaluation report in accordance with Article 8 of Regulation (EC) No 396/2005, which was submitted to the European Commission and forwarded to the European Food Safety Authority (EFSA) on 5 September 2016. To accommodate for the intended uses of fluazinam, the EMS proposed to raise the existing MRLs from the limit of quantification (LOQ) to 0.06 mg/kg.

EFSA based its assessment on the evaluation report submitted by the EMS, the draft assessment report (DAR) and its addendum prepared under Directive 91/414/EEC, the revised Commission review report on fluazinam, the conclusion on the peer review of the pesticide risk assessment of the active substance fluazinam and previous EFSA reasoned opinions on fluazinam, including the reasoned opinion on the review of the existing MRL according to Article 12 of Regulation (EC) No 396/2005.

The metabolism of fluazinam following foliar applications was investigated in crops belonging to the groups of fruit crops, root crops and pulses/oilseeds. Studies investigating the effect of processing on the nature of fluazinam (hydrolysis studies) are not available, but there were indications that fluazinam is not stable under sterilisation conditions. In rotational crops, fluazinam and its related metabolites (AMPA-fluazinam and AMGT) were not found. The major residue identified was the metabolite trifluoroacetic acid (TFA).

Based on the metabolic pattern identified in plant metabolism studies, the toxicological significance of the relevant metabolites, the residue definition for enforcement for plant products was proposed as fluazinam. Tentatively, the sum of fluazinam, AMPA-fluazinam and AMGT, expressed as fluazinam was proposed for processed products. The risk assessment residue definition was set as the sum of fluazinam, AMPA-fluazinam and AMGT, expressed as fluazinam. According to the metabolism studies on primary crops, significant TFA residues are not expected after foliar applications on root crops.

EFSA concluded that for the crops assessed in this application, the metabolism of fluazinam in primary and rotational crops has been sufficiently addressed and that the previously derived residue definitions are applicable. The need for investigations on the nature of fluazinam in processed products is not triggered by the intended uses.

A sufficiently validated analytical method is available to quantify residues in the crops assessed in this application according to the enforcement residue definition. The method enables quantification of residues at or above 0.01 mg/kg (LOQ).

The available residue trials are sufficient to derive a MRL proposal of 0.06 mg/kg for onions and, by extrapolation, for shallots and garlic. For these crops, a conversion factor of 3 for risk assessment was derived from the metabolism study on root crops (potatoes).

Specific studies investigating the magnitude of fluazinam residues in processed commodities are not required. The MRL review did not propose any particular restriction related to rotational crops. This conclusion is applicable to the crops under consideration, provided that the compound is applied according to the proposed good agricultural practice (GAP). Residues of fluazinam in commodities of animal origin were not assessed since the crops under consideration in this MRL application are normally not fed to livestock.

The toxicological profile of fluazinam was assessed in the framework of the EU pesticides peer review under Directive 91/414/EEC and the data were sufficient to derive an acceptable daily intake (ADI) of 0.01 mg/kg body weight (bw) per day and an acute reference dose (ARfD) of 0.07 mg/kg bw.

The consumer risk assessment was performed with revision 2 of the EFSA Pesticide Residues Intake Model (PRIMo). Based on the risk assessment results, EFSA concluded that the proposed use of fluazinam on onions, shallots and garlic will not result in a consumer exposure exceeding the toxicological reference values and therefore is unlikely to pose a risk to consumers' health.

EFSA proposes to amend the existing MRLs as reported in the summary table below.

Code[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Comment/justification
Enforcement residue definition: Fluazinam[(F)]				
220010	Garlic	0.01*	0.06	NEU use supported from residue data on onions extrapolated to shallots and garlic. Unlikely to pose consumer health risk
220020	Onions	0.01*	0.06	
220030	Shallots	0.01*	0.06	

MRL: maximum residue levels; NEU: northern Europe.
*: Indicates that the MRL is set at the limit of analytical quantification (LOQ).
(a): Commodity code number according to Annex I of Regulation (EC) No 396/2005.
(F): Fat soluble.

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Background

Regulation (EC) No 396/2005[1] (hereinafter referred to as 'the MRL regulation') establishes the rules governing the setting of pesticide maximum residue levels (MRLs) at European Union (EU) level. Article 6 of the MRL regulation lays down that any party having a legitimate interest or requesting an authorisation for the use of a plant protection product in accordance with Council Directive 91/414/EEC,[2] repealed by Regulation (EC) No 1107/2009[3], shall submit an application to a Member State to modify a MRL in accordance with the provisions of Article 7 of the MRL regulation.

The applicant Adama Makhteshim[4] submitted an application to the competent national authority in the Netherlands, hereafter referred to as the evaluating Member State (EMS), to modify the existing MRL for the active substance fluazinam in onions, shallots and garlic. This application was notified to the European Commission and the European Food Safety Authority (EFSA) and was subsequently evaluated by the EMS in accordance with Article 8 of the MRL regulation.

The EMS summarised the data provided by the applicant in an evaluation report which was submitted to the European Commission and forwarded to EFSA on 5 September 2016. The application was included in the EFSA Register of Questions with the reference number EFSA-Q-2016-00545 and the following subject:

Fluazinam: MRLs in onions, shallots and garlic.

The Netherlands proposed to raise the existing MRLs of fluazinam in onions, shallots and garlic from the limit of quantification (LOQ) to 0.06 mg/kg.

EFSA assessed the application and the evaluation report as required by Article 10 of the MRL regulation.

Terms of Reference

In accordance with Article 10 of Regulation (EC) No 396/2005, EFSA shall assess the application and the evaluation report and give a reasoned opinion on the risks to the consumer and where relevant to animals associated with the setting of the requested MRLs. The opinion shall include:

- an assessment of whether the analytical method for routine monitoring proposed in the application is appropriate for the intended control purposes;
- the anticipated LOQ for the pesticide/product combination;
- an assessment of the risks of the acceptable daily intake (ADI) and acute reference dose (ARfD) being exceeded as a result of the modification of the MRL;
- the contribution to the intake due to the residues in the product for which the MRLs was requested;
- any other element relevant to the risk assessment.

In accordance with Article 11 of the MRL regulation, EFSA shall give its reasoned opinion as soon as possible and at the latest within three months from the date of receipt of the application.

The evaluation report submitted by the EMS (Netherlands, 2016) and the exposure calculations using the EFSA Pesticide Residues Intake Model (PRIMo) are considered as supporting documents to this reasoned opinion and, thus, are made publicly available as background documents to this reasoned opinion. Furthermore, a screenshot of the Report sheet of the PRIMo is presented in Appendix C.

The active substance and its use pattern

The detailed description of the intended uses of fluazinam in onions, shallots and garlic, which are the basis for the current MRL application, is reported in Appendix A.

Fluazinam is the ISO common name for 3-chloro-*N*-(3-chloro-5-trifluoromethyl-2-pyridyl)-α,α,α-trifluoro-2,6-dinitro-*p*-toluidine (IUPAC). The chemical structures of the active substance and its main metabolites are reported in Appendix E.

[1] Regulation (EC) No 396/2005 of the Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC. OJ L 70, 16.3.2005, p. 1–16.

[2] Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market. OJ L 230, 19.8.1991, p. 1–32.

[3] Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. OJ L 309, 24.11.2009, p. 1–50.

[4] Adama Makhteshim, Golan Street, 7015103 Airport City, Israel.

Fluazinam was evaluated in the framework of Directive 91/414/EEC with Austria designated as rapporteur Member State (RMS) for the representative use as foliar applications on potatoes. The draft assessment report (DAR) prepared by the RMS has been peer reviewed by EFSA (EFSA, 2008). Fluazinam was included in Annex I of this Directive by Directive 2008/108/EC[5] for the use as fungicide on 1 March 2009.

The EU MRLs for fluazinam are established in Annexes II of Regulation (EC) No 396/2005. The review of existing MRLs according to Article 12 of Regulation (EC) No 396/2005 (MRL review) has been performed (EFSA, 2015) and the proposed modifications have been implemented in the MRL legislation.[6] After completion of the MRL review, EFSA has issued one reasoned opinion on the modification of MRL for fluazinam in blueberries. The proposal from this reasoned opinion has been considered in recent regulation[7] for EU MRL legislation.

Assessment

EFSA has based its assessment on the evaluation report submitted by the EMS (Netherlands, 2016), the DAR and its addendum prepared under Directive 91/414/EEC (Austria, 2005, 2007), the revised Commission review report on fluazinam (European Commission, 2011), the conclusion on the peer review of the pesticide risk assessment of the active substance fluazinam (EFSA, 2008) and the conclusions from previous EFSA opinions on fluazinam (EFSA, 2015, 2016).

For this application, the data requirements established in Regulation (EU) No 544/2011[8] and the guidance documents applicable at the date of submission of the application to the EMS are applicable (European Commission, 1997a–g, 2000, 2010a,b, 2016; OECD, 2011). The assessment is performed in accordance with the legal provisions of the Uniform Principles for the Evaluation and the Authorisation of Plant Protection Products adopted by Commission Regulation (EU) No 546/2011[9].

A selected list of end points of the studies assessed by EFSA in the framework of the MRL review, including the end points of the residue trials submitted in support of the current MRL application, are presented in Appendix B.

1. Residues in plants

1.1. Nature of residues and methods of analysis in plants

1.1.1. Nature of residues in primary crops

The metabolism of fluazinam in primary corps belonging to the groups of fruit crops (apples, grapes), root crops (potatoes) and pulses/oilseeds (peanuts) has been assessed in the framework of the EU pesticides peer review and the MRL review (EFSA, 2008, 2015). After foliar applications, the metabolic pattern in the tested crops was similar but varies widely quantitatively. In fruit crops, parent compound was the major component of the residues (11–45% total radioactive residue (TRR)), while AMGT (10.4% TRR) and AMPA-fluazinam (5% TRR) were the main identified metabolites. In potato tubers, TRR was low (max. 0.025 mg eq/kg), with fluazinam and its structurally related compounds below 0.001 mg/kg and incorporation to starch was found predominant (47% TRR). In peanuts, extensive metabolism was observed as only trifluoroacetic acid (TFA) derivatives were present (38.4% TRR).

For the intended uses, the metabolic behaviour in primary crops is sufficiently addressed.

[5] Commission Directive 2008/108/EC of 26 November 2008 amending Council Directive 91/414/EEC to include flutolanil, benfluralin, fluazinam, fuberidazole and mepiquat as active substances. OJ L 317, 27.11.2008, p. 6–13.

[6] Commission Regulation (EU) 2016/1822 of 13 October 2016 amending Annexes II, III and V to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for aclonifen, deltamethrin, fluazinam, methomyl, sulcotrione and thiodicarb in or on certain products. OJ L 281, 18.10.2016, p. 1–44.

[7] Commission Regulation (EU) 2016/1902 of 27 October 2016 amending Annexes II and III to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for acetamiprid, ametoctradin, azoxystrobin, cyfluthrin, difluoroacetic acid, dimethomorph, fenpyrazamine, flonicamid, fluazinam, fludioxonil flupyradifurone, flutriafol, fluxapyroxad, metconazole, proquinazid, prothioconazole, pyriproxyfen, spirodiclofen and trifloxystrobin in or on certain products. OJ L 298, 4.11.2016, p. 1–60.

[8] Commission Regulation (EU) No 544/2011 of 10 June 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the data requirements for active substances. OJ L 155, 11.6.2011, p. 1–66.

[9] Commission Regulation (EU) No 546/2011 of 10 June 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards uniform principles for evaluation and authorisation of plant protection products. OJ L 155, 11.6.2011, p. 127–175.

1.1.2. Nature of residues in rotational crops

Fluazinam is proposed to be used on crops that can be grown in rotation with other crops. In the confined rotational crop studies assessed in the framework of the EU pesticides peer review and in the MRL review (EFSA, 2008, 2015), TFA was the only relevant compound in rotational crops (lettuces, barley grains, carrots). Fluazinam, AMPA-fluazinam and AMGT were not found. EFSA concluded on a more extensive metabolic pattern in rotational crops without major difference compared to primary crops.

For the intended uses, the metabolic behaviour in rotational crops is sufficiently addressed.

1.1.3. Nature of residues in processed commodities

A standard hydrolysis study investigating the effect of processing on the nature of fluazinam is not available and a data gap has been identified (EFSA, 2015). The study assessed in the framework of the MRL review was conducted with non-radiolabelled material and did not investigated conditions simulating pasteurisation. Indicative results from this study showed that fluazinam was not stable in processing involving a sterilisation step, but the degradation products formed were not identified.

No new information has been submitted with the MRL application and is not required. Residues in raw agricultural commodities (RAC) are expected to be low (< 0.1 mg/kg) and the total theoretical maximum daily intake (TMDI) below the trigger value of 10% of the ADI.

1.1.4. Methods of analysis in plants

Analytical methods for the determination of fluazinam residues were assessed during the EU pesticides peer review and the MRL review (EFSA, 2008, 2015). It is noted that the method proposed to enforce the metabolites AMPA-fluazinam and AMGT in high water content matrices was lacking inter-laboratory validation (ILV). Pending the results from the hydrolysis study (see Section 1.1.3), additional data may therefore be required.

The liquid chromatography with tandem mass spectrometry detector (LC–MS/MS) method was concluded to be sufficiently validated for residues of fluazinam in high water content commodities, to which group the crops under consideration belong. The method allows quantifying residues at or above the LOQ of 0.01 mg/kg.

1.1.5. Stability of residues in plants

The storage stability of fluazinam and the metabolites AMPA-fluazinam and AMGT residues in plants stored under frozen conditions was investigated in the framework of the EU pesticides peer review and the MRL review (EFSA, 2008, 2015).

It was demonstrated that in the crops assessed in the framework of this application, residues of fluazinam and AMGT were stable for at least 26 months, while AMPA-fluazinam residues were concluded to be stable up to 18 months.

1.1.6. Proposed residue definitions

Based on the metabolic pattern depicted in primary and rotational crops, the toxicological significance of metabolites, the capabilities of enforcement analytical methods, the following residue definitions were proposed:

- residue definition for risk assessment: sum of fluazinam, AMPA-fluazinam and AMGT, expressed as fluazinam (primary crops and, tentatively, processed products)

According to the metabolism studies on primary crops, significant TFA residues are not expected from foliar applications on fruit and root crops. TFA metabolite was significantly formed in pulses and oilseeds following foliar application and in rotational crops following soil treatment.

- residue definition for enforcement:
  - fluazinam (primary crops)
  - sum of fluazinam, AMPA-fluazinam and AMGT, expressed as fluazinam (tentative, processed products)

The residue definition for enforcement set in Regulation (EC) No 396/2005 is identical with the above mentioned residue definition.

The proposed residue definitions for enforcement and risk assessment for processed commodities will be reconsidered pending the outcome of the radiolabelled standard hydrolysis study investigating the nature of residues in processed commodities (EFSA, 2015).

For the intended uses, EFSA concluded that the residue definitions proposed during the MRL review are appropriate.

1.2. Magnitude of residues in plants

1.2.1. Magnitude of residues in primary crops

In support of the MRL application, the applicant submitted eight good agricultural practices (GAP)-compliant residue trials performed in onions and proposed to extrapolate residues from onions to shallots and garlic. Since the intended uses are the same, the extrapolation is possible (European Commission, 2016).

The samples were analysed for parent and AMPA-fluazinam, but not for AMGT. However, EFSA considers that this is a minor deficiency, since both AMGT and AMPA-fluazinam were observed at a trace level (< 0.01 mg/kg) in the metabolism study on potatoes (at 2.5N the intended application rate in bulb vegetables). It can therefore reasonably be expected that AMGT residues will be below the LOQ of the method and further data on this metabolite are not required.

Samples from these trials were also not analysed for TFA, but based on the metabolism studies on root crops following foliar applications, quantifiable residues are not expected (EFSA, 2015).

According to the assessment of the EMS, the methods used were sufficiently validated and fit for purpose. The samples of the residue trials were stored for up to 7 months under conditions for which integrity of the samples has been demonstrated.

1.2.2. Magnitude of residues in rotational crops

TFA residues may occur in crops that are grown in rotation with other plants that were previously treated with fluazinam. Information on the magnitude of TFA in lettuces, barley and carrots can be retrieved from the confined rotational crop metabolism studies. The MRL review concluded that rotational crops field trials were not required for the authorised uses of fluazinam and did not propose any particular restriction related to rotational crops (EFSA, 2015). Since the intended uses of fluazinam on onions, shallots and garlic are not more critical than the existing uses assessed in the MRL review, the conclusions reached are applicable to the crops under consideration provided that the compound is applied according to the proposed GAPs.

1.2.3. Magnitude of residues in processed commodities

Specific processing studies for the crops under assessment were not submitted and are not required, since significant residues were not observed in RAC and the total theoretical maximum daily intake (TMDI) is expected to be below the trigger value of 10% of the ADI.

1.2.4. Proposed MRLs

The available data are considered sufficient to derive MRL proposals as well as risk assessment values for the commodities under evaluation (see Appendix B.1.2.1). The conservative conversion factor (CF) of 3 from enforcement to risk assessment derived from the metabolism data on the root crop group (potatoes) was applied. In Section 3, EFSA assessed whether residues on these crops resulting from the intended uses are likely to pose a consumer health risk.

2. Residues in livestock

Not relevant as onions, shallots and garlic are not used for feed purposes.

3. Consumer risk assessment

EFSA performed a dietary risk assessment using revision 2 of the EFSA PRIMo (EFSA, 2007). This exposure assessment model contains food consumption data for different subgroups of the EU population and allows the acute and chronic exposure assessment to be performed in accordance with the internationally agreed methodology for pesticide residues (FAO, 2016).

The toxicological reference values for fluazinam used in the risk assessment (i.e. ADI and ARfD values) were derived in the framework of the EU pesticides peer review (European Commission, 2011). The metabolites AMGT and AMPA-fluazinam included in the risk assessment residue definition were considered to be of similar toxicity than the parent compound.

The intended foliar use on the onions, shallots and garlic is not expected to significantly contribute to the overall indicative risk assessment for TFA previously carried by EFSA (2014, 2015). Therefore, an update of this risk assessment is not necessary.

3.1. Short-term (acute) dietary risk assessment

The short-term exposure assessment was performed for the commodities assessed in this application in accordance with the internationally agreed methodology (FAO, 2016). The calculations were based on the highest residue (HR) value derived from supervised field trials using a conversion factor for risk assessment of 3 and the list of input values can be found in Appendix D.2.

The short-term exposure did not exceed the ARfD for any crop assessed in this application (see Appendix B.3).

3.2. Long-term (chronic) dietary risk assessment

In the framework of the MRL review, a comprehensive long-term exposure assessment was performed, taking into account the existing uses at EU level (EFSA, 2015). EFSA updated the calculation with the supervised trials median residue (STMR) values derived from the residue trials submitted in support of this MRL application and the STMR for blueberries derived in an EFSA opinion issued after the MRL review (EFSA, 2016). The related conversion factors for risk assessment were applied. The input values used in the exposure calculations are summarised in Appendix D.2.

The estimated long-term dietary intake was in the range of 1–32% of the ADI. The contribution of residues expected in the commodities assessed in this application to the overall long-term exposure is presented in more detail in Appendix B.3.

EFSA concluded that the long-term intake of residues of fluazinam resulting from the existing and the intended uses is unlikely to present a risk to consumer health.

Conclusions and recommendations

The data submitted in support of this MRL application were found to be sufficient to derive MRL proposals for all corps under consideration.

An adequate analytical method for enforcement is available to control the residues of fluazinam in the commodities under consideration.

Based on the risk assessment results, EFSA concluded that the short-term and long-term intake of residues resulting from the use of fluazinam according to the intended agricultural practices is unlikely to present a risk to consumer health.

The MRL recommendations are summarised in Appendix B.4.

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Abbreviations

a.s.	active substance
ADI	acceptable daily intake
AR	applied radioactivity
ARfD	acute reference dose
BBCH	growth stages of mono- and dicotyledonous plants
bw	body weight
CF	conversion factor for enforcement to risk assessment residue definition
DALA	days after last application
DAR	draft assessment report
DAT	days after treatment
EMS	evaluating Member State
eq	residue expressed as a.s. equivalent
FAO	Food and Agriculture Organization of the United Nations
GAP	Good Agricultural Practice
HR	highest residue
IEDI	international estimated daily intake
IESTI	international estimated short-term intake
ILV	independent laboratory validation
ISO	International Organisation for Standardisation
IUPAC	International Union of Pure and Applied Chemistry
LC	liquid chromatography
LOQ	limit of quantification

Mo	monitoring
MRL	maximum residue level
MS	Member States
MS/MS	tandem mass spectrometry detector
MW	molecular weight
NEU	northern Europe
OECD	Organisation for Economic Co-operation and Development
PBI	plant back interval
PHI	pre-harvest interval
PRIMo	(EFSA) Pesticide Residues Intake Model
RA	risk assessment
RAC	raw agricultural commodity
RD	residue definition
RMS	rapporteur Member State
SANCO	Directorate-General for Health and Consumers
SC	suspension concentrate
SEU	southern Europe
SMILES	simplified molecular-input line-entry system
STMR	supervised trials median residue
TFA	trifluoroacetic acid
TMDI	theoretical maximum daily intake
TRR	total radioactive residue
WHO	World Health Organization

Appendix A – Summary of intended GAP triggering the amendment of existing EU MRLs

Crop and/or situation	NEU, SEU, MS or country	F G or I[a]	Pests or group of pests controlled	Preparation		Application				Application rate per treatment			PHI (days)[d]	Remarks
				Type[b]	Conc. a.s.	Method kind	Range of growth stages & season[c]	Number min–max	Interval between application (min)	kg a.s./hL min–max	Water L/ha min–max	kg a.s./ha min–max		
Onions	NL, PL, BE	F	*Botrytis squamosa, Peronospora destructor*	SC	200 g/L	Foliar spray	BBCH 13-48	1–4	7	0.067–0.133	150–300	0.2	21	Applications between June and September
Shallots	NL, PL, BE	F	*Botrytis squamosa, Peronospora destructor*	SC	200 g/L	Foliar spray	BBCH 13-48	1–4	7	0.067–0.133	150–300	0.2	21	Applications between June and September
Garlic	NL, PL, BE	F	*Botrytis squamosa, Peronospora destructor*	SC	200 g/L	Foliar spray	BBCH 13-48	1–4	7	0.067–0.133	150–300	0.2	21	Applications between June and September

MRL: maximum residue level; NEU: northern Europe; SEU: southern Europe; MS; Member State; SC: suspension concentrate; a.s.: active substance.
(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).
(b): CropLife International Technical Monograph no 2, 6th Edition. Revised May 2008. Catalogue of pesticide formulation types and international coding system.
(c): Growth stage range from first to last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including, where relevant, information on season at time of application.
(d): PHI – minimum preharvest interval.

Appendix B – List of selected end points

B.1. Residues in plants

B.1.1. Nature of residues and methods of analysis in plants

B.1.1.1. Metabolism studies, methods of analysis and residue definitions in plants

Primary crops (available studies)	**Crop groups**	**Crops**	**Applications**	**Sampling (DALA)**
	Fruit crops	Grapes	Foliar, 2 × 0.75 kg/ha	71
		Apples	Foliar, 6 × 0.93 kg/ha	32
	Root crops	Potatoes	Foliar, 4 × 0.43 kg/ha Foliar, 4 × 0.51 kg/ha	7 6
	Pulses/oilseeds	Peanuts	Foliar, 4 × 0.56 kg/ha	55, 66
	Comments: [phenyl-U-^{14}C] and [pyridyl-2,6-^{14}C] fluazinam Reference: Austria (2005), EFSA (2008, 2015)			
Rotational crops (available studies)	**Crop groups**	**Crops**	**Application**	**PBI (DAT)**
	Root/tuber crops	Carrots	Bare soil, 2 × 1.12 kg/ha	30, 120, 365
	Leafy crops	Lettuces	Bare soil, 2 × 1.12 kg/ha	30, 120, 365
	Cereal (small grain)	Barley	Bare soil, 2 × 1.12 kg/ha	30, 120, 365
	Other	–	–	–
	Comments: [phenyl-U-^{14}C] and [pyridyl-2,6-^{14}C] fluazinam Reference: Austria (2005), EFSA (2008, 2015)			
Processed commodities (hydrolysis study)	**Conditions**		**Investigated?**	
	Pasteurisation (20 min, 90°C, pH 4)		No	
	Baking, brewing and boiling (60 min, 100°C, pH 5)		(a)	
	Sterilisation (20 min, 120°C, pH 6)		(a)	
	Comments: (a) Studies not performed with radiolabelled material; results are only indicative. Fluazinam was not stable during sterilisation and the degradation products were not identified Reference: EFSA (2015)			

DALA: days after last application; DAT: days after treatment; PBI: plant back interval; PHI: preharvest interval.

Can a general residue definition be proposed for primary crops?	Yes
Rotational crop and primary crop metabolism similar?	Yes (metabolism in rotational crops is more extensive: fluazinam is not detected while metabolite TFA is significant in rotational crops)
Residue pattern in processed commodities similar to residue pattern in raw commodities?	Open (radiolabelled hydrolysis study required)

Plant residue definition for monitoring (RD-Mo)	-Fluazinam (primary crops) -Sum of fluazinam, AMPA-fluazinam and AMGT, expressed as fluazinam (tentative) (processed commodities) [10]
Plant residue definition for risk assessment (RD-RA)	Sum of fluazinam, AMPA-fluazinam and AMGT, expressed as fluazinam[11]
Conversion factor (monitoring to risk assessment)	CF of 3 derived from metabolism data on root crops applied to onions, shallots and garlic
Methods of analysis for monitoring of residues (analytical technique, crop groups, LOQs)	Matrices with high water content: Fluazinam: LC–MS/MS, LOQ 0.01 mg/kg (EFSA, 2015) Metabolites AMPA-fluazinam and AMGT: LC–MS/MS, LOQ 0.01 mg/kg. ILV missing (EFSA, 2015)

B.1.1.2. Stability of residues in plants

Plant products (available studies)	**Category**	**Commodity**	**T (°C)**	**Stability (Months/years)**
	High water content			
	Fluazinam	Potatoes	−15	26 months
	AMGT	Tomatoes	−20	26 months
	AMPA-fluazinam	Tomatoes	−20	18 months
	Comments: – Reference: EFSA (2015)			

[10] The proposal should apply on a tentative basis to processed commodities subject to hydrolysis conditions such as pasteurisation, boiling, baking, cooking and sterilisation. However, it should still be confirmed by a valid hydrolysis study (EFSA, 2015).

[11] Based on the metabolism in primary and rotational crops, the metabolite TFA was significantly formed in pulses, oilseeds and/or after soil treatment. When uses are authorised on pulses, oilseeds and/or for soil treatment, residue data for metabolite TFA should also be provided in order to update the risk assessment relative to this compound.

B.1.2. Magnitude of residues in plants

B.1.2.1. Summary of residues data from the supervised residue trials

Crop (supervised trials)	Region/ indoor[a]	Residue levels observed in the supervised residue trials (mg/kg)	Comments (OECD calculations)	MRL proposals (mg/kg)	HR_{Mo}[b] (mg/kg)	$STMR_{Mo}$[c] (mg/kg)	CF[d]
Onions	NEU	**Mo:** 5 × < 0.010; 0.015; 0.017; 0.038 **RA:** –	AMPA-fluazinam: 8 × < 0.01 mg/kg AMGT: not analysed MRL_{OECD} = 0.054/0.060 **Extrapolation to shallots and garlic**	0.06	0.04	0.01	3

MRL: maximum residue level; OECD: Organisation for Economic Co-operation and Development; RA: risk assessment; Mo: monitoring.
(a): NEU: Outdoor trials conducted in northern Europe, SEU: Outdoor trials conducted in southern Europe, Indoor: indoor EU trials or Country code: if non-EU trials.
(b): Highest residue according to the residue definition for monitoring.
(c): Supervised trials median residue according to the residue definition for monitoring.
(d): Conversion factor to recalculate residues according to the residue definition for risk assessment derived from the metabolism study on root crops (potatoes).

B.1.2.2. Residues in succeeding crops

Confined rotational crop study (quantitative aspect)	Fluazinam, AMPA-fluazinam and AMGT were not found in rotational crops Metabolite TFA was present at significant levels in lettuces (0.07 mg TFA/kg), barley grains (0.05 mg TFA/kg) and carrots (0.014 mg TFA/kg) Reference: EFSA, 2015
Field rotational crop study	Not required for the uses under assessment Reference: EFSA, 2015

B.1.2.3. Processing factors

Not relevant.

B.2. Residues in livestock

B.2.1. Nature of residues and methods of analysis in livestock

B.2.1.1. Metabolism studies, methods of analysis and residue definitions in livestock

Not relevant.

B.2.2. Magnitude of residues in livestock

Not relevant.

B.3. Consumer risk assessment

ARfD	0.07 mg/kg bw (European Commission, 2011)
Highest IESTI, according to EFSA PRIMo	Onions: 6.83% of ARfD Garlic: 0.09% of ARfD Shallots: 0.05% of ARfD
Assumptions made for the calculations	The calculation is based on the highest residue level expected in raw agricultural commodities for the crops under consideration, using a conversion factor for risk assessment of 3 derived from metabolism data on root crops

ADI	0.01 mg/kg bw per day (European Commission, 2011)
Highest IEDI, according to EFSA PRIMo	32% ADI (FR all population) Contribution of crops assessed: Onions: 0.23% of ADI Shallots: 0.02% of ADI Garlic: 0.02% of ADI
Assumptions made for the calculations	The calculation is based on the median residue levels derived in raw agricultural commodities for the crops under consideration, for blueberries and for the authorised uses assessed in the MRL review. Conversion factors for risk assessment were taken into account The contributions of commodities where no GAP was reported in the MRL review and the MRL application on blueberries assessed after its issue were not included in the calculation

B.4. Recommended MRLs

Code[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Comment/justification
Enforcement residue definition: Fluazinam[(F)]				
220010	Garlic	0.01*	0.06	NEU use supported from residue data on onions extrapolated to shallots and garlic. Unlikely to pose consumer health risk
220020	Onions	0.01*	0.06	
220030	Shallots	0.01*	0.06	

MRL: maximum residue levels; NEU: northern Europe.
*: Indicates that the MRL is set at the limit of analytical quantification (LOQ).
(a): Commodity code number according to Annex I of Regulation (EC) No 396/2005.
(F): Fat soluble.

Appendix C – Pesticide Residue Intake Model (PRIMo)

Fluazinam			
Status of the active substance:	**Approved**	Code no.	
LOQ (mg/kg bw):	0.01	Proposed LOQ:	
Toxicological end points			
ADI (mg/kg bw/day):	**0.01**	ARfD (mg/kg bw):	**0.07**
Source of ADI:	**COM**	Source of ARfD:	**COM**
Year of evaluation:	**2011**	Year of evaluation:	**2011**

MRLs according to Reg. (EU) 2016/1822, except for garlic, onions and shallots.

Chronic risk assessment – refined calculations

TMDI (range) in % of ADI minimum – maximum	
1	32
No of diets exceeding ADI:	---

Highest calculated TMDI values in % of ADI	MS Diet	Highest contributor to MS diet (in % of ADI)	Commodity/ group of commodities	2nd contributor to MS diet (in % of ADI)	Commodity/ group of commodities	3rd contributor to MS diet (in % of ADI)	Commodity/ group of commodities	pTMRLs at LOQ (in % of ADI)
32	FR all population	31	Wine grapes	0.2	Apples	0.1	Tomatoes	0.1
21	PT General population	19	Wine grapes	0.5	Potatoes	0.5	Apples	0.6
16	WHO Cluster diet B	14	Wine grapes	0.9	Tomatoes	0.5	Apples	0.3
14	WHO cluster diet E	13	Wine grapes	0.4	Apples	0.4	Potatoes	0.4
12	DK adult	11	Wine grapes	0.4	Apples	0.1	Potatoes	0.1
11	IE adult	10	Wine grapes	0.4	Apples	0.2	Potatoes	0.3
9	UK Adult	8	Wine grapes	0.2	Apples	0.1	Potatoes	0.2
8	DE child	6	Apples	0.6	Table grapes	0.3	Tomatoes	0.3
7	UK vegetarian	6	Wine grapes	0.3	Apples	0.2	Tomatoes	0.2
6	NL general	5	Wine grapes	0.6	Apples	0.3	Potatoes	0.3
6	WHO Cluster diet F	5	Wine grapes	0.3	Potatoes	0.3	Apples	0.4
5	NL child	3	Apples	0.6	Potatoes	0.4	Table grapes	0.6
4	WHO cluster diet D	3	Wine grapes	0.4	Potatoes	0.3	Apples	0.4
4	ES adult	3	Wine grapes	0.4	Apples	0.2	Tomatoes	0.1
3	WHO regional European diet	2	Wine grapes	0.4	Potatoes	0.3	Apples	0.4
3	FI adult	2	Wine grapes	0.2	Apples	0.2	Blueberries	0.1
2	FR toddler	1	Apples	0.5	Potatoes	0.2	Tomatoes	0.5
2	PL general population	1	Apples	0.3	Potatoes	0.3	Tomatoes	0.3
2	UK Toddler	1	Apples	0.3	Potatoes	0.3	Wine grapes	0.4
2	DK child	1	Apples	0.2	Potatoes	0.2	Pears	0.2
2	FR infant	1	Apples	0.4	Potatoes	0.1	Pears	0.4
2	UK Infant	1	Apples	0.3	Potatoes	0.1	Wine grapes	0.4
1	LT adult	1	Apples	0.3	Potatoes	0.2	Tomatoes	0.3
1	SE general population 90th percentile	1	Apples	0.4	Potatoes	0.2	Tomatoes	0.4
1	ES child	1	Apples	0.3	Tomatoes	0.2	Potatoes	0.2
1	IT kids/toddler	0	Apples	0.4	Tomatoes	0.1	Pears	0.1
1	IT adult	0	Apples	0.3	Tomatoes	0.1	Pears	0.1

Conclusion:
The estimated Theoretical Maximum Daily Intakes (TMDI), based on pTMRLs were below the ADI.
A long-term intake of residues of Fluazinam is unlikely to present a public health concern.

Acute risk assessment /children – refined calculations	Acute risk assessment/adults/general population – refined calculations

The acute risk assessment is based on the ARfD.

For each commodity, the calculation is based on the highest reported MS consumption per kg bw and the corresponding unit weight from the MS with the critical consumption. If no data on the unit weight was available from that MS, an average European unit weight was used for the IESTI calculation.

In the **IESTI 1** calculation, the variability factors were 10, 7 or 5 (according to JMPR manual 2002); for lettuce, a variability factor of 5 was used.

In the **IESTI 2** calculations, the variability factors of 10 and 7 were replaced by 5. For lettuce, the calculation was performed with a variabilty factor of 3.

Threshold MRL is the calculated residue level which would leads to an exposure equivalent to 100 % of the ARfD.

Unprocessed commodities

No of commodities for which ARfD/ADI is exceeded (IESTI 1):		---	**No of commodities for which ARfD/ADI is exceeded (IESTI 2):**		---	**No of commodities for which ARfD/ADI is exceeded (IESTI 1):**		---	**No of commodities for which ARfD/ADI is exceeded (IESTI 2):**		---
IESTI 1	*)	**)	**IESTI 2**	*)	**)	**IESTI 1**	*)	**)	**IESTI 2**	*)	**)
Highest % of ARfD/ADI	Commodities	pTMRL/ threshold MRL (mg/kg)	Highest % of ARfD/ADI	Commodities	pTMRL/ threshold MRL (mg/kg)	Highest % of ARfD/ADI	Commodities	pTMRL/ threshold MRL (mg/kg)	Highest % of ARfD/ADI	Commodities	pTMRL/ threshold MRL (mg/kg)
6.83	Onions	0.12/ -	4.90	Onions	0.12/ -	2.55	Onions	0.12/ -	1.82	Onions	0.12/ -
0.09	Garlic	0.12/ -	0.09	Garlic	0.12/ -	0.11	Garlic	0.12/ -	0.11	Garlic	0.12/ -
0.05	Shallots	0.12/ -	0.05	Shallots	0.12/ -	0.04	Shallots	0.12/ -	0.04	Shallots	0.12/ -
No of critical MRLs (IESTI 1)			---			**No of critical MRLs (IESTI 2)**			---		

Processed commodities

No of commodities for which ARfD/ADI is exceeded:		---		**No of commodities for which ARfD/ADI is exceeded:**		---	
		***)				***)	
Highest % of ARfD/ADI	Processed commodities	pTMRL/ threshold MRL (mg/kg)		Highest % of ARfD/ADI	Processed commodities	pTMRL/ threshold MRL (mg/kg)	

*) The results of the IESTI calculations are reported for at least 5 commodities. If the ARfD is exceeded for more than 5 commodities, all IESTI values > 90% of ARfD are reported.

**) pTMRL: provisional temporary MRL.

***) pTMRL: provisional temporary MRL for unprocessed commodity.

Conclusion:

For Fluazinam, IESTI 1 and IESTI 2 were calculated for food commodities for which pTMRLs were submitted and for which consumption data are available.

No exceedance of the ARfD/ADI was identified for any unprocessed commodity.

For processed commodities, no exceedance of the ARfD/ADI was identified.

Appendix D – Input values for the exposure calculations

D.1. Livestock dietary burden calculations

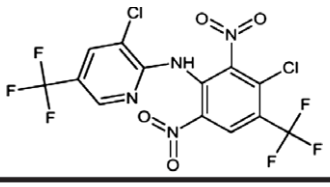
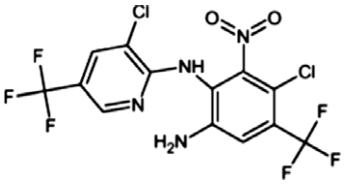
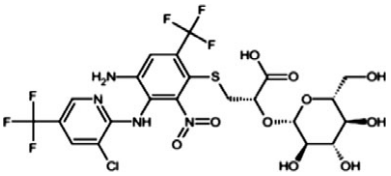
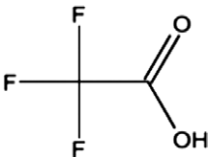
Not relevant.

D.2. Consumer risk assessment

Commodity	Chronic risk assessment		Acute risk assessment	
	Input value (mg/kg)	Comment	Input value (mg/kg)	Comment
Garlic, onions, shallots	0.03	$STMR_{Mo}$ × CF (3)	0.12	HR_{Mo} × CF (3)
Apples	0.05	$STMR_{Mo}$ × CF (1.7) (EFSA, 2015)	Acute risk assessment performed only on the crops under consideration	
Pears	0.03	$STMR_{Mo}$ × CF (1.7) (EFSA, 2015)		
Table grapes	0.05	$STMR_{Mo}$ × CF (5) (EFSA, 2015)		
Wine grapes	0.78	$STMR_{Mo}$ × CF (1.3) (EFSA, 2015)		
Blackberries, dewberries, raspberries	0.01	$STMR_{Mo}$ × CF (1) (EFSA, 2015)		
Blueberries	0.06	$STMR_{Mo}$ × CF (1.13) (EFSA, 2016)		
Potatoes	0.01	$STMR_{Mo}$ × CF (1) (EFSA, 2015)		
Tomatoes	0.03	$STMR_{Mo}$ × CF (1) (EFSA, 2015)		
Beans (pulses)	0.01	$STMR_{Mo}$ × CF (1) (EFSA, 2015)		
Herbal infusions from roots	2.43	$STMR_{Mo}$ × CF (3) (EFSA, 2015)		

STMR: supervised trials median residue; HR: highest residue; CF: conversion factor; Mo: monitoring.

Appendix E – Used compound codes

Code/trivial name	Chemical name/SMILES notation[a]	Structural formula[a]
Fluazinam	3-chloro-*N*-(3-chloro-5-trifluoromethyl-2-pyridyl)- α,α,α-trifluoro-2,6-dinitro-*p*-toluidine MW: 465.1 g/mol	
Fluazinam derivative metabolites		
AMPA-fluazinam	4-chloro-*N*2-[3-chloro-5-(trifluoromethyl)-2-pyridinyl]-3-nitro-5-(trifluoromethyl)-1,2-benzenediamine	
AMGT	(2*S*)-3-{[4-amino-3-{[3-chloro-5-(trifluoromethyl)-2-pyridinyl]amino}-2-nitro-6-(trifluoromethyl)phenyl]thio}-2-(β-D-glucopyranosyloxy)propanoic acid	
Trifluoroacetic acid (TFA)	Trifluoroacetic acid	

SMILES: simplified molecular-input line-entry system; MW: molecular weight.

(a): (ACD/ChemSketch, Advanced Chemistry Development, Inc., ACD/Labs Release: 12.00 Product version: 12.00 (Build 29305, 25 Nov 2008).