REASONED OPINION

EFSA Journal

APPROVED: 22 May 2017

doi: 10.2903/j.efsa.2017.4867

Modification of the existing maximum residue levels for spinetoram in various crops

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Abstract

In accordance with Article 6 of Regulation (EC) No 396/2005, the applicant Dow AgroSciences Ltd submitted a request to the competent national authority in France and the Netherlands to modify the existing maximum residue levels (MRL) for the active substance spinetoram in several crops. The data submitted in support of the requests were found to be sufficient for making several MRL proposals for the crops under consideration. Adequate analytical methods for enforcement are available to control the residues of spinetoram on the commodities under consideration. Based on the risk assessment results, EFSA concluded that a risk from short-term intake cannot be excluded for escaroles. Therefore, no MRL has been proposed for this use. Furthermore, in a screening step, risk to consumers has been identified for the current use of spinetoram in lettuce. EFSA therefore proposes to lower the current MRL for lettuce to a safe limit. For the remaining crops, the expected short-term exposure is unlikely to present a risk to consumer health. The long-term intake of residues resulting from the uses of spinetoram according to the reported agricultural practices is unlikely to present a risk to public health.

Keywords: spinetoram, various crops, MRL application, consumer risk assessment

Requestor: European Commission

Question numbers: EFSA-Q-2016-00257; EFSA-Q-2016-00652

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Suggested citation: EFSA (European Food Safety Authority), Brancato A, Brocca D, De Lentdecker C, Erdos Z, Ferreira L, Greco L, Jarrah S, Kardassi D, Leuschner R, Lythgo C, Medina P, Miron I, Molnar T, Nougadere A, Pedersen R, Reich H, Sacchi A, Santos M, Stanek A, Sturma J, Tarazona J, Theobald A, Vagenende B, Verani A and Villamar-Bouza L, 2017. Reasoned opinion on the modification of the existing maximum residue levels for spinetoram in various crops. EFSA Journal 2017;15(6):4867, 29 pp. https://doi.org/10.2903/j.efsa.2017.4867

ISSN: 1831-4732

The EFSA Journal is a publication of the European Food Safety Authority, an agency of the European Union.

Summary

In accordance with Article 6 of Regulation (EC) No 396/2005, Dow AgroSciences Ltd submitted two applications to the competent national authority in France and the Netherlands (evaluating Member States (EMSs)) to modify the existing maximum residue levels (MRL) for the active substance spinetoram in several crops. The EMSs drafted an evaluation report in accordance with Article 8 of Regulation (EC) No 396/2005, and both were submitted to the European Commission and to the European Food Safety Authority (EFSA) on 4 April 2016 (France, 2016) and on 11 October 2016 (Netherlands, 2016). To accommodate for the intended uses of spinetoram, France and the Netherlands proposed to modify the existing MRLs as follows: from the limit of quantification (LOQ) of 0.05* to 2 mg/kg in cherries, from 0.8 to 1.0 mg/kg in raspberry, from the LOQ of 0.05* to 0.3 mg/kg in other cane fruits, from 0.2 to 0.4 mg/kg in blueberry, from 0.05* to 0.4 mg/kg in other small fruits and berries, from 0.05* to 4.0 mg/kg in other lettuces and salad plants, from 0.05* to 1.5 mg/kg in spinaches and similar leaves, from 0.05* to 4.0 mg/kg for herbs and edible flowers, from 0.1* to 40 mg/kg for herbal infusions (from flowers, leaves and herbs) and from 0.05* to 0.06 mg/kg in leeks.

EFSA bases its assessment on the evaluation reports submitted by the EMSs, the draft assessment report (DAR) (and its final addendum) prepared under Regulation (EC) No 1107/2009, the Commission review report on spinetoram, the conclusion on the peer review of the pesticide risk assessment of the active substance spinetoram, the Joint Meeting on Pesticide Residues (JMPR) evaluation report as well as the conclusions from a previous EFSA opinion on spinetoram.

The metabolism of spinetoram following foliar application was investigated in crops belonging to the groups of fruit crops, root crops and leafy crops.

Studies investigating the effect of processing on the nature of spinetoram (hydrolysis studies) demonstrated that the active substance is stable.

A confined rotational crop study has been submitted and evaluated under the current application. The metabolism of spinetoram in rotational crops is deemed to be similar to the metabolic pattern depicted in primary crops.

Based on the metabolic pattern identified in primary and rotational crops, the nature of the residues in processed commodities and the toxicological significance of metabolites, the residue definitions for plant products were proposed as 'spinetoram (sum of XDE-175-J, XDE-175-L) only' for monitoring and as 'spinetoram (sum of XDE-175-J, XDE-175-L), metabolites *N*-demethyl-175-J and *N*-formyl-175-J, expressed as spinetoram' for risk assessment purposes. These residue definitions are applicable to primary crops, rotational crops and processed products.

EFSA concluded that for the crops assessed in this application, metabolism of spinetoram in primary and in rotational crops and the nature of residues in processed products have been sufficiently addressed and that the previously derived residue definitions are applicable.

Sufficiently validated analytical methods based on high-performance liquid chromatography (HPLC) are available to determine residues in the crops assessed in this application according to the enforcement residue definition. The methods enable quantification of residues at or above 0.02 mg/kg in the crops assessed (LOQ).

The available residue trials are sufficient to derive several MRL proposals as indicated in the table at the end of the summary section.

Specific studies investigating the magnitude of spinetoram residues in processed commodities are not requested, as the total theoretical maximum daily intake (TMDI) is below the trigger value of 10% of the acceptable daily intake (ADI) for all the crops under assessment.

Specific processing studies are in principle required for spinaches, cherries, cane fruit and small fruits and berries where residue levels exceed 0.1 mg/kg; however, considering the expected low contribution of the processed commodities of these crops to the dietary burden, the stability of spinetoram under the standard hydrolysis conditions and the low contribution of these crops to the TMDI and to the international estimated short-term intake (IESTI), EFSA is of the opinion that these processing trials are not needed.

One processing study has been submitted under the current application and a tentative processing factor (PF) of 0.79 has been derived from spinaches to cooked spinaches.

Based on the available information, it cannot be excluded that the use of spinetoram according to the proposed good agricultural practices (GAPs) results in residues > 0.01 mg/kg in leafy crops grown in rotation. Therefore, potential restriction to avoid rotation with leafy crops at short plant back intervals (30 days) should be implemented at Member State level when granting authorisations for the use of spinetoram.

Residues of spinetoram 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 spinetoram was assessed in the framework of the EU pesticides peer review under Regulation (EC) No 1107/2009 and the data were sufficient to derive an ADI of 0.025 mg/kg body weight (bw) per day and an acute reference dose (ARfD) of 0.1 mg/kg bw. No ARfD was previously derived.

The consumer risk assessment was performed with revision 2 of the EFSA Pesticide Residues Intake Model (PRIMo). A screening risk assessment has been done considering all the current MRLs in the Commission Regulation (EU) 2016/46. EFSA identified an exceedance of the ARfD for lettuce accounting for 257% of the ARfD for the current MRL and proposes to lower the current limit to an MRL of 4 mg/kg for the use of spinetoram in lettuce according to the intended GAP for lettuce submitted in this application.

The short-term exposure assessment was performed for the commodities assessed in this application in accordance with the internationally agreed methodology. For the intended use in escaroles/broad- leaved endives, an exceedance of 249% of the ARfD has been identified and therefore no MRL is proposed for this use. For the remaining crops, the short-term dietary intake calculation did not exceed the ARfD.

The estimated long-term dietary intake was calculated to be 48% of the ADI. The contribution of expected residues in the commodities assessed under this application to the overall long-term exposure is presented in more detail in Appendix B.3.1.

It should be highlighted that the above assessment does not consider the possible impact of plant metabolism on the isomer ratio of the active substance and further investigation on this matter would be required. Since guidance is not yet available on the consideration of isomer ratios in the consumer risk assessment, EFSA recommends that this issue is reconsidered when such guidance is available.

EFSA concludes that, although uncertainties remain due to the data gaps identified in this and previous evaluations, the proposed use of spinetoram on cherries, cane fruits and other small fruits and berries, lettuces and other salad plants except escaroles/broad-leaved endives, spinaches and similar leaves, herbs and edible flowers, herbal infusions from leaves and herbs and leeks will not result in a consumer exposure exceeding the toxicological reference values and therefore are unlikely to pose a health risk for consumers.

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: Spinetoram (sum of XDE-175-J and XDE-175-L)[(F)]				
0140020	Cherries	0.05*	2	SEU use supported by sufficient residue trials Risk for consumers unlikely
0153000	Cane fruits	Raspberry: 0.8 Others: 0.05*	1	SEU and indoor uses supported by extrapolation from residue data on raspberries Risk for consumers unlikely
0154000	Other small fruits and berries	Blueberry: 0.2 Others: 0.05*	0.4	SEU and indoor uses supported by extrapolation from residue data on blueberries and currants Risk for consumers unlikely
0251000	Lettuces and salad plants	0.05	4	An MRL of 4 mg/kg has been derived and is considered as acceptable for the indoor use on lettuces and salad plants, except for escaroles/ broad-leaves endives for which a consumer intake concern has been identified Risk for consumers unlikely
0251020	Lettuces	10	4	An exceedance of the ARfD has been identified for the current MRL implemented in the EU legislation. An MRL of 4 mg/kg is proposed to be implemented, in support of the EU intended use and supported by residue data for which no consumer intake concern has been identified

Code[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Comment/justification
0251030	Escaroles/broad-leaves endives	0.05*	No proposal	An exceedance of the ARfD has been identified for the intended use based on the extrapolation from lettuce open leaf varieties No data are available to derive other MRL proposal
0252000	Spinaches and similar leaves	0.05*	1.5	The submitted data are sufficient to derive a MRL proposal for the SEU use with an extrapolation to the whole group of spinaches and similar leaves Risk for consumers unlikely
0256000	Herbs and edible flowers	0.05*	4	An MRL of 4 mg/kg has been derived based on the possible extrapolation from the indoor GAP-compliant residue trials in lettuce open leaf varieties to the whole group of herbs and edible flowers Risk for consumers unlikely
0270060	Leeks	0.05*	0.06	The submitted data are sufficient to derive a MRL proposal for the NEU use Risk for consumers unlikely
0631000	Herbal infusions from flowers	0.01*	No proposal	No extrapolation foreseen by the EU guidelines
0632000	Herbal infusions from leaves and herbs	0.01*	40	An MRL of 40 mg/kg has been derived based on the possible extrapolation from the indoor GAP-compliant residue trials in lettuce open leaf varieties to the subgroup of herbal infusions from leaves and herbs. A default dehydration factor of 10 is proposed as MRLs for herbal infusions refer to the dry commodities Risk for consumers unlikely

MRL: maximum residue level; SEU: southern European Union; ARfD: acute reference dose; GAP Good Agricultural Practice; NEU: northern European Union.
*: 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 several MRLs in accordance with the provisions of Article 7 of the MRL regulation.

The applicant Dow AgroSciences Ltd[4] submitted an application to the competent national authority in France and another application to the competent national authority in the Netherlands, hereafter referred to as the evaluating Member States (EMSs), to modify the existing MRLs for the active substance spinetoram in several crops. These applications were notified to the European Commission and the European Food Safety Authority (EFSA) and subsequently evaluated by the EMS in accordance with Article 8 of the MRL regulation.

The EMS summarised the data provided by the applicant in the evaluation reports that were submitted to the European Commission and to EFSA on 4 April 2016 (France, 2016) and 11 October 2016 (Netherlands, 2016), respectively. Both applications were included in the EFSA Register of Questions with the reference number EFSA-Q-2016-00257 and EFSA-Q-2016-00652 and the following subject:

Spinetoram – Modification of existing MRLs in various crops
Spinetoram – Modification of existing MRL in leeks

For efficiency reasons, EFSA combined both applications in a single reasoned opinion.

France and the Netherlands proposed to modify the existing MRLs of spinetoram as follows: from the limit of quantification (LOQ) of 0.05* to 2 mg/kg (cherries), to 0.3 mg/kg (other cane fruits), to 0.4 mg/kg (other small fruits and berries), to 0.06 mg/kg (leeks), to 4.0 mg/kg (herbs and edible flowers), to 1.5 mg/kg (spinaches and similar leaves), to 4.0 mg/kg (other lettuces and salad plants), from 0.8 to 1.0 mg/kg in raspberries, from 0.2 to 0.4 mg/kg in blueberries and from 0.01* to 40 mg/kg for herbal infusions (from flowers and from leaves and herbs).

EFSA assessed the applications and the evaluation reports as required by Article 10 of the MRL regulation. EFSA identified data gaps and points which needed further clarification, which were requested from the EMS France. On 13 June 2016, the EMS submitted the requested information and a revised evaluation report, which replaced the previously submitted evaluation report. In November 2016, the applicant submitted to the EMS France a new application for the modification of the MRL on cherry to support an amendment of the critical Good Agricultural Practice (cGAP) for spinetoram on cherries (preharvest interval (PHI) 3 days instead of 7 days). Based on this new GAP, France evaluated the submitted data on cherries and provided an updated version of the evaluation report in January 2017.

EFSA proceeded with the assessment of the applications and the evaluation reports as required by Article 10 of the 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;

[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] Dow AgroSciences Ltd, 3B Park Square, OX14 4RN, Abingdon, UK.

- 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 products for which the MRLs were 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 3 months from the date of receipt of the application.

The evaluation reports submitted by the EMSs (France, 2016; 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.

The active substance and its use pattern

The detailed description of the intended uses of spinetoram in all the crops which are the basis for the current MRL applications is reported in Appendix A.

Spinetoram is the ISO common name for the mixture of:

- 50–90% (2*R*,3a*R*,5a*R*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*R*)-2-(6-deoxy-3-*O*-ethyl-2,4-di-*O*-methyl-α-L-mannopyranosyloxy)-13-[(2*R*,5*S*,6*R*)-5-(dimethylamino)tetrahydro-6-methylpyran-2-yloxy]-9-ethyl-2,3,3a,4,5,5a,5b,6,9,10,11,12,13,14,16a,16b-hexadecahydro-14-methyl-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecine-7,15-dione (XDE-175-J major factor)
- and 50–10% (2*S*,3a*R*,5a*S*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*S*)-2-(6-deoxy-3-*O*-ethyl-2,4-di-*O*-methyl-α-L-mannopyranosyloxy)-13-[(2*R*,5*S*,6*R*)-5-(dimethylamino)tetrahydro-6-methylpyran-2-yloxy]-9-ethyl-2,3,3a,5a,5b,6,9,10,11,12,13,14,16a,16b-tetradecahydro-4,14-dimethyl-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecine-7,15-dione (XDE-175-L minor factor) (IUPAC).

The chemical structures of the active substance and its main metabolites are reported in Appendix D.

Spinetoram was initially evaluated in the framework of Directive 91/414/EEC with the United Kingdom designated as rapporteur Member State (RMS). In accordance with Regulation (EU) No 188/2011[5], laying down detailed rules for the assessment of new active substances and in accordance with the transitional provisions foreseen in Article 80(1)(a) of Regulation (EC) No 1107/2009 repealing Directive 91/414/EEC, spinetoram has been approved under Regulation (EC) No 1107/2009 by Commission Implementing Regulation (EU) No 140/2014[6], which entered into force on 6 March 2014 for the use as insecticide.

Spinetoram was evaluated in the framework of Regulation (EC) No 1107/2009 for the representative uses as foliar applications on grapes (wine and table). The draft assessment report (DAR) prepared by the RMS has been peer reviewed by EFSA (EFSA, 2013a).

The EU MRLs for spinetoram are established in Annex IIIa of Regulation (EC) No 396/2005. EFSA has issued several reasoned opinions on the modification of MRLs for spinetoram as presented in Table 1.

[5] Commission Regulation (EU) No 188/2011 of 25 February 2011 laying down detailed rules for the implementation of Council Directive 91/414/EEC as regards the procedure for the assessment of active substances which were not on the market 2 years after the date of notification of that Directive. OJ L 53, 26.2.2011, p. 51–55.

[6] Commission Implementing Regulation (EU) No 140/2014 of 13 February 2014 approving the active substance spinetoram, in accordance with Regulation (EC) No 1107/2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market, and amending the Annex to Commission Implementing Regulation (EU) No 540/2011, OJ L 44, 14.2.2014, p. 35–39.

Table 1: Overview of the MRL changes since the entry into force of Regulation (EC) No 396/2005

Procedure[a]	Considered by Regulation	Remarks
Art. 10 (EFSA, 2009)	(EU) No 459/2010[b]	Peaches (including nectarines) and apricots (import tolerance)
Art. 43 (EFSA, 2012)	(EU) No 473/2012[c]	Setting of temporary MRLs in cherries, raspberries and blueberries
Art. 43 (EFSA, 2013b)	(EU) No 491/2014[d]	CAC (2013)
Implementation of CXL	(EU) No 491/2014	CAC (2013)

(a): Art. 10: Assessment of MRL application according to Article 6 to 10 of Regulation (EC) No 396/2005.
Art. 12: Review of the existing MRLs according to Article 12 of Regulation (EC) No 396/2005.
Art. 43: EFSA scientific opinion according to Article 43 of Regulation (EC) No 396/2005.
(b): Commission Regulation (EU) No 459/2010 of 27 May 2010 amending Annexes II, III and IV to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for certain pesticides in or on certain products. OJ L 129, 28.5.2010, p. 3–49.
(c): Commission Regulation (EU) No 473/2012 of 4 June 2012 amending Annex III to Regulation (EC) No 396/2005 of the European Parliament and of the Council as regards maximum residue levels for spinetoram (XDE-175) in or on certain products. OJ L 144, 5.6.2012, p. 25–38.
(d): Commission Regulation (EU) No 491/2014 of 5 May 2014 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 ametoctradin, azoxystrobin, cycloxydim, cyfluthrin, dinotefuran, fenbuconazole, fenvalerate, fludioxonil, fluopyram, flutriafol, fluxapyroxad, glufosinate-ammonium, imidacloprid, indoxacarb, MCPA, methoxyfenozide, penthiopyrad, spinetoram and trifloxystrobin in or on certain products. OJ L 146, 16.5.2014, p. 1–91.

Assessment

EFSA has based its assessment on the evaluation reports submitted by the EMSs (France, 2016; Netherlands, 2016), the DAR (and its final addendum) prepared under Regulation (EC) No 1107/2009 (United Kingdom, 2012, 2013), the Commission review report on spinetoram (European Commission, 2013), the conclusion on the peer review of the pesticide risk assessment of the active substance spinetoram (EFSA, 2013a), the JMPR Evaluation report (FAO, 2012), as well as the conclusions from a previous EFSA reasoned opinion on spinetoram (EFSA, 2009). For this application, the data requirements established in Regulation (EU) No 544/2011[7] and the guidance documents applicable at the date of submission of the application to the EMS are applicable (European Commission, 1996, 1997a–g, 2000, 2010a,b, 2016; FAO, 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[8].

The details of the intended GAPs for spinetoram are given in Appendix A.

A selected list of end points of the studies assessed by EFSA in the framework of peer review process, including the end points of studies 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 spinetoram in primary corps belonging to the group of fruit crops, root crops and leafy crops has been investigated in the framework of the EU pesticides peer review (EFSA, 2013a).

For all crop categories investigated, XDE-175-J and its metabolites (*N*-demethyl-175-J and *N*-formyl-175-J) were the predominant compounds of the residues. XDE-175-J levels ranged from 35% to 69% of the total radioactive residues (TRR) at harvest in apple, lettuce and turnips. XDE-175-L and its metabolites (*N*-demethyl-175-L and *N*-formyl-175-L) were also present, but in lower proportions

[7] 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.
[8] 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.

(EFSA, 2013a). A general data gap was identified in the peer review process to demonstrate that the stereochemistry of compounds tested in the toxicological studies was basically identical to the stereochemistry of residues identified in the metabolism/degradation studies in animals, plants and the environment.

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

1.1.2. Nature of residues in rotational crops

The metabolic pattern of spinetoram in rotational crops has not been previously assessed in the context of the EU pesticide peer review, since the representative use of spinetoram was on permanent crops (grapes) (EFSA, 2013a).

For the intended uses under assessment, spinetoram is proposed to be used on several crops that can be grown in rotation with other crops. According to the soil degradation studies evaluated in the framework of the peer review, the DT_{90} value of spinetoram in the worst-case field conditions are 197 days for XDE-175-J and 328 days for the metabolite *N*-demethyl-175-J. The main soil metabolites, *N*-demethyl-175-J and *N*-demethyl-175-L, were considered to exhibit moderate to high persistence (EFSA, 2013a). The plateau level reached in soils has not been calculated. Since the DT_{90} value for XDE-175-J exceeds 100 days further investigation of the residues in rotational crops is required.

A confined rotational crop metabolism study has been submitted in the framework of this assessment (France, 2016). This study was conducted following bare soil treatment with ^{14}C- XDE-175-J and ^{14}C- XDE-175-L at a total application rate of 540 g/ha (3.6N). Lettuce, radish and wheat were planted into the treated soil at 30, 120 and 365 days plant back intervals (PBIs) and grown to maturity. At all PBIs and for all crops higher levels of TRRs were recovered following the application of spinetoram ^{14}C-XDE-175-J compared to residue levels resulting from ^{14}C-XDE-175-L application. At 30-day PBI, the parent XDE-175-J was tentatively identified in immature radish tops and lettuce (15.3% and 13.4% TRR, respectively) while a bulk of metabolites including *N*-demethyl-175-J, *O*-deethyl-175-J and *N*-formyl-175-J accounted for 26% TRR and 28% TRR in immature radish tops and in lettuce, respectively. The total residues of spinetoram (XDE-175-J and XDE-175-L) were very low in mature radish root (< 0.011 mg eq/kg) and in wheat straw (0.037 mg eq/kg) while significant levels of total residues were recovered in immature and mature lettuce (0.118 and 0.043 mg eq/kg, respectively). At all PBIs the total residues of spinetoram (XDE-175-J and XDE-175-L) in cereal grain accounted for < 0.01–0.014 mg eq/kg but further identification of metabolites was not attempted. At 120-day PBI and beyond, crop parts for human consumption are expected to contain total spinetoram residues at up to 0.012 mg eq/kg in mature radish roots and up to 0.019 mg eq/kg in lettuce. Higher total residue levels were, however, found in potential feed items as in immature radish tops (0.012–0.024 mg eq/kg), in wheat forage (0.01–0.019 mg eq/kg), in wheat hay (0.019–0.052 mg eq/kg) and in wheat straw (0.025–0.074 mg eq/kg). Based on these results, the metabolism of spinetoram in rotational crops is deemed to be similar to the metabolic pattern depicted in primary crops. A deficiency has been identified during the assessment related to the determination of the residues in straw. For future uses, further investigation on the nature of spinetoram residues in feed items from crops grown in rotation as result of the application of spinetoram should be provided.

1.1.3. Nature of residues in processed commodities

The effect of processing on the nature of spinetoram was investigated in the framework of the EU pesticides peer review (EFSA, 2013a).

Standard hydrolysis studies showed that spinetoram is hydrolytically stable under standard processing conditions representative of pasteurisation, baking/brewing/boiling and sterilisation.

1.1.4. Methods of analysis in plants

An analytical method for the determination of spinetoram residues (both factors of the active substance) was assessed during the EU pesticides peer review (EFSA, 2013b).

The method is sufficiently validated for the determination of residues of spinetoram in high water-, high acid-, high oil- content and dry matrices (France, 2016; Netherlands, 2016). The method allows quantifying residues at the LOQ of 0.01 mg/kg respectively for XDE-175-J and XDE-175-L; the LOQ of 0.02 mg/kg was set for the sum of the two factors (XDE-175). A data gap was identified for oily and dry crop groups (EFSA, 2013b).

Since the food items under the current application belong to the high water content and high acid content commodities, it is concluded that a sufficiently validated analytical method is available for the determination of residues of spinetoram in those food items.

1.1.5. Stability of residues in plants

Residues of XDE-175-J, XDE-175-L, *N*-demethyl-175-J and *N*-formyl-175-J are demonstrated to be stable for up to 372 days in high water- (lettuce, sugar beet), high oil- (soyabean), high starch/dry- (wheat grain) and high acid- (orange) content commodities (EFSA, 2013a).

Since residue samples were stored for less than 1 year for the high water content commodities (lettuces, leeks, spinaches and cherries) and for the high acid content commodities (raspberries, blueberries and cane fruits), the integrity of the residues has been demonstrated (France, 2016; Netherlands, 2016).

1.1.6. Proposed residue definitions

Based on the metabolic pattern identified in metabolism studies for primary crops and the results of hydrolysis studies addressing the nature of the residues in processed commodities, the toxicological profile of metabolites and the degradation products and the capabilities of enforcement analytical methods, the residue definitions were proposed as 'Spinetoram (sum of XDE-175-J, XDE-175-L) only' for monitoring and as 'Spinetoram (sum of XDE-175-J, XDE-175-L) and *N*-demethyl-175-J and *N*-formyl-175-J metabolites, expressed as spinetoram' for risk assessment purposes.

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 residue trials performed on cherries, leeks, lettuces, spinaches, blueberries and currants and raspberries. According to the assessment of the EMS, the methods used were sufficiently validated and fit for purpose. Residue samples were stored for a shorter period than 1 year under those storage conditions for which the integrity of the samples has been previously demonstrated (Section 1.1.5).

Those residue trials not compliant with the cGAP were disregarded from the MRL calculations. For those situations in which the number of residue trials was insufficient, MRLs were not calculated. Residues of spinetoram parent compound (XDE-175-J and XDE-175-L) and those metabolites considered in the residue definition for risk assessment (*N*-demethyl-175-J and *N*-formyl-175-J) have been analysed in all the submitted residue trials.

1.2.1.1. Cherries

In support of the southern European Union (SEU) GAP (2 × 75 g/ha, PHI 3 days), six GAP-compliant residue trials performed in cherries were considered for the MRL calculation. Residues of spinetoram accounted from residues below the LOQ to a maximum of 1.17 mg/kg. Using the MRL OECD calculator, an MRL of 2 mg/kg was calculated for the intended use in cherries.

1.2.1.2. Leeks

In support of the northern European Union (NEU) GAP (2 × 60 g/ha, PHI 7 days), eight GAP-compliant residue trials performed in leek were considered for the MRL calculation. Residues of spinetoram accounted from residues at LOQ to a maximum of 0.0381 mg/kg. Using the MRL OECD calculator, an MRL of 0.06 mg/kg was calculated for the intended use in leeks.

1.2.1.3. Raspberries

Four residue trials compliant with the SEU GAP (2 × 60 g/ha, PHI 3 days) and six residue trials compliant with the indoor GAP (2 × 60 g/ha, PHI 3 days) were submitted and used to derive an MRL that represents the most critical residue situation for which no consumer concern is identified. Spinetoram residues resulting from the residue data set compliant with the SEU cGAP were detected in higher concentrations compared to the residue trials compliant with the indoor GAP, accounting for a maximum of 0.47 mg/kg. An MRL of 1 mg/kg has been calculated using the OECD calculator. In accordance with the EU extrapolation rules (European Commission, 2016), it is possible to consider the

same residue situation for the whole group of cane fruits; therefore, an MRL of 1 mg/kg is proposed to be applicable for the whole group of cane fruits.

1.2.1.4. Other small fruits and berries

Six residue trials compliant with the SEU GAP (2 × 60 g/ha, PHI 3 days) and six residue trials compliant with the indoor GAP (2 × 60 g/ha, PHI 3 days) were submitted and used to derive an MRL for indoor and outdoor uses that represent the most critical residue situation. Two residue trials on blueberries and four residue trials on currants were submitted. Spinetoram residues resulting from the residue trials compliant with the SEU GAP were higher compared to spinetoram residues detected in the indoor trials, accounting for a maximum of 0.19 mg/kg. An MRL of 0.4 mg/kg has been calculated using the OECD calculator supported by the SEU trials. In accordance with the EU extrapolation rules (European Commission, 2016) and as requested by the applicant, it is possible to consider the same residue situation for the whole group of other small fruits and berries; therefore, an MRL of 0.4 mg/kg is proposed to be applicable to the whole group of other small fruits and berries.

1.2.1.5. Lettuces

The residue trials on lettuce (open leaf) according to the indoor GAP (3 × 50 g/ha, PHI 3 days) have been considered to derive an MRL. Only four residue trials on lettuce compliant with the SEU GAP (2 × 50 g/ha, PHI 3 days) were submitted and were therefore not considered in the MRL calculation. Eight residue trials were used in the MRL calculator to derive an MRL proposal of 4 mg/kg and residues of spinetoram were detected from 0.22 mg/kg up to 2.35 mg/kg. According to the EU extrapolation rules, an MRL of 4 mg/kg can be used by extrapolation of the whole group of lettuces and salad plants to the whole group of herbs and edible flowers and for the whole group of herbal infusions from leaves and herbs. Furthermore, the EMS proposed to derive an MRL of 40 mg/kg for the group of herbal infusions from leaves and herbs by extrapolation from the trials conducted on lettuce, taking into account a default dehydration factor of 10, as MRLs for herbal infusions refer to the dry commodities (France, 2016). EFSA agrees with the EMS proposal to apply a dehydration factor (DF) of 10 to derive an MRL of 40 mg/kg for the whole group of herbal infusions from leaves and herbs.

It has also been proposed by the applicant to extend the MRL to the whole group of herbal infusions from flowers, by using the lettuce open leaf varieties residue trials and the DF of 10. EFSA is however of the opinion that the extrapolation from lettuce to flowers of herbal infusions is not possible considering that the crop commodities classified in this category are not morphologically comparable to lettuce. The extrapolation of the MRL proposal to the whole group of herbal infusions from flowers is therefore not recommended by EFSA.

1.2.1.6. Spinaches

Four GAP-compliant residue trials were submitted in support of the SEU GAP for spinaches (2 × 50 g/ha, PHI 3 days) and the highest residue value was 0.58 mg/kg. Only two residue trials on spinaches and compliant with the indoor GAP (3 × 50 g/ha, PHI 3 days) are available. A calculated MRL of 1.5 mg/kg has been derived in support of the SEU use and applicable for the whole group of spinaches and similar leaves as requested by the applicant and in accordance with the EU extrapolation rules (European Commission, 2016).

1.2.2. Magnitude of residues in rotational crops

The possible transfer of spinetoram residues to crops that are grown in rotation has been assessed in the current assessment. The available studies demonstrated that residues above 0.01 mg/kg might occur in succeeding crops (lettuce, radish leaves and wheat straw) planted in soil treated at 540 g a.s./ha. Spinetoram (sum of XDE-175-J and XDE-175-L) residues were detected at maximum levels of 0.12 mg eq/kg and 0.043 mg eq/kg in immature and mature lettuce, respectively, and in immature radish tops at 0.10 mg/kg. Based on the available information, it cannot be excluded that the use of spinetoram according to the proposed GAPs results in residues > 0.01 mg/kg in leafy crops grown in rotation. Therefore, potential restriction to avoid rotation with leafy crops at short PBIs (30 days) should be implemented at Member State level when granting authorisations for the use of spinetoram.

Rotational crops field trials have not been submitted.

1.2.3. Magnitude of residues in processed commodities

A processing study investigating the magnitude of spinetoram residues in cooked spinaches has been submitted (France, 2016). However, this study was considered as not reliable by the EMS considering the lack of validation data for the analytical method. EFSA assessed the data submitted and since the analytical method has been fully validated for primary crops until the residue level of 2.5 mg/kg, EFSA considers that the study is valid with this regard. However, since only one residue trial has been performed to derive a processing factor (PF) of 0.76 from spinaches unwashed leaves to cooked spinaches, the derived PF should be considered only on a tentative basis. Additional processing residue trials are in principle required according to the current recommendations (European Commission, 1997d).

Processing studies are in principle required for spinaches, cherries, cane fruit and small fruits and berries where residue levels exceed 0.1 mg/kg; however, considering the expected low contribution of the processed commodities of these crops to the dietary burden, the stability of spinetoram under the standard hydrolysis conditions and the low contribution of these crops to the theoretical maximum daily intake (TMDI) and to the international estimated short-term intake (IESTI), EFSA is of the opinion that these processing trials are not requested.

A DF of 10 has been proposed by the EMS (France, 2016) for deriving an MRL for herbal infusions from leaves and herbs. In the absence of more specific data, EFSA agrees with the approach proposed and a DF of 10 has been considered for the MRL calculation for the whole group of herbal infusions from leaves and herbs and for deriving the values for risk assessment purposes.

1.2.4. Proposed MRLs

The available data are considered sufficient to derive several MRL proposals as well as risk assessment input values for the commodities under evaluation, except for herbal infusions from flowers for which the proposed extrapolation is not allowed according to the EU extrapolation rules (European Commission, 2016). The current MRL proposals and further considerations are summarised in Appendix B (B.4).

2. Residues in livestock

Not relevant since the crops under consideration in the current MRL applications 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 spinetoram used in the risk assessment (i.e. ADI and ARfD values) were derived in the framework of the EU pesticides peer review (EFSA, 2013a).

A screening risk assessment has been done considering all the current MRLs in the EU Regulation. EFSA identified an exceedance of the ARfD for lettuce accounting for 257% of the ARfD considering a highest residue (HR) of 9.55 mg/kg used in the last JMPR evaluation for spinetoram (FAO, 2012) for which a Codex maximum residue limit (CXL) of 10 mg/kg has been implemented in the EU legislation. Considering the use of spinetoram in lettuces under the intended GAP and the available residue trials, a calculated MRL of 4 mg/kg has been derived. Since no risk for consumers has been identified for the calculated MRL, EFSA proposes to lower the MRL of 10 mg/kg to 4 mg/kg for the use of spinetoram in lettuce.

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. The calculations were based on the HR derived from supervised field trials according to the residue definition for risk assessment. The complete list of input values can be found in Appendix C.

For the intended use in escaroles, as a result of the extrapolation from lettuce open leaf varieties, an exceedance of 249% of the ARfD has been identified. Thus, no MRL is proposed under the current

evaluation for this use. For the remaining crops, the short-term exposure did not exceed the ARfD (see Appendix B.3.2).

3.2. Long-term (chronic) dietary risk assessment

The long-term exposure assessment was performed taking into account the supervised trials median residue (STMR) values derived for the commodities assessed in this application according to the residue definition for risk assessment; for the remaining commodities covered by Regulation (EC) No 396/2005 and implemented under Regulation (EU) 2016/46, the existing EU MRLs multiplied by a conversion factor (CF) of 2 have been used as chronic risk assessment input values. This default CF of 2 has been derived considering the worst-case scenario in which there is an equal contribution of the metabolites included in the residue definition for risk assessment and parent compound which is the marker for monitoring purposes.

The complete list of input values is presented in Appendix C.

The estimated long-term dietary intake was calculated to be 48% 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.3.1.

The uses for which a consumer dietary intake concern has been identified under the current assessment, were not included in the consumer risk assessment, since EFSA understands that these uses would be withdrawn from the EU Regulation.

It is noted that the above risk assessment was performed disregarding the possible impact of the isomer ratios due to plant or livestock metabolism. Considering however that the isomer ratio of spinetoram is a mixture of XDE-175-J (50–90%) and XDE-175-L (10–50%) and that the toxicological studies were carried out according to these specifications (EFSA, 2013a), a change of isomer ratios in the residue might, in the worst-case situation, lead to a duplication of the toxicological burden of the residue. Since the exposure calculations represent less than 50% of the ADI and ARfD, EFSA concludes that the potential change of isomer ratios in the final residue will not be of concern for the proposed uses assessed in the framework of this application. In case future uses of active substance would lead to a higher consumer exposure, further information regarding the impact of plant and livestock metabolism on the isomer ratio might be required.

EFSA concluded that although the uncertainties remain due to the data gaps identified in the previous sections, this indicative long-term intake of residues of spinetoram 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 cane fruits, other small fruits and berries, spinaches and similar leaves, lettuces and salad plants except escaroles, herbs and edible flowers, herbal infusions from leaves and herbs, cherries and leeks.

During the EU peer review process, a data gap was identified to prove that the stereochemistry of the metabolites (including where metabolites are potential isomers derived from both factors of the active substance) tested in the toxicological studies was identical to the stereochemistry of the metabolites identified in the metabolism/degradation studies in plants and relevant to consumer exposure assessment.

A tentative consumer risk assessment has been performed and EFSA concluded that the short-term and long-term intake of residues resulting from the use of spinetoram according to the reported agricultural practices is unlikely to present a public health concern.

The MRL recommendations are summarised in Appendix B.4.

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Abbreviations

a.s.	active substance
ADI	acceptable daily intake
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
cGAP	critical GAP
CXL	Codex maximum residue limit
DAR	draft assessment report
DAT	days after treatment
DF	dehydration factor
DT_{90}	period required for 90% dissipation (define method of estimation)
EMS	evaluating Member State
GAP	Good Agricultural Practice
HPLC	high-performance liquid chromatography
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
JMPR	Joint Meeting on Pesticide Residues
LC–MS/MS	liquid chromatography with tandem mass spectrometry
LOQ	limit of quantification
Mo	monitoring
MRL	maximum residue level
MS	Member States
NEU	northern European Union
OECD	Organisation for Economic Co-operation and Development
PBI	plant back interval
PF	processing factor
PHI	preharvest interval
PRIMo	(EFSA) Pesticide Residues Intake Model
QuEChERS	Quick, Easy, Cheap, Effective, Rugged, and Safe (analytical method)
RA	risk assessment
RD	residue definition
RMS	rapporteur Member State
SC	suspension concentrate
SEU	southern European Union
SMILES	simplified molecular-input line-entry system
STMR	supervised trials median residue
TRR	total radioactive residues
TMDI	theoretical maximum daily intake
WG	water-dispersible granule
WHO	World Health Organization

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

Crop	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 and season[c]	Number min–max	Interval between application	g/hL min–max	Water L/ha min–max	g/ha min–max		
Leeks	NEU (BE, NL, DE, AT)	F	THRITB, THRISP	SC	25	Directed foliar application by mechanical sprayer	BBCH 10–49 (May–October)	1–2	28	10–30	200–600	60	7	
Cherries	SEU (FR, IT, ES)	F	*Drosophila* spp.	WG	250	Directed foliar application by mechanical sprayer	BBCH 75–87 (Mar–July)	1–2	28	5–9	800–1,500	75	3	
Blueberries and currants	SEU (FR, IT, ES, PT)	F	*Drosophila* spp. and other minor uses	SC	25	Directed foliar application by mechanical sprayer	BBCH 11–89 (Mar–Oct)	1–2	28	6–20	200–1,000	60	3	
Blueberries and currants	NEU (AT, DE, BE, NL)	G	*Drosophila suzukii*	SC	25	Directed foliar application by mechanical sprayer	BBCH 11–89 (Mar–Oct)	1–2	28	6–20	200–1,000	60	3	
Raspberry	SEU (FR, IT, ES, PT)	F	*Drosophila* spp. and other minor uses (pests: ex *Resseliella* spp. THOMTE)	SC	25	Directed foliar application by mechanical sprayer	BBCH 11–89 (Mar–Oct)	1–2	28	6–30	200–1,000	60	3	
Raspberry	NEU (AT, DE, BE, NL)SEU (FR, ES, IT, PT, EL, CY)	G	*Drosophila suzukii*	SC	25	Directed foliar application by mechanical sprayer	BBCH 11–89 (Mar–Oct)	1–2	28	6–30	200–1,000	60	3	

Crop	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 and season[c]	Number min–max	Interval between application	g/hL min–max	Water L/ha min–max	g/ha min–max		
Lettuce, spinach, fresh herbs, herbal infusions from flowers, herbal infusions from leaves and herbs	SEU (FR, IT, ES, PT, EL, CY)	F	*Heliothis*, Spodoptera, Thrips	SC	25	Directed foliar application by mechanical sprayer	BBCH 11–49 (Feb–Nov)	1–2	28	5–17	30–1,000	50	3	
Lettuce, spinach, fresh herbs, herbal infusions from flowers, herbal infusions from leaves and herbs	NEU (AT, DE, BE, NL) SEU (FR, IT, ES, PT, EL, CY)	G	*Heliothis*, Spodoptera, Thrips (EL, CY *Frankliniella*)	SC	25	Directed foliar application by mechanical sprayer	BBCH 11–89 (Feb–Nov)	1–3	14	5–17	30–1,000	50	3	

NEU: northern European Union; SEU: southern European Union; MS; Member State; SC: suspension concentrate; WG: water-dispersible granule; 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.
(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 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**	**Crop(s)**	**Label position**	**Application(s)**	**Sampling (DAT)**
	Fruit crops	Apple	^{14}C-XDE-175-J	Foliar, 1 × 1,810.2 g/ha	0, 1, 3, 7, 14
			^{14}C-XDE-175-L	Foliar, 1 × 1,108.2 g/ha	30
	Leafy	Lettuce	^{14}C-XDE-175-J	Foliar, 1 × 900 g/ha	0, 0.25, 1, 3, 7
			^{14}C-XDE-175-L	Foliar, 1 × 300 g/ha	30
	Root crops	Turnip	^{14}C-XDE-175-J	Foliar, 3 × 900 g/ha	3, 7
			^{14}C-XDE-175-L	Foliar, 3 × 300 g/ha	3, 7
	DAT: days after treatment Source: France (2016)				
Rotational crops (available studies)	**Crop groups**	**Crop(s)**	**Label position**	**Application(s)**	**PBI (DAT)**
	Root	Radish	^{14}C-XDE-175-J ^{14}C-XDE-175-L	Bare soil, total application: 540 g/ha	30, 120, 365
	Leafy	Lettuce			30, 120, 365
	Cereals	Wheat			30, 120, 365
	Source: France (2016)				
	Confined rotational crop metabolism study. Radiolabelled spinetoram as ^{14}C-Spinetoram-J and ^{14}C-Spinetoram-L at rates 405 and 135 g/ha				
Processed commodities (hydrolysis study)	**Conditions**				**Investigated?**
	Pasteurisation (20 min, 90°C, pH 4)				Yes
	Baking, brewing and boiling (60 min, 100°C, pH 5)				Yes
	Sterilisation (20 min, 120°C, pH 6)				Yes
	Source: France (2016) Some degradation of spinetoram into C17-pseudyaglycone-175-J/-175-L (7–11% of applied radioactivity) (EFSA, 2013a)				

PBI: plant back interval.

Can a general residue definition be proposed for primary crops?	Yes. Only foliar uses were assessed.
Rotational crop and primary crop metabolism similar?	Yes. Source: Confined rotational crop studies submitted under the current application (France, 2016).
Residue pattern in processed commodities similar to residue pattern in raw commodities?	Yes
Plant residue definition for monitoring (RD-Mo)	XDE-175 (sum of XDE-175-J and XDE-175-L)
Plant residue definition for risk assessment (RD-RA)	XDE-175 (sum of XDE-175-J and XDE-175-L) and the *N*-demethyl-175-J and *N*-formyl-175-J metabolites, expressed as XDE-175

Conversion factor (monitoring to risk assessment)	Conversion factors were derived from GAP-compliant residue trials for all crops under consideration and analysing for all the compounds included in the risk assessment residue definition
Methods of analysis for monitoring of residues (analytical technique, crop groups, LOQs)	LC–MS/MS (acidic, wet, dry and oily crops) LOQ = 0.02 mg/kg (XDE-175; 0.01 mg/kg individually for XDE-175-J and XDE-175-L) (Acceptable ILV) Confirmatory method/data for oily and dry crops is still required. DFG-S19 (apple, orange and grape)

B.1.1.2. Stability of residues in plants

Plant products (available studies)	**Category**	**Commodity**	**T (°C)**	**Stability (Months)**
	High water content	Lettuce Sugar beet	−18°C	12
	High acid content	Orange	−18°C	12
	High starch content	Wheat grain	−18°C	12
	High oil content	Soyabeans	−18°C	12
	Storage stability data on XDE-175-J, XDE-175-L, N-demethyl-175-J and N-formyl-175-J Source: EFSA (2013a)			

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]
Cherries	SEU	**Mo:** < 0.02, 2 × 0.03, 0.050, 0.070, 1.170 **RA:** < 0.040, 2 × 0.050, 0.070, 0.090, 1.190	MRL_{OECD}: 2.10/2.00	2	1.17 **HR_{RA}** 1.19	0.04 **$STMR_{RA}$** 0.06	1.7
Leeks	NEU	**Mo:** 3 × < 0.02, 0.0308, 0.0243, 0.0282, 0.0284, 0.0381 **RA:** 3 × < 0.04, 0.0508, 0.0443, 0.0482, 0.0438, 0.0629	MRL_{OECD}: 0.06/0.06	0.06	0.04 **HR_{RA}** 0.06	0.03 **$STMR_{RA}$** 0.04	1.7
Raspberries	SEU	**Mo:** 0.04, 2 × 0.110, 0.47 **RA:** 0.060, 0.13, 0.15, 0.53	MRL_{OECD}: 0.96/1.00 Extrapolation from raspberries to the whole group of cane fruits allowed (European Commission, 2016)	1	0.47 **HR_{RA}** 0.53	0.11 **$STMR_{RA}$** 0.14	1.4
	Indoor	**Mo:** 0.030, 3 × 0.050, 0.11, 0.12 **RA:** 0.05, 3 × 0.070, 2 × 0.14	MRL_{OECD}: 0.22/0.30 Extrapolation from raspberries to the whole group of cane fruits allowed (European Commission, 2016)	0.3	0.12 **HR_{RA}** 0.14	0.05 **$STMR_{RA}$** 0.07	1.4
Blueberries and currants (black, red and white)	SEU	**Mo:** 0.010, 0.040, 0.070, 0.110, 0.170, 0.190 **RA:** 0.12, 0.06, 0.09, 0.13, 0.19, 0.21	MRL_{OECD}: 0.39/0.40 MRL supported by 6 residue trials on, respectively, blueberries (2) and currants (4). Data set support the extrapolation to the whole group of small fruits and berries	0.4	0.19 **HR_{RA}** 0.21	0.09 **$STMR_{RA}$** 0.13	1.4
	Indoor	**Mo:** 0.020, 0.030, 0.060, 0.080, 0.10, 0.11 **RA:** 0.040, 0.050, 0.100, 0.110, 0.120, 0.150	MRL_{OECD}: 0.21/0.30 MRL supported by 6 residue trials respectively on blueberries (2) and on currants (4). Data set support the extrapolation to the whole group of small fruits and berries	0.3	0.11 **HR_{RA}** 0.15	0.07 **$STMR_{RA}$** 0.11	1.4

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]
Lettuce	SEU	**Mo**: < 0.11, 0.12, 0.37, 0.53 **RA**: < 0.13, 0.21, 0.72, 0.69	No sufficient GAP-compliant residue trials	–	–	–	–
	Indoor	**Mo:** 0.220; 0.290; 0.310; 0.490; 0.540; 0.560; 1.000; 2.350 **RA:** 0.280; 0.400; 0.440; 0.570; 0.610; 0.660; 1.280; 2.850	MRL_{OECD}: 3.53/4.00 Calculated MRL supported by 8 residue trials in open leaf varieties Possible extrapolation to other lettuces and salad plants crops, to the whole group of herbs and edible flowers and to the whole group of herbal infusions from leaves and herbs (European Commission, 2016). The extrapolation to the whole group of herbal infusions from flowers is not acceptable considering the current guidance recommendations	4	2.35 **HR_{RA}** 2.85	0.52 **$STMR_{RA}$** 0.59	1.3
Spinach	SEU	**Mo:** < 0.020; 0.070; 0.200; 0.580 **RA:** 0.100; 0.190; 0.330; 1.050	MRL_{OECD}: 1.23/1.50 Calculated MRL supported by 4 residue trials according to the cGAP. Possible extrapolation to the whole group of spinaches and similar leaves (European Commission, 2016)	1.5	0.58 **HR_{RA}** 1.05	0.14 **$STMR_{RA}$** 0.26	1.7
	Indoor	**Mo:** 0.36, 1.04 **RA:** 0.55, 1.74	No sufficient GAP-compliant residue trials	–	–	–	–

MRL: maximum residue level; OECD: Organisation for Economic Co-operation and Development; Mo: monitoring; RA: risk assessment; cGAP: critical GAP; GAP: Good Agricultural Practice; HR_{RA}: Highest residue according to the residue definition for risk assessment; $STMR_{RA}$: Supervised trials median residue according to the residue definition for risk assessment.
(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 monitoring to the residue definition for risk assessment.

B.1.2.2. Residues in succeeding crops

Confined rotational crop study (quantitative aspect)	Relevant for parent compound and main soil metabolite *N*-demethyl-175-J, since DT_{90} > 100 days The metabolism of spinetoram in rotational crops is deemed to be similar to the metabolic pattern depicted in primary crops
Field rotational crop study	Not submitted Potential restriction to avoid rotation with leafy crops at short plant back intervals (30 days) should be implemented at Member State level when granting authorisations for the use of spinetoram

B.1.2.3. Processing factors

Processed commodity	Number of studies	Processing factor (PF)		CF_P
		Individual values	Median PF	
Indicative processing factors (limited data set and/or residues not analysed according to the proposed residue definitions)				
–	–	–	–	–

B.2. Residues in livestock

Relevant groups	Dietary burden expressed in				Most critical diet	Most critical commodity	Trigger exceeded (Y/N)
	mg/kg bw per day		mg/kg DM				
	Med.	Max.	Med.	Max.			
No livestock exposure expected since the intended uses are crops normally not fed to animals							

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

Livestock (available studies)	Animal	Dose (mg/kg bw per day)	Duration (days)	N rate/comment
	No studies available and not required			

Time needed to reach a plateau concentration in milk and eggs (days)	Not applicable
Metabolism in rat and ruminant similar (Yes/No)	Not applicable
Animal residue definition for monitoring (RD-Mo)	Not required
Animal residue definition for risk assessment (RD-RA)	Not required
Conversion factor (monitoring to risk assessment)	Not applicable
Fat soluble residues (Yes/No)	Not applicable
Methods of analysis for monitoring of residues (analytical technique, matrix, LOQs)	Not required

B.2.1.2. Stability of residues in livestock

Animal products (available studies)	Animal	Commodity	T (°C)	Stability (months/years)
	No studies available and not required			

B.2.2. Magnitude of residues in livestock

B.2.2.1. Summary of the residue data from livestock feeding studies

Animal commodity	Residues at the closest feeding level (mg/kg)		Estimated value at 1N		MRL proposal (mg/kg)
	Mean	Highest	STMR (mg/kg)	HR (mg/kg)	
	No studies available and not required				

B.3. Consumer risk assessment

B.3.1. Chronic risk assessment

ADI	0.025 mg/kg bw per day (EFSA, 2013a)
Highest IEDI, according to EFSA PRIMo	48% ADI (German, child) Contribution of crops assessed: Cherries: 0.09% of ADI (German, child) Cane fruits: 0.08% of ADI (IE, child) Gooseberries: 0.1% of ADI (WHO Cluster diet B) as maximum of the small fruits and berries Other small fruits and berries: 0.1% of ADI (NL, child) Other lettuces and salad plants: 0.45% of ADI (FR all population) Spinaches: 0.74% of ADI (FR toddler) Herbs: 0.16% of ADI (WHO cluster diet D) Leeks: 0.11% of ADI (FR toddler)
Assumptions made for the calculations	The calculation is based on the median residue levels derived for raw agricultural commodities according to the residue definition for risk assessment and the EU MRLs according to the Regulation (EU) 2016/46 For those MRLs in the EU regulation, an overall conversion factor for risk assessment of 2 has been used for risk assessment purposes considering the worst-case scenario from monitoring to risk assessment

B.3.2. Acute risk assessment

ARfD	0.1 mg/kg (EFSA, 2013a)
Highest IESTI, according to EFSA PRIMo	Screening scenario: Lettuce: **257**% of ARfD Scenario 1: Escaroles: **249.2**% of ARfD Spinaches: 23.7% of ARfD Beet leaves: 18.4% of ARfD Celery leaves:16.3% of ARfD Purslane: 15.9% of ARfD Scenario 2: Spinaches: 23.7% of ARfD Beet leaves: 18.4% of ARfD Celery leaves:16.3% of ARfD Purslane: 15.9% of ARfD Cherries: 14.6 % of ARfD
Assumptions made for the calculations	**Screening scenario:** Taking into consideration the current EU MRLs in the Regulation (EU) 2016/46, a screening risk assessment scenario has been performed A MRL of 10 mg/kg in lettuce as result of the JMPR evaluation in 2008 has been implemented in the EU legislation. Due to the current assessment, EFSA noted that the HR of 9.55 mg/kg retrieved from the JMPR evaluation leads to an exceedance of 257% of the ARfD. The ARfD has been derived after the JMPR evaluation and in the framework of the EU peer review process; reason why this concern has not been previously identified For the EU use of spinetoram in lettuce, the residue trials submitted under the current application support an MRL of 4 mg/kg with and HR of 2.85 mg/kg for which no consumer intake concern is identified Therefore, EFSA recommends revising the MRL of 10 mg/kg for lettuce currently in the EU legislation and proposes a MRL of 4 mg/kg for which no consumer intake concern has been identified pending on the outcome of the MRL review **Scenario 1:** An acute exposure assessment scenario has been performed using the HR derived in the current assessment and the extrapolations allowed at EU level. No acute dietary intake concern has been identified for the intended uses except for the use of spinetoram in escaroles, for which an exceedance of 249% of the ARfD has been identified **Scenario 2:** Based on the previous dietary intake calculation in scenario 1, EFSA proposed a non-MRL proposal for the use in escaroles, and therefore, the figures presented at the beginning of this section shown characterisation of the acute risk assessment scenario

B.4. Recommended MRLs

Code[(a)]	Commodity	Existing EU MRL (mg/kg)	Proposed EU MRL (mg/kg)	Comment/justification
Enforcement residue definition: Spinetoram (sum of XDE-175-J and XDE-175-L)[(F)]				
0140020	Cherries	0.05*	2	SEU use supported by sufficient residue trials Risk for consumers unlikely
0153000	Cane fruits	Raspberry: 0.8 Others: 0.05*	1	SEU and indoor uses supported by extrapolation from residue data on raspberries Risk for consumers unlikely
0154000	Other small fruits and berries	Blueberry: 0.2 Others: 0.05*	0.4	SEU and indoor uses supported by extrapolation from residue data on blueberries and currants Risk for consumers unlikely
0251000	Lettuces and salad plants	0.05	4	An MRL of 4 mg/kg has been derived and is considered as acceptable for the indoor use on lettuces and salad plants, except for escaroles/broad-leaves endives for which a consumer intake concern has been identified Risk for consumers unlikely
0251020	Lettuce	10	4	An exceedance of the ARfD has been identified for the current MRL implemented in the EU legislation. An MRL of 4 mg/kg is proposed to be implemented, in support of the EU intended use and supported by residue data for which no consumer intake concern has been identified
0251030	Escaroles/broad-leaves endives	0.05*	No proposal	An exceedance of the ARfD has been identified for the intended use based on the extrapolation from lettuce open leaf varieties No data are available to derive other MRL proposal
0252000	Spinaches and similar leaves	0.05*	1.5	The submitted data are sufficient to derive a MRL proposal for the SEU use with an extrapolation to the whole group of spinaches and similar leaves Risk for consumers unlikely
0256000	Herbs and edible flowers	0.05*	4	An MRL of 4 mg/kg has been derived based on the possible extrapolation from the indoor GAP-compliant residue trials in lettuce open leaf varieties to the whole group of herbs and edible flowers Risk for consumers unlikely
0270060	Leeks	0.05*	0.06	The submitted data are sufficient to derive a MRL proposal for the NEU use Risk for consumers unlikely
0631000	Herbal infusions from flowers	0.01*	No proposal	No extrapolation foreseen by the EU guidelines
0632000	Herbal infusions from leaves and herbs	0.01*	40	An MRL of 40 mg/kg has been derived based on the possible extrapolation from the indoor GAP-compliant residue trials in lettuce open leaf varieties to the subgroup of herbal infusions from leaves and herbs. A default dehydration factor of 10 is proposed as MRLs for herbal infusions refers to the dry commodities Risk for consumers unlikely

MRL: maximum residue level; SEU: southern European Union; ARfD: acute reference dose; GAP Good Agricultural Practice; NEU: northern European Union.
*: 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 – Input values for the exposure calculations

C.1. Livestock dietary burden calculations

Feed commodity	Median dietary burden		Maximum dietary burden	
	Input value (mg/kg)	Comment	Input value (mg/kg)	Comment
Active substance is not authorised on any animal feed item				

C.2. Consumer risk assessment

Commodity	Chronic risk assessment[b]		Acute risk assessment[b]	
	Input value (mg/kg)	Comment	Input value (mg/kg)	Comment
Cherries	0.06	$STMR_{RA}$	1.19	HR_{RA}
Leeks	0.04	$STMR_{RA}$	0.06	HR_{RA}
Cane fruits group	0.14	$STMR_{RA}$	0.53	HR_{RA}
Small fruits and berries group	0.13	$STMR_{RA}$	0.21	HR_{RA}
Lettuce[a] and other salad plants group excluding escaroles (broad-leaf endive) and lettuce	0.59	$STMR_{RA}$	2.85	HR_{RA}
Herbs and edible flowers	0.59	$STMR_{RA}$	2.85	HR_{RA}
Spinaches and similar leaves	0.26	$STMR_{RA}$	1.05	HR_{RA}
Herbal infusions from leaves and herbs	5.9	$STMR_{RA} \times DF$[c] (10)	28.5	$STMR_{RA} \times DF$[c] (10)
Peaches and apricots	EU MRL × CF (1.4)	EFSA, 2009	Acute risk assessment only undertaken for those commodities under assessment in the current application	
For the remaining commodities, MRLs set at the LOQ according to Art. 18(1) of the EU Regulation 396/2005 and those MRLs supported by data and set above the LOQ and implemented in the Reg (EU) 2016/46. EU MRL values has been used in the exposure calculations multiplied by a conversion factor (CF) of 2 considered the worst case risk assessment scenario				

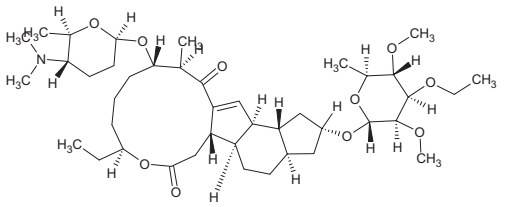
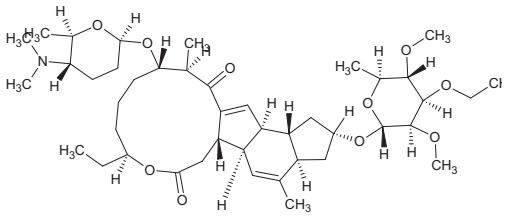
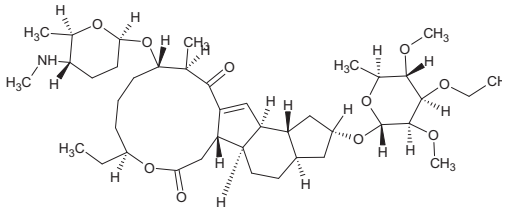
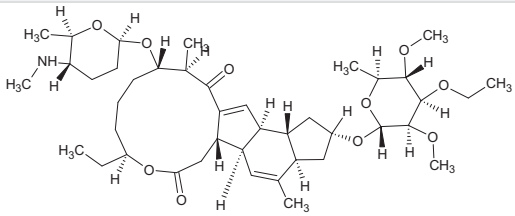
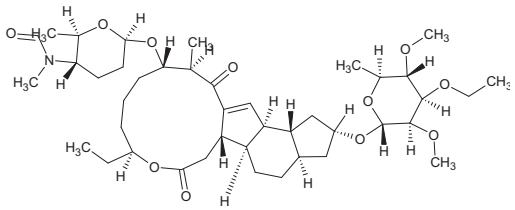
STMR: supervised trials median residue; RA: risk assessment; HR: highest residue; MRL: maximum residue level; LOQ: limit of quantification.

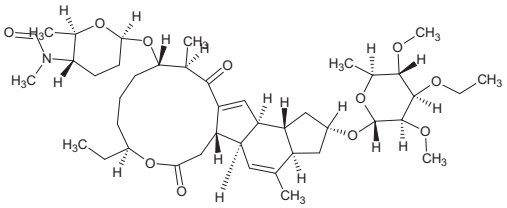
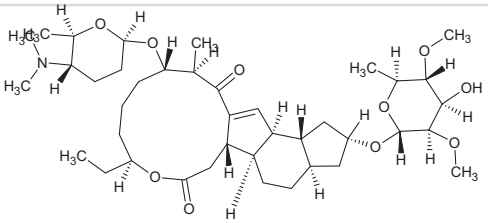
(a): Lettuce has not been considered in the acute and chronic exposure assessment scenario in the framework of this reasoned opinion. However, an exceedance of the ARfD has been identified for lettuce in the screening step. EFSA recommends amending the current MRL for lettuce according to the GAP-compliant residue data submitted and the GAP for the EU intended use. The setting of the ARfD has been established in the framework of the EU peer review process whereas the use on lettuce has been assessed in the context of a JMPR evaluation in 2008.

(b): Input values for the consumer risk assessment calculated based on the risk assessment residue definition. Residue data for the metabolites included in the risk assessment residue definition has been submitted as part of the dataset and used to derive the input values for the exposure calculation in both acute and chronic scenarios.

(c): DF: dehydration factor as result of the processing of the food items and as requested due to extrapolation considerations has been considered (France, 2016).

Appendix D – Used compound codes

Common name/code	IUPAC name/SMILES notation	Structural formula
Spinetoram (XDE-175)	Mixture of 50–90% (2*R*,3a*R*,5a*R*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*R*)-2-(6-Deoxy-3-*O*-ethyl-2,4-di-*O*-methyl-α-L-mannopyranosyloxy)-13-[(2*R*,5*S*,6*R*)-5-(dimethylamino)tetrahydro-6-methylpyran-2-yloxy]-9-ethyl-2,3,3a,4,5,5a,5b,6,9,10,11,12,13,14,16a,16b-hexadecahydro-14-methyl-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecine-7,15-dione CN(C)[C@H]1CC[C@@H](O[C@@H]1C)O[C@H]6CCC[C@H](CC)OC(=O)C[C@@H]5C(=C[C@@H]3[C@H]5CC[C@@H]2C[C@H](C[C@H]23)O[C@@H]4O[C@@H](C)[C@H](OC)[C@@H](OCC)[C@H]4OC)C(=O)[C@@H]6C and 50–10% (2*S*,3a*R*,5a*S*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*S*)-2-(6-Deoxy-3-*O*-ethyl-2,4-di-*O*-methyl-α-L-mannopyranosyloxy)-13-[(2*R*,5*S*,6*R*)-5-(dimethylamino)tetrahydro-6-methylpyran-2-yloxy]-9-ethyl-2,3,3a,5a,5b,6,9,10,11,12,13,14,16a,16b-tetradecahydro-4,14-dimethyl-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecine-7,15-dione CN(C)[C@H]1CC[C@@H](O[C@@H]1C)O[C@H]6CCC[C@H](CC)OC(=O)C[C@@H]5C(=C[C@@H]3[C@H]5C=C(C)[C@@H]2C[C@H](C[C@H]23)O[C@@H]4O[C@@H](C)[C@H](OC)[C@@H](OCC)[C@H]4OC)C(=O)[C@@H]6C	 
N-demethyl-175-J	(2*R*,3a*R*,5a*R*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*R*)-9-Ethyl-14-methyl-13-{[(2*R*,5*S*,6*R*)-6-methyl-5-(methylamino)tetrahydro-2*H*-pyran-2-yl]oxy}-7,15-dioxo-2,3,3a,4,5,5a,5b,6,7,9,10,11,12,13,14,15,16a,16b-octadecahydro-1H-as-indaceno[3,2-d]oxacyclododecin-2-yl 6-deoxy-3-O-ethyl-2,4-di-*O*-methyl-α-L-mannopyranoside CN[C@H]1CC[C@@H](O[C@@H]1C)O[C@H]6CCC[C@H](CC)OC(=O)C[C@@H]5C(=C[C@@H]3[C@H]5CC[C@@H]2C[C@H](C[C@H]23)O[C@@H]4O[C@@H](C)[C@H](OC)[C@@H](OCC)[C@H]4OC)C(=O)[C@@H]6C	
N-demethyl-175-L	(2*S*,3a*R*,5a*S*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*S*)-9-Ethyl-4,14-dimethyl-13-{[(2*R*,5*S*,6*R*)-6-methyl-5-(methylamino)tetrahydro-2*H*-pyran-2-yl]oxy}-7,15-dioxo-2,3,3a,5a,5b,6,7,9,10,11,12,13,14,15,16a,16b-hexadecahydro-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecin-2-yl 6-deoxy-3-*O*-ethyl-2,4-di-*O*-methyl-α-L-mannopyranoside CN[C@H]1CC[C@@H](O[C@@H]1C)O[C@H]6CCC[C@H](CC)OC(=O)C[C@@H]5C(=C[C@@H]3[C@H]5C=C(C)[C@@H]2C[C@H](C[C@H]23)O[C@@H]4O[C@@H](C)[C@H](OC)[C@@H](OCC)[C@H]4OC)C(=O)[C@@H]6C	
N-formyl-175-J	*N*-[(2*R*,3*S*,6*R*)-6-({(2*R*,3a*R*,5a*R*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*R*)-2-[(6-Deoxy-3-*O*-ethyl-2,4-di-*O*-methyl-a-L-mannopyranosyl)oxy]-9-ethyl-14-methyl-7,15-dioxo-2,3,3a,4,5,5a,5b,6,7,9,10,11,12,13,14,15,16a,16b-octadecahydro-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecin-13-yl}oxy)-2-methyltetrahydro-2*H*-pyran-3-yl]-*N*-methylformamide O=CN(C)[C@H]1CC[C@@H](O[C@@H]1C)O[C@H]6CCC[C@H](CC)OC(=O)C[C@@H]5C(=C[C@@H]3[C@H]5CC[C@@H]2C[C@H](C[C@H]23)O[C@@H]4O[C@@H](C)[C@H](OC)[C@@H](OCC)[C@H]4OC)C(=O)[C@@H]6C	

Common name/code	IUPAC name/SMILES notation	Structural formula
N-formyl-175-L	*N*-[(2*R*,3*S*,6*R*)-6-({(2*S*,3a*R*,5a*S*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*S*)-2-[(6-Deoxy-3-*O*-ethyl-2,4-di-*O*-methyl-a-L-mannopyranosyl)oxy]-9-ethyl-4,14-dimethyl-7,15-dioxo-2,3,3a,5a,5b,6,7,9,10,11,12,13,14,15,16a,16b-hexadecahydro-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecin-13-yl}oxy)-2-methyltetrahydro-2*H*-pyran-3-yl]-*N*-methylformamide O=CN(C)[C@H]1CC[C@@H](O[C@@H]1C)O[C@H]6CCC[C@H](CC)OC(=O)C[C@@H]5C(=C[C@@H]3[C@H]5C=C(C)[C@@H]2C[C@H](C[C@H]23)O[C@@H]4O[C@@H](C)[C@H](OC)[C@@H](OCC)[C@H]4OC)C(=O)[C@@H]6C	
3′-*O*-deethyl-175-J	(2*R*,3a*R*,5a*R*,5b*S*,9*S*,13*S*,14*R*,16a*S*,16b*R*)-13-{[(2*R*,5*S*,6*R*)-5-(Dimethylamino)-6-methyltetrahydro-2*H*-pyran-2-yl]oxy}-9-ethyl-14-methyl-7,15-dioxo-2,3,3a,4,5,5a,5b,6,7,9,10,11,12,13,14,15,16a,16b-octadecahydro-1*H*-*as*-indaceno[3,2-*d*]oxacyclododecin-2-yl 6-deoxy-2,4-di-*O*-methyl-a-L-mannopyranoside CN(C)[C@H]1CC[C@@H](O[C@@H]1C)O[C@H]6CCC[C@H](CC)OC(=O)C[C@@H]5C(=C[C@@H]3[C@H]5CC[C@@H]2C[C@H](C[C@H]23)O[C@@H]4O[C@@H](C)[C@H](OC)[C@@H](O)[C@H]4OC)C(=O)[C@@H]6C	

IUPAC: International Union of Pure and Applied Chemistry; SMILES: simplified molecular-input line-entry system.