Modification of the existing maximum residue levels for fluroxypyr in chives, celery leaves, parsley, thyme and basil and edible flowers

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Abstract

In accordance with Article 6 of Regulation (EC) No 396/2005, the applicant Landesanstalt für Landwirtschaft und Gartenbau (LLG) submitted two applications to the competent national authority in Germany to modify the existing maximum residue levels (MRLs) for the active substance fluroxypyr in chives, celery leaves, parsley, thyme and basil and edible flowers. The data submitted in support of the request were found to be sufficient to derive MRL proposals for the commodities under consideration, except for thyme for which a tentative MRL proposal was derived for further risk management considerations. Adequate analytical methods for enforcement are available to control the residues of fluroxypyr in the commodities under consideration at the validated limit of quantification (LOQ) of 0.01 mg/kg. Based on the risk assessment results, EFSA concluded that the intake of residues resulting from the use of fluroxypyr according to the reported agricultural practices is unlikely to present a risk to consumer health.

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Summary

In accordance with Article 6 of Regulation (EC) No 396/2005, Landesanstalt für Landwirtschaft und Gartenbau (LLG) submitted two applications to the competent national authority in Germany (evaluating Member State, EMS) to modify the existing maximum residue levels (MRLs) for the active substance fluroxypyr in chives, celery leaves, parsley, thyme and basil and edible flowers. The EMS drafted two evaluation reports in accordance with Article 8 of Regulation (EC) No 396/2005, which were submitted to the European Commission and forwarded to the European Food Safety Authority (EFSA) on 8 March 2017 and 18 March 2020. To accommodate for the intended uses of fluroxypyr, the EMS proposed to raise the existing MRLs from the limit of quantification (LOQ) 0.02* to 0.4 mg/kg for chives, from 0.05 to 2 mg/kg for thyme and from the LOQ 0.02* to 0.3 mg/kg for basil, parsley and celery leaves. EFSA assessed the applications and the evaluation reports as required by Article 10 of the MRL regulation. As regards the first application, related to chives and thyme, EFSA requested additional information on the analytical method for high water content commodities. Other points were identified in both dossiers which needed further clarification. On 10 August 2020, the EMS submitted revised evaluation reports, which replaced the previously submitted evaluation reports.

Based on the conclusions derived by EFSA in the framework of the pesticides peer review under Directive 91/414/EEC, the data evaluated under the MRL review, the evaluation of confirmatory data following the MRL review and the additional data provided by the EMS in the framework of the present MRL applications, the following conclusions are derived.

The metabolism of fluroxypyr (mepty and butoxypropyl ester) following foliar application in primary crops has been investigated and found to be similar in wheat and in onion (shoots and bulbs). Although for leafy crops, no specific metabolism study was available, there was sufficient evidence to assume that the metabolic behaviour is comparable with the crops for which the metabolism was investigated. Hence, the lack of metabolism study in minor leafy crops was considered a minor deviation. This would be in line with the previous risk management decision to set MRLs for fluroxypyr in the minor leafy crops thyme and herbal infusions from flowers without requesting confirmatory data on primary crop metabolism. For future applications to set MRLs on leafy crops, the data gap for a representative metabolism study covering foliar treatment on leafy vegetables needs to be addressed.

Standard hydrolysis studies investigating the stability of the active substance under conditions representative for pasteurisation, boiling/cooking and sterilisation are not available. The commodities under consideration are usually consumed in low amounts and mostly unprocessed. Considering that the chronic exposure is not expected to exceed 10% of the ADI, investigation of the effect of industrial and/or household processing on the nature of the residues is not required.

Fluroxypyr is authorised to be used on 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 DT90 value of fluroxypyr (as fluroxypyr acid) and of the main soil metabolites fluroxypyr pyridinol and fluroxypyr methoxypropyridine exceed the trigger value of 100 days and, therefore, further studies investigating the nature and magnitude of residues in rotational crops are required. No studies on the magnitude of residues in rotational crops were submitted in the current MRL applications. Considering that the intended uses are on minor crops with application rates below the most critical uses reported for fluroxypyr, the lack of rotational crops field trials covering the maximum plateau concentration of fluroxypyr methoxypropyridine may be considered a minor deviation.

Based on the metabolic pattern identified in metabolism studies, the residue definitions for plant products as proposed in the MRL review are 'sum of fluroxypyr, its salts, its esters and its conjugates, expressed as fluroxypyr' for enforcement and risk assessment. Considering the available evidence, the same residue definition seems to be appropriate for the crops under consideration (minor leafy crops).

Sufficiently validated analytical methods based on high-performance liquid chromatography with tandem mass spectroscopy (HPLC-MS/MS) are available to quantify residues in the crops assessed in this application according to the residue definition for enforcement. The methods enable quantification of residues at or above 0.01 mg/kg in the crops assessed (LOQ).

The available residue trials are sufficient to derive MRL proposals for chives, celery leaves, parsley and basil and edible flowers. For thyme, a tentative MRL proposal was derived due to lack of detailed information on the capabilities of the analytical methods used in residue trials to analyse esters/conjugates and the storage period of samples which exceeded the period for which integrity of the samples was demonstrated.

Residues of fluroxypyr in commodities of animal origin were not assessed since the crops under consideration in this MRL application are not used for feed purposes.
The toxicological profile of fluroxypyr 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 0.8 mg/kg body weight (bw) per day. An acute reference dose (ARfD) was deemed unnecessary.

The consumer risk assessment was performed with revision 3.1 of the EFSA Pesticide Residues Intake Model (PRIMo). Considering the toxicological profile of the active substance, a short-term dietary risk assessment was not necessary.

In the framework of the MRL review, and the assessment of confirmatory data following the MRL review, a comprehensive long-term exposure assessment was performed, taking into account the existing uses at EU level. The long-term dietary risk assessment was performed with regard only to consumers’ exposure from products of plant origin. Several plant commodities were excluded from the exposure assessment because EFSA assumes that uses have been withdrawn following the MRL review and that further uses will be revoked following the confirmatory data assessment. Products of animal origin were not included in the calculation considering that the requested confirmatory data on the toxicological relevance of fluroxypyr pyridinol and its conjugates have not been provided which triggers the need for further risk management decision on the withdrawal of uses in feed products and grassland, and a revision of the existing MRLs for products of animal origin. EFSA updated the calculation with the relevant STMR values for the crops under consideration as derived from the residue trials submitted in support of this MRL application.

The estimated long-term dietary intake was less than 0.1% of the ADI (all diets). The contribution of residues expected in the commodities assessed in the present applications to the overall long-term exposure is each lower than 0.01% of the ADI. EFSA concluded that the proposed use of fluroxypyr on chives, celery leaves, parsley, thyme and basil edible flowers will not result in a consumer exposure exceeding the toxicological reference value (ADI) 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.

Full details of all endpoints and the consumer risk assessment can be found in Appendices B-D.

| Code(a) | Commodity                          | Existing EU MRL (mg/kg) | Proposed EU MRL (mg/kg) | Comment/justification                                                                 |
|---------|------------------------------------|-------------------------|-------------------------|---------------------------------------------------------------------------------------|
| 0256020 | Chives                             | 0.02*                   | 0.5                     | The submitted data are sufficient to derive an MRL proposal. Risk for consumers unlikely |
| 0256030 | Celery leaves                      | 0.02*                   | 0.3                     |                                                                                       |
| 0256040 | Parsley                            | 0.02*                   | 0.3                     |                                                                                       |
| 0256070 | Thyme                              | 0.05 (ft)               | 2                       | Further risk management considerations required                                                                                             |
|         |                                    |                         |                         | A tentative MRL proposal of 2 mg/kg was calculated on the basis of available residues trials. The MRL proposal is affected by additional non-standard uncertainty due to lack of information whether the analytical methods used in the residue trials covered all components of the residue definition and the storage period of samples which exceeded the period for which integrity of the samples was demonstrated. Hence, the MRL and risk assessment values may be underestimated. Further risk management considerations are required whether these deficiencies are acceptable. Risk for consumers unlikely |
| 0256080 | Basil and edible flowers           | 0.02*                   | 0.3                     | The submitted data are sufficient to derive an MRL proposal. Risk for consumers unlikely                                                  |

MRL: maximum residue level.
*: 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.
(ft): The European Food Safety Authority identified some information on the analytical method used in the residue trials as unavailable. When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 1 July 2017, or, if that information is not submitted by that date, the lack of it.
Table of contents

Abstract................................................................................................................................................... 1
Summary................................................................................................................................................. 3
Assessment.............................................................................................................................................. 6
1. Residues in plants .......................................................................................................................... 7
   1.1. Nature of residues and methods of analysis in plants ................................................................. 7
   1.1.1. Nature of residues in primary crops ........................................................................................ 7
   1.1.2. Nature of residues in rotational crops ..................................................................................... 8
   1.1.3. Nature of residues in processed commodities ....................................................................... 8
   1.1.4. Methods of analysis in plants .................................................................................................. 8
   1.1.5. Storage stability of residues in plants ....................................................................................... 9
   1.1.6. Proposed residue definitions ................................................................................................... 9
   1.2. Magnitude of residues in plants ................................................................................................... 9
   1.2.1. Magnitude of residues in primary crops .................................................................................. 9
   1.2.2. Magnitude of residues in rotational crops ............................................................................ 10
   1.2.3. Magnitude of residues in processed commodities ................................................................. 11
   1.2.4. Proposed MRLs ....................................................................................................................... 11
2. Residues in livestock ....................................................................................................................... 11
3. Consumer risk assessment .............................................................................................................. 11
4. Conclusion and Recommendations ................................................................................................ 12
References............................................................................................................................................... 12
Abbreviations ........................................................................................................................................... 14
Appendix A – Summary of intended GAP triggering the amendment of existing EU MRLs............... 15
Appendix B – List of end points ........................................................................................................... 17
Appendix C – Pesticide Residue Intake Model (PRIMo) .................................................................. 24
Appendix D – Input values for the exposure calculations ................................................................. 26
Appendix E – Used compound codes............................................................................................... 27
Assessment

The European Food Safety Authority (EFSA) received an application to modify the existing maximum residue level (MRL) for fluoroxypr in chives and thyme. Subsequently, EFSA received a second application to modify the existing MRL for fluoroxypr in celery leaves, parsley and basil and edible flowers to cover the intended uses in chives, coriander leaves and dill leaves, parsley, thyme and nasturtium (leaves and edible flowers). The detailed description of the intended uses of fluoroxypr in these crops, which are the basis for the current MRL applications, is reported in Appendix A.

Fluoroxypr is the ISO common name for 4-amino-3,5-dichloro-6-fluoro-2-pyridloxyacetic acid (IUPAC). The chemical structures of the active substance, the variant fluoroxypr-meptyl and its main metabolites are reported in Appendix E.

In the EU, fluoroxypr is approved for use as active substance in plant protection products (herbicides); the process of the first renewal of the approval has been completed following the peer review process (EFSA, 2011) based on the RAR prepared by Ireland and Poland being the designated RMS and co-RMS, respectively. The representative uses evaluated comprised outdoor foliar spraying against broadleaved weeds in cereals, maize and pasture/amenity.

The approval conditions were modified in 2017 in order to establish a maximum level for the impurity N-methyl-2-pyrrolidone (NMP) in the commercially manufactured active substance.

The EU MRLs for fluoroxypr 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, 2013) and the proposed modifications have been implemented in the MRL legislation. Recently, EFSA assessed confirmatory data following the Article 12 MRL review (EFSA, 2019b).

In accordance with Article 6 of Regulation (EC) No 396/2005, Landesanstalt für Landwirtschaft, und Gartenbau (LLG) submitted two applications to the competent national authority in Germany (evaluating Member State, EMS) to modify the existing maximum residue levels (MRLs) for the active substance fluoroxypr in chives, celery leaves, parsley, thyme and edible flowers. The EMS drafted two evaluation reports in accordance with Article 8 of Regulation (EC) No 396/2005, which were submitted to the European Commission and forwarded to the European Food Safety Authority (EFSA) on 8 March 2017 and on 18 March 2020. As regards the application related to chives and thyme, EFSA requested additional information on the analytical method for high water content commodities. Other points were identified in both dossiers which needed further clarification. On 10 August 2020, the EMS submitted revised evaluation reports, which replaced the previously submitted evaluation reports (Germany, 2016, 2020). To accommodate for the intended uses of fluoroxypr, the EMS proposed to raise the existing MRL from the limit of quantification (LOQ) 0.02* to 0.4 mg/kg for chives and from 0.05 to 2 mg/kg for thyme and from the limit of quantification (LOQ) 0.02* to 0.3 mg/kg for basil, parsley and celery leaves.

EFSA based its assessment on the evaluation reports submitted by the EMS (Germany, 2016, 2020), the draft assessment report (DAR) (and its final addendum) (Ireland 2009, 2011) prepared under Council Directive 91/414/EEC, the Commission review report on fluoroxypr which was further updated and finalised on 23 March 2017 following the assessment of confirmatory data (European Commission, 2017a), the EFSA conclusion on the peer review of the pesticide risk assessment of the active substance fluoroxypr (EFSA, 2011), as well as the conclusions from previous EFSA opinions on the review of the existing maximum residue levels (MRLs) for fluoroxypr according to Article 12 of

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1 Coriander leaves and dill leaves are classified according to Annex I of Regulation (EC) No 396/2005 under celery leaves (0256030).
2 Nasturtium leaves and flowers are classified according to Annex I of Regulation (EC) No 396/2005 under basil and edible flowers (0256080).
3 Commission Implementing Regulation (EU) No 736/2011 of 26 July 2011 approving the active substance fluoroxypr, 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 195, 27.7.2011, p. 37–41.
4 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.
5 Commission Regulation (EU) 2015/1040 of 30 June 2015 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 azoxystrobin, dimoxystrobin, fluoroxypr, methoxyfenozide, metrafenone, oxadiargyl and tribenuron in or on certain products, OJ L 167/10, 1.7.2015.
Regulation (EC) No 396/2005 (EFSA, 2013) and the evaluation of confirmatory data following the Article 12 MRL review (EFSA, 2019b).

For this application, the data requirements established in Regulation (EU) No 544/2011⁶ and the guidance documents applicable at the date of submission of the applications to the EMS are applicable (European Commission, 1997a–g, 2000, 2010a,b, 2017b; OECD, 2011, 2013). 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 546/2011⁷.

A selected list of end points of the studies assessed by EFSA in the framework of this MRL application including the end points of relevant studies assessed previously is presented in Appendix B.

The evaluation reports submitted by the EMS (Germany, 2016, 2020) 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.

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 fluroxypyr (mepty and butoxypropyl ester) following foliar application in primary crops has been investigated in wheat and in onions (EFSA, 2013, 2019b). According to the relevant EU guidance document, metabolism studies in onions are considered representative for root crops (European Commission, 1997e).

In a wheat metabolism study, the overall distribution of the radioactivity was seen to be similar for both fluroxypyr-butoxypropyl ester and fluroxypyr-meptyl ester, although breakdown of the parent ester was slightly faster for fluroxypyr-butoxypropyl (EFSA, 2013). In wheat forage, the proportion of the parent esters was gradually decreasing from c.a. 95% total radioactive residue (TRR) just after the treatment, to 8–18% TRR, 28 days after application. Inversely, the proportion of fluroxypyr slowly increased from 3% to 15% TRR 2 weeks after application, with significant amounts of polar unknowns that accounted for c.a. 50% TRR after 28 days. Following acidic hydrolysis incubations, fluroxypyr was released from these polar fractions, suggesting that these are mainly composed of conjugates of fluroxypyr. Similar conclusions were reached in a second study in wheat, in which up to 26.6% TRR (7.2 mg eq/kg) were tentatively identified as N-glycosyl conjugates of fluroxypyr. In a third study in wheat, the extraction rate was rather low (32% TRR), but the high proportion (24% TRR) of polar compounds also suggests the presence of the fluroxypyr conjugates (EFSA, 2013).

In onion, fluroxypyr-meptyl was rapidly taken up into shoots and bulbs where it was converted to free acid and conjugates of the acid in the same manner as previously demonstrated in the metabolism studies on wheat (EFSA, 2019b). In addition, two studies in broadleaved weed species provided only qualitative information and indicated a similar metabolic pattern as in wheat and onion (EFSA, 2013).

For leafy crops, a representative metabolism study was requested in the MRL review (EFSA, 2013). However, following a risk management decision, this data gap has not been implemented in the MRL legislation for the very minor leafy crops for which GAPs were notified, i.e. thyme and herbal infusions from flowers.

No additional studies on metabolism of fluroxypyr in primary crops were submitted in support of the present MRL applications which also concern minor leafy vegetables. However, considering the following aspects, the lack of a representative metabolism study on leafy crops may be considered a minor deficiency:

- the conditions of the metabolism studies in rotational crops in lettuce (see Section 1.1.2) can be considered to be also representative for the treatment of leafy crops at an early development stage;

⁶ 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.

⁷ 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.
although onions are considered as being representative for metabolism in root crops (European Commission 1997a), the onion bulb is structurally a short stem with fleshy leaves. Hence, it is expected that the results of the metabolism study in onions are representative for the aerial parts of plants such as leaves; indicative results from metabolism studies in broadleaved weed showed a metabolic pattern comparable with cereals and onion where parent fluoroxypr was the main identified compound.

As the present assessment is also on very minor leafy crops, the lack of a representative metabolism study covering the group of leafy crops may be considered a minor deviation. This would be in line with the previous risk management decision to set MRLs for fluoroxypr in the minor leafy crops thyme and herbal infusions from flowers without requesting confirmatory data on primary crop metabolism.

For future applications to set MRLs on leafy crops, the data gap for a representative metabolism study covering foliar treatment on leafy vegetables needs to be addressed.

1.1.2. Nature of residues in rotational crops

Fluoroxypr is authorised to be used on 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 DT90 value of fluoroxypr (as fluoroxypr acid) and of the main soil metabolites fluoroxypr pyridinol and fluoroxypr methoxypyridine exceed the trigger value of 100 days, and therefore, further studies investigating the nature and magnitude of residues in rotational crops are required (EFSA, 2011). From the rotational crop metabolism studies assessed in the framework of the peer review, it was concluded that metabolism in rotational crops is similar to metabolism in primary crops (EFSA, 2011). In turnip roots, however, fluoroxypr methoxypyridine constituted the major part of the total residues (up to 75% TRR), suggesting a significant root uptake of this major soil metabolite (EFSA, 2013). The MRL review identified a data gap for rotational crops field trials covering the maximum plateau concentration of fluoroxypr methoxypyridine in view of the high persistence in soil and the absence of toxicological data on this metabolite (EFSA, 2013). This data gap was considered relevant for the national authorisations and was therefore not reflected in the MRL legislation, requesting confirmatory data.

No new studies on rotational crops were submitted in the current MRL applications.

Considering that the intended uses are on minor crops with application rates below the most critical uses reported for fluoroxypr, the lack of rotational crops field trials covering the maximum plateau concentration of fluoroxypr methoxypyridine may be considered a minor deviation. See also Section 1.2.2.

1.1.3. Nature of residues in processed commodities

Standard hydrolysis studies investigating the stability of the active substance under conditions representative for pasteurisation, boiling/ cooking and sterilisation are not available. The commodities under consideration are usually consumed in low amounts and mostly unprocessed. Considering that the chronic exposure is not expected to exceed 10% of the ADI, investigation of the effect of industrial and/or household processing on the nature of the residues is not required.

1.1.4. Methods of analysis in plants

Analytical methods for the determination of fluoroxypr residues in high water content matrices were assessed during the evaluation of confirmatory data following the Article 12 MRL review (EFSA, 2019b). The method requires alkaline hydrolysis to convert the esters to the fluoroxypr acid, and an acid hydrolysis to extract bound residues and cleave conjugates. The methods are sufficiently validated for the determination of residues of fluoroxypr and of the ester variant fluoroxypr-meptyl, expressed as fluoroxypr acid equivalent, in the crops under consideration. The methods allow quantifying residues at or above the LOQ of 0.01 mg/kg for the total residue (sum of fluoroxypr and its salts, its esters and its conjugates) in crops belonging to the group of high water content, high acid content and dry matrices. Independent laboratory validation (ILV) is missing for high acid content matrices.
1.1.5. Storage stability of residues in plants

The storage stability of fluroxypyr residues in plants stored under frozen conditions was investigated in the framework of the EU pesticides peer review (EFSA, 2011). Additional storage stability data were submitted and assessed during the evaluation of confirmatory data following the Article 12 MRL review (EFSA, 2019b). Overall, no significant decline of the total residues was observed during the tested storage period of 24 months.

1.1.6. Proposed residue definitions

Based on the metabolic pattern identified in metabolism studies and the capabilities of enforcement analytical methods, the following residue definition was proposed (EFSA, 2013, 2019b):

- Residue definition for risk assessment and for enforcement: sum of fluroxypyr, its salts, its esters and its conjugates, expressed as fluroxypyr.

In primary crops, this residue definition was restricted to cereals, root and tuber vegetables for uses comprising foliar treatment only, and to fruit crops for the uses assessed comprising soil treatment.

Considering the available evidence (see Section 1.1.1), EFSA agrees with the EMS (Germany, 2016) that the same residue definition seems to be appropriate for crops under consideration (minor leafy crops). For future applications on leafy crops, however, EFSA considers that the data gap for a representative metabolism study covering foliar treatment on leafy vegetables needs to be addressed.

The residue definition set for the primary crops was proposed to apply on a tentative basis to rotational crops. However, considering that the use pattern assessed in the current application (appl. rate 180 g/ha instead of 400 g/ha for the most critical use assessed under the MRL review) is less critical and that no significant residues are expected for the soil metabolite fluroxypyr methoxypyridine, the absence of toxicological data on this metabolite and rotational crops field trials covering the maximum plateau concentration of this metabolite are not relevant for this application.

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

1.2. Magnitude of residues in plants

1.2.1. Magnitude of residues in primary crops

In support of the MRL applications, the applicant submitted residue trials performed in chives, thyme, parsley and dill. The residue trials were performed with the active substance variant fluroxypyr-mephtyl (fluroxypyr-1-methylheptyl ester). Residue values are expressed as fluroxypyr equivalents, in accordance with the residue definition for risk assessment and for enforcement.

The methods of analysis in the residue trials are reported to allow quantifying residues of fluroxypyr (total residue) in the crops under consideration at or above an LOQ of 0.01 mg/kg (by HPLC-MS/MS) or at or above an LOQ of 0.025 mg/kg (by GC-MS). The samples of these residue trials were stored under conditions for which integrity of the samples has been demonstrated, with the exception of two trials on thyme (see below).

**Chives**

In support of the proposed NEU GAP, in total five residue trials were conducted on chives in Germany in 2007, 2008 and 2014 (72 g a.s./ha (one trial) or 90 g a.s./ha, two applications, 21-day PHI) (Germany, 2016). Two trials were not independent, as they were carried out at the same location at roughly the same time and so only one of the trials (the trial with the higher residue concentration measured) was considered. Two trials were performed with foliar spray applications at growth stages BBCH 16–19; in the remaining two trials, treatment of the crop occurred after cutting (BBCH 40–45). Three trials were decline studies and were also submitted in support of the NEU GAP in nasturtium, coriander leaves, dill leaves and parsley (28-day PHI, see below).

The intended use for chives foresees application either post-emergence in the year of sowing (from growth stage BBCH 12) or in the following year(s) after cutting, at the beginning of the principal growth stage 4 (from BBCH 41). According to expert judgement, the parameter having the main impact on the residue behaviour in the case of chives is the PHI; the different growth stages at the treatment are considered of having no major impact on the final residues in harvested chives. Hence,
the residue trials performed at BBCH 16–19 and at BBCH 40–45 are considered representative for the intended use.

As regards the analytical methods used to analyse the samples, EFSA noted a minor deficiency: full validation data on the efficiency of the acid hydrolysis step (required to cleave conjugates of fluroxypyr) are not available. However, the EMS reported that hydrolytic conditions were assumed to cleave conjugates (Germany, 2016), and therefore, the trials are considered valid.

Overall, the number and quality of the trials are sufficient to derive an MRL proposal of 0.5 mg/kg for chives. The slightly different MRL proposal derived by EFSA compared to the MRL proposal made by the EMS can be explained by the fact that EFSA excluded one trial which was considered not fully independent.

**Thyme**

In support of the proposed NEU GAP, four residue trials were conducted on thyme in Germany in 2002, 2004 and 2007 (90 g a.s./ha, one application, 28-day PHI) (Germany, 2016). Trials were performed with foliar spray applications. Although the detailed growth stages are not reported, the trials are considered acceptable because samples were taken 28 days after treatment in accordance with the GAP.

In the methods of analysis used to analyse the thyme samples, details are not provided on the hydrolytic conditions. EFSA requested clarification on the efficiency of the hydrolysis step for the methods of analysis used in the residue trials for the determination of fluroxypyr ester and conjugates, which was also identified in the MRL review as a confirmatory data requirement for MRLs for thyme and various other commodities. However, this information could not be retrieved from the study reports and thus was considered not addressed (EFSA, 2019b). In the present application, the EMS provided specific explanations of the analytical method descriptions (in the header of the study results Section C.3.1.2 of the evaluation report) in which alkaline hydrolytic conditions are mentioned, but the details on the conditions used were not provided, and it remains unclear if conjugates were cleaved (Germany, 2016). Hence, the efficiency of the release of the free fluroxypyr acid has not been demonstrated and the results of these residue trials may underestimate the actual residues.

The sample storage periods in two trials (26 and 30 months) exceed the demonstrated storage stability (24 months). Therefore, the results from these trials are considered to be affected by an additional source of non-standard uncertainty.

An MRL proposal of 2 mg/kg was calculated for thyme. The MRL proposal may be underestimated due to lack of information on the capabilities of the analytical methods used in residue trials on thyme to analyse conjugates and the storage period of samples exceeded the period for which integrity of the samples was demonstrated.

**Nasturtium (basil and edible flowers), coriander leaves (celery leaves), dill leaves (celery leaves) and parsley**

In support of the NEU GAP in nasturtium, coriander leaves, dill leaves and parsley, a total of five residue trials were conducted on chives (three trials), dill (one trial) and parsley (one trial) in Germany in 2008, 2014 and 2016 (Germany, 2020).

Trials consisted of foliar spray applications (81 a.s./ha (one trial, dill) or 90 g a.s./ha, two applications, 28-day PHI) at growth stages BBCH 12–19 or BBCH 41–45. Minor deviations regarding the application interval were considered as not having an impact on the validity of the trials.

Extrapolation is possible from any representative of the subgroup herbs and edible flowers (0256000) except sage, rosemary, thyme and laurel/bay leave, to the whole subgroup herbs and edible flowers, including celery leaves (coriander leaves and dill leaves), parsley, and basil and edible flowers (nasturtium leaves and flowers) (European Commission, 2017b).

Overall, the number and quality of the trials are sufficient to derive MRL proposals of 0.3 mg/kg for celery leaves (coriander leaves and dill leaves), parsley, and basil and edible flowers (nasturtium leaves and edible flowers).

A summary of residues data from the supervised residue trials assessed is presented in Appendix B.1.2.1.

### 1.2.2. Magnitude of residues in rotational crops

No new studies on rotational crops were submitted in the current MRL applications. The possible transfer of fluroxypyr residues to crops that are grown in rotation has been assessed in the framework...
of the MRL review on the basis of the available confined rotational crop metabolism studies and the tentative residue definition for rotational crops. In the confined rotational crop metabolism studies assessed in the MRL review, after bare soil application at 600 or 700 kg a.s./ha (3.3 N or 3.9 N), residue levels at 30-day plant back interval were up to 0.04 and 0.08 mg eq/kg in lettuce and turnip roots, respectively (EFSA, 2013).8 EFSA agrees with the EMS who concluded that significant residue levels in rotational crops (exceeding 0.01 mg/kg) are not anticipated, provided that the active substance is applied according to the proposed GAP (Germany, 2016). Considering that the maximum annual application rate for foliar applications of fluroxypyr in the crops under consideration (i.e. 180 g a.s./ha) is lower than the application rates tested in the confined rotational crop metabolism studies on bare soil (i.e. 3.3 N or 3.9 N), the EMS proposed that significant residue levels are not anticipated in rotational crops (exceeding 0.01 mg/kg), provided that the active substance is applied according to the proposed GAP. EFSA considered that sufficient information is not available to conclude on the potential magnitude of residues in rotational crops.

The MRL review identified a data gap for rotational crop field trials covering the maximum plateau concentration of the soil metabolite fluroxypyr methoxypyridine in view of the high persistence and absence of toxicological data on this metabolite. The MRL review concluded that if this data gap is not addressed in the future, Member States are recommended to withdraw or modify the relevant authorisations at national level. Meanwhile, Member States were also recommended to avoid rotation with root and tuber crops (EFSA, 2013). Considering that the intended uses are on minor leafy crops with application rates below the most critical uses reported for fluroxypyr, the lack of rotational crops field trials covering the maximum plateau concentration of fluroxypyr methoxypyridine may be considered a minor deviation.

1.2.3. Magnitude of residues in processed commodities

The commodities under consideration are mostly consumed unprocessed. Considering the low contribution to the dietary exposure, specific processing studies for the crops under assessment are not available and are not required.

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, except thyme. The tentative MRL proposal and risk assessment values for thyme are affected by additional non-standard uncertainty, due to lack of detailed information on the capabilities of the analytical methods used in residue trials to analyse esters/conjugates and the storage period of samples which exceeded the period for which integrity of the samples was demonstrated (see Section 1.2.1). A summary of the proposed MRLs is presented in Appendix B.4.

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 various crops under assessment are not used for feed purposes.

3. Consumer risk assessment

EFSA performed a dietary risk assessment using revision 3.1 of the EFSA PRIMo (EFSA, 2018, 2019a). 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 value for fluroxypyr used in the risk assessment (i.e. ADI) was derived in the framework of the EU pesticides peer review (European Commission, 2017a). No acute reference dose (ARfD) has been derived and considered to not be required for fluroxypyr (European Commission, 2017a).

Short-term (acute) dietary risk assessment

A short-term (acute) dietary risk assessment is not necessary for plant commodities because an ARfD was not required due to the toxicological profile for the active substance fluroxypyr.

Long-term (chronic) dietary risk assessment

In the framework of the MRL review and the assessment of confirmatory data following the MRL review, a comprehensive long-term exposure assessment was performed, taking into account the existing uses at EU level (EFSA, 2013, EFSA, 2019b). The long-term dietary risk assessment was performed with regard only to consumers’ exposure from products of plant origin. Several plant commodities were excluded from the exposure assessment because EFSA assumes that uses have been withdrawn following the MRL review and that further uses will be revoked following the confirmatory data assessment (EFSA, 2019b). Products of animal origin were not included in the calculation considering that the requested confirmatory data on the toxicological relevance of fluroxypyr pyridinol and its conjugates have not been provided which triggers the need for further risk management decision on the withdrawal of uses in feed products and grassland, and a revision of the existing MRLs for products of animal origin (EFSA, 2019b).

EFSA updated the calculation with the relevant STMR values derived from the residue trials submitted in support of the present MRL applications on chives, celery leaves, parsley, thyme and basil and edible flowers. The input values used in the exposure calculations are summarised in Appendix D.1.

The estimated long-term dietary intake from products of plant origin was less than 0.1% of the ADI (all diets). The contribution of residues expected in the commodities assessed in this application to the overall long-term exposure is each lower than 0.01% of the ADI.

EFSA concluded that, based on the risk assessment, the long-term intake of residues of fluroxypyr resulting from the intended uses in chives, celery leaves, parsley, thyme and basil and edible flowers is unlikely to present a risk to consumer health.

For further details on the exposure calculations, a screenshot of the Report sheet of the PRIMo is presented in Appendix C.

4. Conclusion and Recommendations

The data submitted in support of this MRL application were found to be sufficient to derive MRL proposals for chives, celery leaves, parsley, and basil and edible flowers. EFSA also derived a tentative MRL proposal for thyme which is affected by additional non-standard uncertainty due to lack of information on the capabilities of the analytical methods used in residue trials to analyse esters/conjugates and the storage period of samples which exceeded the period for which integrity of the samples was demonstrated.

EFSA concluded that, based on the risk assessment outlined in Section 3, the long-term intake of residues of fluroxypyr resulting from the existing and the intended uses in chives, celery leaves, parsley, thyme and basil and edible flowers is unlikely to present a risk to consumer health.

The MRL recommendations are summarised in Appendix B.4.

References

EFSA (European Food Safety Authority), 2011. Conclusion on the peer review of the pesticide risk assessment of the active substance fluroxypyr. EFSA Journal 2011;9(3):2091, 91 pp. https://doi.org/10.2903/j.efsa.2011.2091

EFSA (European Food Safety Authority), 2013. Reasoned opinion on the review of the existing maximum residue levels (MRLs) for fluroxypyr according to Article 12 of Regulation (EC) No 396/2005. EFSA Journal 2013;11 (12):3495, 49 pp. https://doi.org/10.2903/j.efsa.2013.3495
Abbreviations

a.s. active substance
ADI acceptable daily intake
ARFD acute reference dose
BBCH growth stages of mono- and dicotyledonous plants
bw body weight
CAS Chemical Abstract Service
DAR draft assessment report
DAT days after treatment
DT$_{90}$ period required for 90% dissipation (define method of estimation)
EC emulsifiable concentrate
EMS evaluating Member State
eq residue expressed as a.s. equivalent
FAO Food and Agriculture Organization of the United Nations
GAP Good Agricultural Practice
GC gas chromatography
GC-MS gas chromatography with mass spectrometry
HPLC high-performance liquid chromatography
HPLC-MS high-performance liquid chromatography with mass spectrometry
HPLC-MS/MS high-performance liquid chromatography with tandem mass spectrometry
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
MRL maximum residue level
MS Member States
MS mass spectrometry detector
MS/MS tandem mass spectrometry detector
MW molecular weight
NEU northern Europe
OECD Organisation for Economic Co-operation and Development
PF processing factor
PHI pre-harvest interval
RA risk assessment
RAC raw agricultural commodity
RD residue definition
RMS rapporteur Member State
SANCO Directorate-General for Health and Consumers
SC suspension concentrate
SL soluble concentrate
SP water-soluble powder
STMR supervised trials median residue
TAR total applied radioactivity
TMDI theoretical maximum daily intake
TRR total radioactive residue
UV ultraviolet (detector)
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 | FG or IoT(a) | Pests or group of pests controlled | Preparation | Application | Application rate per treatment | PHI (days)(e) | Remarks |
|-----------------------|--------------------------|--------------|----------------------------------|-------------|-------------|-------------------------------|--------------|---------|
|                       |                          |              |                                  | Type(b) | Conc. a.s. | Method kind | Range of growth stages & season(c) | Number min-max | Interval between application (min) | g a.s./hL | min-max | Water L/ha | min-max | Rate(d) | Unit | |
| Chives                | NEU                      | F            | Annual dicotyledonous, weeds, Galium aparine | EC       | 180 g/L    | Foliar treatment – broadcast spraying | BBCH 12 | 2 | 7 | 200-400 | 90 g a.i./ha | 21 | Chives is a perennial crop which is harvested several times a year |
| Chives                | NEU                      | F            | Annual dicotyledonous, weeds, Galium aparine | EC       | 180 g/L    | Foliar treatment – broadcast spraying | BBCH 41 | 2 | 7 | 200-400 | 90 g a.i./ha | 21 | Application growth stage after cutting of the crop (BBCH 41). Chives is a perennial crop which is harvested several times a year |
| Thyme                 | NEU                      | F            | Annual dicotyledonous, weeds, Galium aparine | EC       | 180 g/L    | Foliar treatment – broadcast spraying | BBCH 12 | 1 | – | 200-400 | 90 g a.i./ha | 28 | Thyme is a perennial crop |
| Thyme                 | NEU                      | F            | Annual dicotyledonous, weeds, Galium aparine | EC       | 180 g/L    | Foliar treatment – broadcast spraying | BBCH 41 | 1 | – | 200-400 | 90 g a.i./ha | 28 | Thyme is a perennial crop with application intended from the second year after sprouting (from BBCH 41) |
| Crop and/or situation | Preparation | Application | Application rate per treatment | PHI (days)<sup>(e)</sup> | Remarks |
|-----------------------|-------------|-------------|---------------------------------|--------------------------|---------|
| Coriander leaves      | Annual dicotyledonous weeds, catchweed bedstraw | 260 g/L Foliar treatment – broadcast spraying | 12–16 | 2 | 5 | 200–400 | 90 g a.i./ha | 28 | MRL application refers to celery leaves (0256030) |
| Dill leaves           | Annual dicotyledonous weeds, catchweed bedstraw | 260 g/L Foliar treatment – broadcast spraying | 13–16 | 2 | 5 | 200–400 | 90 g a.i./ha | 28 | MRL application refers to celery leaves (0256030) |
| Parsley               | Annual dicotyledonous weeds, catchweed bedstraw | 260 g/L Foliar treatment – broadcast spraying | 13–16 | 2 | 5 | 200–400 | 90 g a.i./ha | 28 |
| Nasturtium (leaves and edible flowers) | Annual dicotyledonous weeds, catchweed bedstraw | 260 g/L Foliar treatment – broadcast spraying | 12–14 | 2 | 5 | 200–400 | 90 g a.i./ha | 28 | MRL application refers to basil and edible flowers (0256080) |

MRL: maximum residue level; GAP: Good Agricultural Practice; NEU: northern European Union; SEU: southern European Union; MS: Member State; a.s.: active substance; EC: emulsifiable concentrate.
(a): Outdoor or field use (F), greenhouse application (G) or indoor application (I).
(b): CropLife International Technical Monograph no 2, 7th Edition. Revised March 2017. 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): Application rate is expressed as fluoroxypr acid.
(e): 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) | Application(s) | Sampling (DAT) | Comment/Source |
|-----------------------------------|-------------|---------|----------------|----------------|----------------|
| Fruit crops                       | –           | –       | –              | –              | No representative metabolism study available. The MRL review considered that for the specific uses assessed for fruit crops following soil treatment (citrus fruits, pome fruits), the metabolism is sufficiently addressed by the available rotational crop metabolism studies after bare soil application (EFSA, 2013) |
| Root crops                        | Onions      | Foliar, F BBCH 09–13 1 × 0.1 kg, 2 × 0.1 kg, 1 × 0.2 kg or 2 × 0.2 kg fluoroxyprypha | Plants: 0, 3, 14, 28  Root, bulb, skin, shoots: 3 months, 3.5 months | Radiolabelled active substance: 2,6-14C ring-labelled fluoroxyprymethyl (EFSA, 2019b) |
| Leafy crops                       | –           | –       | –              | –              | No representative metabolism study available |
| Cereals/grass                     | Spring wheat| Foliar, F BBCH 37–39 1 × 0.3 kg fluoroxyprypha | Whole plant: 0 Stalk and leaves; heads: 28 Straw and grain: 62 | Radiolabelled active substance: 2,6-14C ring-labelled fluoroxyprymethyl (EFSA, 2013) |
|                                  |  | Foliar, G BBCH 31 1 × 0.6 kg fluoroxyprypha | Wheat forage: 0, 13 Straw and grain: 62 | Radiolabelled active substance: 2,6-14C ring-labelled fluoroxyprymethyl (EFSA, 2013) |
|                                  |  | Foliar, F BBCH 31 1 × 0.2 kg fluoroxyprypha | Whole plant: 0, 3, 7, 14, 28 Straw and grain: 104 | Radiolabelled active substance: 2,6-14C ring-labelled fluoroxyprymethyl (EFSA, 2013) |
|                                  |  | Foliar, F BBCH 31 1 × 0.2 kg fluoroxyprypha | Whole plant: 0, 3, 7, 14, 28 Straw and grain: 104 | Radiolabelled active substance: 2,6-14C ring-labelled fluoroxypropyl ester (EFSA, 2013) |
| Pulses/oilseeds                  | –           | –       | –              | –              | – |
| Miscellaneous                     | Broadleaved weed species (Galium aparine) | Foliar 1 × 0.15 kg fluoroxyprypha | 7 | Radiolabelled active substance: not specified Indicative information (EFSA, 2013) |
|                                  | Broadleaved weed species (Stellaria media, Viola arvensis) | Foliar, G 1 × 0.075 kg fluoroxyprypha | Whole plant: 1, 7 | Radiolabelled active substance: 2,6-14C ring-labelled fluoroxyprymethyl Indicative information (EFSA, 2013) |
| Rotational crops (available studies) | Crop groups | Crop(s) | Application(s) | PBI (DAT) | Comment/Source |
|------------------------------------|-------------|---------|----------------|-----------|----------------|
|                                    | Root/tuber crops | Turnip | Bare soil, F 0.6 kg a.s./ha | 30 120(b) 366 | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Root and tops Harvest intervals: 98, 183, 438 DAT (EFSA, 2013) |
|                                    |                                          | Turnip | Bare soil, F 0.7 kg a.s./ha | 30 120 365 | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Root and tops Harvest intervals: 91, 215, 428 DAT (EFSA, 2013) |
|                                    | Leafy crops | Lettuce | Bare soil, F 0.6 kg a.s./ha | 30 120(b) 366 | Radiolabelled active substance: 14C-pyridinyl labelled fluroxypyr-meptyl Harvest intervals: 86, 113, 156, 200, 225, 443 DAT (EFSA, 2013) |
|                                    |                                          | Lettuce | Bare soil, F 0.7 kg a.s./ha | 30 120 365 | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Harvest intervals: 77, 168, 418 DAT (EFSA, 2013) |
|                                    | Cereal (small grain) | Wheat | Bare soil, F 0.6 kg a.s./ha | 30 120(b) 366 | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Grain and straw Harvest intervals: 128, 232, 458 DAT (EFSA, 2013) |
|                                    |                                          | Wheat | Bare soil, F 0.7 kg a.s./ha | 30 120 365 | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Immature plant, grain, chaff and straw Harvest intervals: 83, 156, 202, 289, 414, 467 DAT (EFSA, 2013) |
|                                    |                                          | Corn | Bare soil, F 0.7 kg a.s./ha | 365 | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Fodder and grain Harvest interval: 467 DAT (EFSA, 2013) |
|                                    | Pulses/oilseeds | Green beans | Bare soil, F 0.6 kg a.s./ha | 30 366 | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Whole plant and beans Harvest interval: 94, 119, 441, 451 DAT (EFSA, 2013) |
|                                    |                                          | Soya beans | Bare soil, F 0.6 kg a.s./ha | 120(b) | Radiolabelled active substance: 14C-pyridinyl-labelled fluroxypyr-meptyl Beans and trash Harvest interval: 226 DAT (EFSA, 2013) |
|                                    | Other | – | – | – | – |

**Processed commodities (hydrolysis study)**

| Conditions | Stable? | Comment/Source |
|------------|---------|----------------|
| Pasteurisation (20 min, 90°C, pH 4) | Not triggered | – |
| Baking, brewing and boiling (60 min, 100°C, pH 5) | Not triggered | – |
| Sterilisation (20 min, 120°C, pH 6) | Not triggered | – |
| Other processing conditions | – | – |

(a): Outdoor/field application (F) or glasshouse/protected/indoor application (G).
(b): The 120 DAT plot was under greenhouse conditions.
Can a general residue definition be proposed for primary crops?  
No

Rotational crop and primary crop metabolism similar?  
Inconclusive  
EFSA (2013)

Residue pattern in processed commodities similar to residue pattern in raw commodities?  
Not triggered  
The chronic exposure is not expected to exceed 10% of the ADI

Plant residue definition for monitoring (RD-Mo)

Plant residue definition for risk assessment (RD-RA)

Sum of fluroxypyr, its salts, its esters and its conjugates, expressed as fluroxypyr.
Residue definition is applicable to cereals following foliar treatment (EFSA, 2013), root crops (EFSA, 2019b) and was considered appropriate for fruit crops following soil treatment and minor leafy crops

Sum of fluroxypyr, its salts, its esters and its conjugates, expressed as fluroxypyr.
Residue definition is applicable to cereals following foliar treatment (EFSA, 2013), root crops (EFSA, 2019b) and was considered appropriate for fruit crops following soil treatment and minor leafy crops

Matrices with high water content, high acid content and dry matrices: HPLC–MS/MS, LOQ 0.01 mg/kg (method DOW 091171). Validated for the determination of fluroxypyr and its salts, its esters and its conjugates in high water content (apple, onion, grass forage), high acid content (grapefruit) and dry matrices (wheat grain, wheat hay).

Confirmatory method available.
ILV available for high water content and dry matrices. ILV missing for high acid content matrices.
Method applicability not demonstrated for high oil content matrices. (EFSA, 2019b)

B.1.1.2. Stability of residues in plants

| Plant products (available studies) | Category | Commodity | T (°C) | Stability period | Compounds covered | Comment/ Source |
|-----------------------------------|----------|-----------|--------|-----------------|-------------------|-----------------|
|                                   |          |           |        | Value | Unit |                    |                 |
| High water content                | Wheat forage | −18 | 24 | Months | Fluroxypyr | EFSA (2011) |
| High water content                | Corn forage | −20 | 11 | Months | Fluroxypyr | EFSA (2019b) |
| High oil content                  | Olive fruit | −18 | 10 | Months | Fluroxypyr | EFSA (2019b) |
| High protein content              | –         | –         | –     | –     | –    | –                |
| Dry/High starch                   | Wheat grain | −18 | 24 | Months | Fluroxypyr | EFSA (2011) |
| Dry/High starch                   | Corn grain | −20 | 10 | Months | Fluroxypyr | EFSA (2019b) |
| High acid content                 | Orange fruit | −18 | 10 | Months | Fluroxypyr | EFSA (2019b) |
| Processed products                | Orange peel | –     | –   | –     | –    | –                |
| Others                            | Corn stover | −20 | 11 | Months | Fluroxypyr | EFSA (2019b) |
### B.1.2. Magnitude of residues in plants

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

| Commodity | Region/Indoor(a) | Residue levels observed in the supervised residue trials (mg/kg) | Comments/Source | Calculated MRL (mg/kg) | HR(b) (mg/kg) | STMR(c) (mg/kg) |
|------------|------------------|---------------------------------------------------------------|-----------------|-------------------------|--------------|-----------------|
| Chives     | NEU              | 0.040, 0.047, 0.11, 0.21(†)                                    | Residue trials on chives compliant with GAP (†) highest residue value of two trials not sufficiently independent regarding geographical location and dates of treatments but performed with different experimental conditions (different growth stages) | 0.5          | 0.21          | 0.08            |
| Thyme      | NEU              | 0.46(‡), 0.57, 0.66, 0.84(‡)                                   | Residue trials on thyme compliant with GAP. Limited information is available on the capabilities of the analytical methods used in residue trials, and it remains unclear if conjugates were analysed in accordance with the residue definition (‡) sample storage exceeds the demonstrated stability period | 2 (tentative)| 0.84          | 0.62            |
| Nasturtium (basil and edible flowers), coriander leaves (celery leaves), dill leaves (celery leaves), parsley | NEU              | Dill: < 0.01 Chives: < 0.025, 0.064, 0.12(†) Parsley: < 0.01 | Residue trial on dill (1) compliant with the GAP. Residue trials on chives (3) and parsley (1) not fully compliant with the GAP were judged as acceptable (†) highest residue value of two trials not sufficiently independent regarding geographical location and dates of treatments but performed with different experimental conditions (different growth stages) Extrapolation is possible to the whole subgroup herbs and edible flowers, including celery leaves (coriander leaves and dill leaves), parsley, and basil and edible flowers (nasturtium leaves and flowers) | 0.3          | 0.12          | 0.03            |

MRL: maximum residue level; GAP: Good Agricultural Practice.

(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. The highest residue for risk assessment refers to the whole commodity and not to the edible portion.

(c): Supervised trials median residue. The median residue for risk assessment refers to the whole commodity and not to the edible portion.
B.1.2.2. Residues in rotational crops

Residues in rotational and succeeding crops expected based on confined rotational crop study?

inconclusive

In view of the high persistence of the metabolite fluroxypyr methoxypyridine and the absence of toxicological data on this metabolite, rotational crops field trials covering the maximum plateau concentration of this metabolite are required (EFSA, 2013).

Residue levels following bare soil application of 600 and 700 g/ha following 30 days of plant back interval were up to 0.04 and 0.08 mg eq/kg in lettuce and turnip roots, respectively. Avoiding root and tuber vegetables as succeeding crop is recommended.

Residues in rotational and succeeding crops expected based on field rotational crop study?

inconclusive

Data gap for rotational crop field trials covering the maximum plateau concentration of fluroxypyr methoxypyridine metabolite in view of its high persistence in soil and in absence of toxicological data on this metabolite (EFSA, 2013).

B.1.2.3. Processing factors

No processing studies were submitted in the framework of the present MRL applications.

B.2. Residues in livestock

Not relevant for the commodities under assessment.
B.3. Consumer risk assessment

ARfD

Not established, not required (European Commission, 2017a)

Highest IESTI, according to EFSA PRIMo

A short-term (acute) dietary risk assessment is not necessary for products of plant origin because an ARfD has been considered not required for the active substance fluroxypyr (European Commission, 2017a)

Assumptions made for the calculations

–

ADI

0.8 mg/kg bw per day (fluroxypyr acid) (European Commission, 2017a)

Highest IEDI, according to EFSA PRIMo

< 0.1% ADI (all diets)

Contribution of crops assessed:

Chives, celery leaves (including coriander leaves and dill leaves), parsley, thyme and basil and edible flowers (including nasturtium leaves and flowers): each <0.01% of ADI

Assumptions made for the calculations

The calculation is performed using PRIMo version 3.1. The long-term dietary risk assessment was performed considering exposure via products of plant origin. Assuming that the uses in feed and grassland will be revoked, residues in animal products are not expected and were not included in the calculation. The calculation is based on the median residue levels derived for the raw agricultural commodities from the submitted residue trials, the MRL review, and the assessment of confirmatory data following the MRL review (EFSA, 2013, 2019b). Several plant commodities were excluded from the exposure assessment because EFSA assumes that uses have been withdrawn following the MRL review and that further uses will be revoked following the confirmatory data assessment (EFSA, 2019b). Commodities for which no GAP was reported in the framework of the MRL review and the current assessment 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                          |
|--------|-----------------|-------------------------|------------------------|------------------------------------------------|
| 0256020| Chives          | 0.02*                   | 0.5                    | The submitted data are sufficient to derive an MRL proposal. Risk for consumers unlikely |
| 0256030| Celery leaves   | 0.02*                   | 0.3                    |                                                  |
| 0256040| Parsley         | 0.02*                   | 0.3                    |                                                  |

ARfD: acute reference dose; IESTI: international estimated short-term intake; PRIMo: (EFSA) Pesticide Residues Intake Model; ADI: acceptable daily intake; IEDI: international estimated daily intake; bw: body weight; PRIMo: (EFSA) Pesticide Residues Intake Model PROFile; MRL: maximum residue level; GAP: Good Agricultural Practice.
| Code\(^{(a)}\) | Commodity | Existing EU MRL (mg/kg) | Proposed EU MRL (mg/kg) | Comment/justification |
|-------------|-----------|------------------------|------------------------|-----------------------|
| 0256070     | Thyme     | 0.05 \(^{(ft)}\)       | 2                      | Further risk management considerations required |
|             |           |                        |                        | A tentative MRL proposal of 2 mg/kg was calculated on the basis of available residues trials. The MRL proposal is affected by additional non-standard uncertainty due to lack of information whether the analytical methods used in the residue trials covered all components of the residue definition and the storage period of samples which exceeded the period for which integrity of the samples was demonstrated. Hence, the MRL and risk assessment values may be underestimated. Further risk management considerations are required whether these deficiencies are acceptable. Risk for consumers unlikely |
| 0256080     | Basil and edible flowers | 0.02\(^*\) | 0.3                  | The submitted data are sufficient to derive an MRL proposal. Risk for consumers unlikely |

MRL: maximum residue level.
\(^*\): 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.
\(^{(ft)}\): The European Food Safety Authority identified some information on the analytical method used in the residue trials as unavailable. When re-viewing the MRL, the Commission will take into account the information referred to in the first sentence, if it is submitted by 1 July 2017, or, if that information is not submitted by that date, the lack of it.
Appendix C – Pesticide Residue Intake Model (PRIMo)

### Fluroxypyr

#### Toxicological reference values

| Toxicological reference values | ADI (mg/kg bw/day) | ARfD (mg/kg bw) | Source of ADI | Source of ARfD |
|-------------------------------|-------------------|----------------|---------------|----------------|
| LOQs (mg/kg) range from:      | 0.01              | not necessary  | EC            | EC             |
|                               | 0.05              |                |               |                |

#### EFSA PRIMo revision 3.1; 2019/03/01

#### Year of evaluation: 2011

#### No of diets exceeding the ADI: ---

#### Refined calculation mode

| Commodity/group of commodities | Calculated exposure (% of ADI) | Exposure resulting from | Chronic risk assessment: JMPR methodology (IEDI/TMDI) |
|--------------------------------|-------------------------------|------------------------|------------------------------------------------------|
|                                | % of ADI (%)                   | % of ADI (%)           | IEDI/TMDI                                             |
|                                | Exposure resulting from        | % of ADI (%)           | IEDI/TMDI                                             |
|                                | % of ADI (%)                   | % of ADI (%)           | IEDI/TMDI                                             |
|                                | % of ADI (%)                   | % of ADI (%)           | IEDI/TMDI                                             |
|                                | % of ADI (%)                   | % of ADI (%)           | IEDI/TMDI                                             |

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The estimated long-term dietary intake (TMDI/NEDI/IEDI) was below the ADI.

The long-term intake of residues of Fluroxypyr is unlikely to present a public health concern.
As an ARID is not necessary/not applicable, no acute risk assessment is performed.

### Unprocessed commodities

| Highest % of ARfD/ADI | Commodities | MRL / input for RA (mg/kg) | Exposure (µg/kg bw) | IESTI |
|-----------------------|-------------|-----------------------------|---------------------|-------|

| Highest % of ARfD/ADI | Commodities | MRL / input for RA (mg/kg) | Exposure (µg/kg bw) | IESTI |
|-----------------------|-------------|-----------------------------|---------------------|-------|

#### Total number of commodities exceeding the ARfD/ADI in children and adult diets (IESTI calculation)

### Processed commodities

| Highest % of ARfD/ADI | Processed commodities | MRL / input for RA (mg/kg) | Exposure (µg/kg bw) | IESTI |
|-----------------------|-----------------------|-----------------------------|---------------------|-------|

| Highest % of ARfD/ADI | Processed commodities | MRL / input for RA (mg/kg) | Exposure (µg/kg bw) | IESTI |
|-----------------------|-----------------------|-----------------------------|---------------------|-------|

#### Conclusion:
## Appendix D – Input values for the exposure calculations

### D.1. Consumer risk assessment

| Commodity                          | Chronic risk assessment | Acute risk assessment |
|-----------------------------------|-------------------------|-----------------------|
|                                   | Input value (mg/kg)     | Comment               | Input value (mg/kg) | Comment |
| Residue definition for risk assessment: sum of fluoroxyypyr, its salts, its esters and its conjugates, expressed as fluoroxyypyr |
| Apples                            | 0.01                    | EFSA (2019b)          | 0.01                | EFSA (2019b) |
| Onions                            | 0.01                    | EFSA (2019b)          |                      |          |
| Chives                            | 0.08                    | Germany (2016)        |                      |          |
| Celery leaves (coriander leaves, dill leaves) | 0.03                    | Germany (2020)        |                      |          |
| Parsley                           | 0.03                    | Germany (2020)        |                      |          |
| Thyme                             | 0.62                    | Germany (2016)        |                      |          |
| Basil and edible flowers (nasturtium leaves and flowers) | 0.03                    | Germany (2020)        |                      |          |
| Other plant commodities           | –                       | Several plant commodities were excluded from the exposure assessment because EFSA assumes that uses have been withdrawn following the MRL review and that further uses will be revoked following the confirmatory data assessment (EFSA, 2019b) |                      |          |

### Residue definition for risk assessment: Ruminants: sum of fluoroxyypyr and its salts, expressed as fluoroxyypyr (tentatively derived in the MRL review)

**General recommendation:** The tentative residue definition for risk assessment (ruminants) should be reconsidered because the metabolite fluoroxyypyr pyridinol and its conjugates may be present at significant levels in products of animal origin. Toxicological information on fluoroxyypyr pyridinol is not available and is required in order to assess whether fluoroxyypyr pyridinol and its conjugates are of lower, similar or higher toxicity in comparison with the parent fluoroxyypyr or whether specific reference values should be set (EFSA, 2019b)

| Commodities of animal origin     | The long-term (chronic) risk assessment was not performed for products of animal origin. The long-term dietary risk assessment should be updated pending confirmation of the residue definition for risk assessment for ruminants and the data gap for toxicological information on the metabolite fluoroxyypyr pyridinol and its conjugates (EFSA, 2019b) | A short-term dietary risk assessment may be required for products of animal origin, pending confirmation of the residue definition for risk assessment for products of animal origin (ruminants) and the data gap for toxicological information on the metabolite fluoroxyypyr pyridinol and its conjugates (EFSA, 2019b) |
|---                                |                         |                       |

MRL: maximum residue level; ARfD: acute reference dose.
## Appendix E – Used compound codes

| Code/trivial name<sup>(a)</sup> | IUPAC name/SMILES notation/InChiKey<sup>(b)</sup> | Structural formula<sup>(c)</sup> |
|-------------------------------|---------------------------------|----------------------------------|
| **Fluroxypyr**                | 4-amino-3,5-dichloro-6-fluoro-2-pyridyloxyacetic acid | ![Structural formula](image1) |
| Fluroxypyr acid               | O=C(O)COc1nc(F)c(Cl)c(N)c1Cl MEFQPUMEMWTJP-UHFFFAOYSA-N | ![Structural formula](image2) |
| **Fluroxypyr-meptyl**         | (R5)-1-methylheptyl [(4-amino-3,5-dichloro-6-fluoro-2-pyridyloxy]acetate | ![Structural formula](image3) |
| Fluroxypyr-MHE                | CC(CCCCC)OC(-O)COc1nc(F)c(Cl)c(N)c1Cl OLZQTUCTGLHFTQ-UHFFFAOYSA-N | ![Structural formula](image4) |
| Fluroxypyr methylheptyl       | [RS-1-methylheptyl [(4-amino-3,5-dichloro-6-fluoro-2-pyridyloxy]acetate | ![Structural formula](image5) |
| Fluroxypyr 1-methylheptyl     | CC(COCCCC)OC(-O)COc1nc(F)c(Cl)c(N)c1Cl ZKFARSBUEBZZJT-UHFFFAOYSA-N | ![Structural formula](image6) |
| **Fluroxypyr-butoxypropyl**   | (R5)-2-butoxy-1-methylethyl [(4-amino-3,5-dichloro-6-fluoro-2-pyridyloxy]acetate | ![Structural formula](image7) |
| Fluroxypyr-BPE                | CC(COCCCC)OC(-O)COc1nc(F)c(Cl)c(N)c1Cl ZKFARSBUEBZZJT-UHFFFAOYSA-N | ![Structural formula](image8) |
| **Fluroxypyr pyridinol**      | 4-amino-3,5-dichloro-6-fluoropyridin-2-ol | ![Structural formula](image9) |
| Fluroxypyr 2-pyridinol        | Nc1c(Cl)c(F)nc(O)c1Cl JPMASQTVFRLSAV-UHFFFAOYSA-N | ![Structural formula](image10) |
| **N-methyl-2-pyrrolidone**    | 1-methyl-2-pyrrolidinone | ![Structural formula](image11) |
| NMP                           | O=C1CCCN1C SECXISLQFMRJMJ-UHFFFAOYSA-N | ![Structural formula](image12) |
| **Fluroxypyr methoxypyridine**| 3,5-dichloro-2-fluoro-6-methoxypyridin-4-amine | ![Structural formula](image13) |
| DMP                           | Clc1c(N)c(Cl)c(F)nc1OC XBFLRBREHZOLD-UHFFFAOYSA-N | ![Structural formula](image14) |

**IUPAC**: International Union of Pure and Applied Chemistry; **SMILES**: simplified molecular-input line-entry system; **InChiKey**: International Chemical Identifier Key.

<sup>(a)</sup> The metabolite name in bold is the name used in the reasoned opinion.

<sup>(b)</sup> ACD/Name 2018.2.2 ACD/Labs 2018 Release (File version N50E41, Build 103230, 21 July 2018).

<sup>(c)</sup> ACD/ChemSketch 2018.2.2 ACD/Labs 2018 Release (File version C60H41, Build 106041, 7 December 2018).