Pesticide Action Network Europe

générations FUTURES

Ms. Sandra Gallina,
Director General, DG Health and Food Safety
European Commission
1049 Brussels Belgium

Subject: Notification of new data on the toxicity of flupyradifurone on non-target organisms - risk of developmental neurotoxicity

Dear Mrs. Gallina,

Flupyradifurone was approved in 2015 for a period of 10 years. EFSA, in its peer review that served as the basis for the approval, had identified a "low" risk to honey bees.

In 2020, the Commission received notifications from the Netherlands and France about new studies submitted by the applicant and available in peer-reviewed literature, on the potential serious risks that flupyradifurone may pose to human health and to the environment. Within the evidence provided, it was pointed out that not only flupyradifurone causes harm to honeybees , but also that the solitary bee species *Megachile rotundata* appears to be much more sensitive than the honey bee, the latter being the only bee species assessed in the approval dossier.

Following these notifications, the Commission sent a mandate to EFSA, which published a new statement in 2022 highlighting that the initial assessment examined the effects of flupyradifurone solely on honey bees, and it was based on the outdated methodological guidance SANCO/10329/2002 from 2002. EFSA said: "*the previous peer review (EFSA, 2015a) made use of SANCO (2002). In this risk assessment scheme, solitary bees are not considered. Hence unless a different scheme is used, no definitive consideration can be made concerning the risk assessment.* ***It appears however very unlikely that the present risk assessment based on either lower tier or higher tier honey bee data is protective of solitary bees as well***"

EFSA recommended, for an update of the risk assessment:

- *(i) for honey bees, new laboratory experiments addressing chronic toxicity to adults and repeated exposure to larvae are carried out in accordance with the relevant OECD standards;*
- *(ii) the available higher tier honey bee studies are re-assessed against the principles of EFSA (2013); and*
- *(iii) for solitary bees, an appropriate specific risk assessment for the intended uses is performed considering the available data*

In parallel with the assessment of the renewal application submitted by Bayer in December 2022, the Commission initiated in October 2022 a review of the approval of flupyradifurone under Article 21 of Regulation (EC) No 1107/2009, in order to examine the new toxicity data available on pollinators. A letter was sent to the authorisation holder (Bayer) asking it to provide, by the end of 2022, all data it holds on the effects of flupyradifurone on bees, together with an evaluation of the relevant scientific literature.
In January 2023, the Commission indicated that the requested information had been submitted by Bayer and that Greece, as the Rapporteur Member State (RMS), had been asked to provide its comments and opinion within three months.
In May 2023, the Commission indicated that Greece had submitted its assessment of the additional information regarding the effects of flupyradifurone on bees. The Commission then stated that it intends to mandate EFSA, in accordance with Article 21(2), to provide scientific and technical assistance and to deliver a statement on the information submitted by the authorisation holder taking into consideration the assessment of the RMS.
In March 2024, the Commission reported having received additional information from the applicant concerning the risk assessment for the use of flupyradifurone in seed treatment.
Since then, discussions among Member States have taken place without reaching a consensus on whether to include in EFSA's mandate the additional information submitted by the applicant in March 2024 concerning the risk assessment for use of flupyradifurone in the treatment of oilseed rape and sugar beet seeds. According to available minutes of SCOPAFF meetings, the mandate to EFSA was never sent.

Lastly, in July 2025, the Commission extended the authorisation for flupyradifurone until June 2029, representing a 3.5-year extension.

We are questioning the management of this case by the Commission over the last four years and hence request clarifications. **Has the Commission already sent, or does it plan to send a mandate to EFSA under Article 21 of the regulation 1107/2009 to assess the new data on pollinators?** Furthermore, we are questioning the scope of this mandate to EFSA, particularly in light of the recommendations made in its 2022 statement, mentioned above. **Does this mandate include a request to perform an appropriate specific risk assessment for solitary bees considering the available data and to re-assess the available higher tier honey bee studies against the principles of EFSA (2013)** ?

We regret, in general, the lack of transparency regarding this review procedure. We also regret the slow process and prolonged discussions within SCOPAFF, which are significantly delaying the review under Article 21 of Regulation 1107/2009 and render this procedure ineffective.

While the review procedure has been stalled for four years, evidence of flupyradifurone's negative impacts on pollinators has been accumulating in the academic literature. Générations Futures carried out a literature review up to 01 March 2026 showing that **72 studies on the effects of flupyradifurone on non-target organisms are available and have not, to date, been evaluated by EFSA**. Of these 72 publications, 44 concern impacts on bees and bumblebees. The vast majority of these studies report toxic effects, particularly

on wild species and often at environmental exposure levels. Please find the list of these studies as an annex to this letter.

We would like to underline the breach of regulation (EC) 1107/2009 by the applicant. Indeed, the applicant failed to respect art.56 by not sending the identified studies. According to art.44(3)(e), Member States ought to revoke the national authorisations due to this breach of EU law. We therefore request the Commission to ensure a proper implementation of the above mentioned articles of the pesticide regulation.

In order to evaluate all of these data as quickly as possible, we ask you to forward them to EFSA and to include them in the ongoing Article 21 review procedure. Indeed, although a review of the academic literature was requested from the authorisation holder, that review was carried out in 2022 and is therefore now largely incomplete. Moreover, we emphasize that in its 2022 statement, EFSA recommends that "*elective selection of evidence should be avoided and that a systematic evidence-based approach should be applied instead, in order to avoid bias*".

We would also like to raise your attention on the fact that flupyradifurone is a neonicotinoid-like substance: even though the producer arbitrarily invented a new category[1], this substance has the same mode of action as the one from neonicotinoids and presents the same physico-chemical properties. As explained to the Commission in previous letters regarding acetamiprid, we would like to recall that the scientific literature clearly shows that all neonicotinoids pass the placental barrier and interact with foetuses' neurons. Considering that an effect is observed at the highest dose in the applicant's OECD 426 developmental neurotoxicity study, and considering the knowledge available with other neonicotinoid insecticides, we are asking the Commission to adopt a precautionary approach and lower the reference values for this substance, in order to protect foetuses' and children's brains. We also ask the Commission to mandate EFSA to initiate a review of the scientific literature for all neonicotinoid substances in order to develop a global approach on the risk they pose to developing brains, considering they pass the brain blood barrier.

According to this evidence, it is highly unlikely that flupyradifurone meets the approval criteria laid down in article 4 of the Regulation 1107/2009. It is therefore urgent to speed up the review of the approval under article 21 of the Regulation 1107/2009 and not wait until June 2029 to withdraw the authorisation of flupyradifurone.

Kind regards,

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[1]https://www.pan-europe.info/facsheets/sulfoxaflor-and-flupyradifurone-neonics-or-not-how-pesticide-industry-tricks-regulators-14

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Annex: List of 72 scientific studies on the effects of flupyradifurone on non-target organisms, not assessed by EFSA in its 2015 peer review and 2022 statement

DOI	Référence	Year of publication
https://doi.org/10.1093/jee/tow186	Campbell JW, Cabrera AR, Stanley-Stahr C, Ellis JD. An Evaluation of the Honey Bee (Hymenoptera: Apidae) Safety Profile of a New Systemic Insecticide, Flupyradifurone, Under Field Conditions in Florida. J Econ Entomol. 2016 Oct;109(5):1967-72.	2016
https://doi.org/10.1016/j.envpol.2016.07.022	Prosser RS, de Solla SR, Holman EAM, Osborne R, Robinson SA, Bartlett AJ, Maisonneuve FJ, Gillis PL. Sensitivity of the early-life stages of freshwater mollusks to neonicotinoid and butenolide insecticides. Environ Pollut. 2016 Nov;218:428-435.	2016
https://doi.org/10.1038/s41598-017-18060-z	Tan K, Wang C, Dong S, Li X, Nieh JC. The pesticide flupyradifurone impairs olfactory learning in Asian honey bees (Apis cerana) exposed as larvae or as adults. Sci Rep. 2017 Dec 19;7(1):17772.	2017
https://doi.org/10.1038/s41598-018-23200-0	Hesselbach H, Scheiner R. Effects of the novel pesticide flupyradifurone (Sivanto) on honeybee taste and cognition. Sci Rep. 2018 Mar 21;8(1):4954.	2018
https://doi.org/10.1016/j.envpol.2018.03.004	Bartlett AJ, Hedges AM, Intini KD, Brown LR, Maisonneuve FJ, Robinson SA, Gillis PL, de Solla SR. Lethal and sublethal toxicity of neonicotinoid and butenolide insecticides to the mayfly, Hexagenia spp. Environ Pollut. 2018 Jul;238:63-75.	2018
https://doi.org/10.1016/j.ecoenv.2019.03.038	Bartlett AJ, Hedges AM, Intini KD, Brown LR, Maisonneuve FJ, Robinson SA, Gillis PL, de Solla SR. Acute and chronic toxicity of neonicotinoid and butenolide insecticides to the freshwater amphipod, Hyalella azteca. Ecotoxicol Environ Saf. 2019 Jul 15;175:215-223.	2019
https://doi.org/10.1093/jisesa/ieaa130	Bell HC, Montgomery CN, Benavides JE, Nieh JC. Effects of Nosema ceranae (Dissociodihaplophasida: Nosematidae) and Flupyradifurone on Olfactory Learning in Honey Bees, Apis mellifera (Hymenoptera: Apidae). J Insect Sci. 2020 Nov 1;20(6):29.	2020
https://doi.org/10.1016/j.pestbp.2020.104703	Kablau A, Eckert JH, Pistorius J, Sharbati S, Einspanier R. Effects of selected insecticidal substances on mRNA transcriptome in larvae of Apis mellifera. Pestic Biochem Physiol. 2020 Nov;170:104703.	2020
https://doi.org/10.1098/rspb.2020.1265	Siviter H, Muth F. Do novel insecticides pose a threat to beneficial insects? Proc Biol Sci. 2020 Sep 30;287(1935):20201265.	2020
https://doi.org/10.1002/etc.4639	Maloney EM, Sykes H, Morrissey C, Peru KM, Headley JV, Liber K. Comparing the Acute Toxicity of Imidacloprid with Alternative Systemic Insecticides in the Aquatic Insect Chironomus dilutus. Environ Toxicol Chem. 2020 Mar;39(3):587-594.	2020

https://doi.org/10.1038/s42003-021-02336-2	Tosi S, Nieh JC, Brandt A, Colli M, Fourrier J, Giffard H, Hernández-López J, Malagnini V, Williams GR, Simon-Delso N. Long-term field-realistic exposure to a next-generation pesticide, flupyradifurone, impairs honey bee behaviour and survival. Commun Biol. 2021 Jun 28;4(1):805.	2021
https://doi.org/10.3390/insects12040357	Guo Y, Diao QY, Dai PL, Wang Q, Hou CS, Liu YJ, Zhang L, Luo QH, Wu YY, Gao J. The Effects of Exposure to Flupyradifurone on Survival, Development, and Foraging Activity of Honey Bees (Apis mellifera L.) under Field Conditions. Insects. 2021 Apr 16;12(4):357	2021
https://doi.org/10.1016/j.ecoenv.2021.112247	Haas J, Zaworra M, Glaubitz J, Hertlein G, Kohler M, Lagojda A, Lueke B, Maus C, Almanza MT, Davies TGE, Bass C, Nauen R. A toxicogenomics approach reveals characteristics supporting the honey bee (Apis mellifera L.) safety profile of the butenolide insecticide flupyradifurone. Ecotoxicol Environ Saf. 2021 Jul 1;217:112247	2021
https://doi.org/10.1111/1751-7915.13673	Al Naggar Y, Paxton RJ. The novel insecticides flupyradifurone and sulfoxaflor do not act synergistically with viral pathogens in reducing honey bee (Apis mellifera) survival but sulfoxaflor modulates host immunocompetence. Microb Biotechnol. 2021 Jan;14(1):227-240	2021
https://doi.org/10.1016/j.ecoenv.2020.111268	Wu YY, Pasberg P, Diao QY, Nieh JC. Flupyradifurone reduces nectar consumption and foraging but does not alter honey bee recruitment dancing. Ecotoxicol Environ Saf. 2021 Jan 1;207:111268.	2021
https://doi.org/10.1016/j.envpol.2021.117323	Zhong K, Meng Y, Wu J, Wei Y, Huang Y, Ma J, Lu H. Effect of flupyradifurone on zebrafish embryonic development. Environ Pollut. 2021 Sep 15;285:117323.	2021
https://doi.org/10.1002/etc.5027	Gergs A, Hager J, Bruns E, Preuss TG. Disentangling Mechanisms Behind Chronic Lethality through Toxicokinetic-Toxicodynamic Modeling. Environ Toxicol Chem. 2021 Jun;40(6):1706-1712.	2021
https://doi.org/10.1098/rspb.2022.1013	Knauer AC, Alaux C, Allan MJ, Dean RR, Dievart V, Glauser G, Kiljanek T, Michez D, Schwarz JM, Tamburini G, Wintermantel D, Klein AM, Albrecht M. Nutritional stress exacerbates impact of a novel insecticide on solitary bees' behaviour, reproduction and survival. Proc Biol Sci. 2022 Oct 12;289(1984):20221013	2022
https://doi.org/10.3390/insects13100961	Góngora-Gamboa C, Ruiz-Sánchez E, Ballina-Gómez HS, González-Moreno A, Zamora-Bustillos R. Survival Rate of the Neotropical Stingless Bees Nannotrigona perilampoides and Frieseomelitta nigra after Exposure to Five Selected Insecticides, under Controlled Conditions. Insects. 2022 Oct 20;13(10):961	2022
https://doi.org/10.1016/j.scitotenv.2022.157941	Al Naggar Y, Singavarapu B, Paxton RJ, Wubet T. Bees under interactive stressors: the novel insecticides flupyradifurone and sulfoxaflor along with the fungicide azoxystrobin disrupt the gut microbiota of honey bees and increase opportunistic bacterial pathogens. Sci Total Environ. 2022 Nov 25;849:157941.	2022

https://doi.org/10.3389/finsc.2022.907555	Harwood GP, Prayugo V, Dolezal AG. Butenolide Insecticide Flupyradifurone Affects Honey Bee Worker Antiviral Immunity and Survival. Front Insect Sci. 2022 Jul 11;2:907555	2022
https://doi.org/10.1016/j.envpol.2022.119575	Siviter H, Muth F. Exposure to the novel insecticide flupyradifurone impairs bumblebee feeding motivation, learning, and memory retention. Environ Pollut. 2022 Aug 15;307:119575.	2022
https://doi.org/10.1016/j.jmgm.2022.108177	Shuai J, Wang X, Li G, Kong Y, Li W, Li Z, Cheng J. Study on the mode of action between Apis mellifera (α8)2(β1)3 nAChR and typical neonicotinoids versus flupyradifurone with different bee-toxic levels. J Mol Graph Model. 2022 Jul;114:108177	2022
https://doi.org/10.1016/j.chemosphere.2022.133771	Mundy-Heisz KA, Prosser RS, Raine NE. Acute oral toxicity and risks of four classes of systemic insecticide to the Common Eastern Bumblebee (Bombus impatiens). Chemosphere. 2022 May;295:133771.	2022
https://doi.org/10.1021/acs.est.2c04085	Mangold-Döring A, Huang A, van Nes EH, Focks A, van den Brink PJ. Explicit Consideration of Temperature Improves Predictions of Toxicokinetic-Toxicodynamic Models for Flupyradifurone and Imidacloprid in Gammarus pulex. Environ Sci Technol. 2022 Nov 15;56(22):15920-15929.	2022
https://doi.org/10.1016/j.jenvman.2022.115989	Qiao Z, Li P, Tan J, Peng C, Zhang F, Zhang W, Jiang X. Oxidative stress and detoxification mechanisms of earthworms (Eisenia fetida) after exposure to flupyradifurone in a soil-earthworm system. J Environ Manage. 2022 Nov 15;322:115989.	2022
https://doi.org/10.1016/j.ecoenv.2022.113977	Huang A, Mangold-Döring A, Focks A, Zhang C, Van den Brink PJ. Comparing the acute and chronic toxicity of flupyradifurone and imidacloprid to non-target aquatic arthropod species. Ecotoxicol Environ Saf. 2022 Sep 15;243:113977	2022
https://doi.org/10.3390/v15061284	Al Naggar Y, Shafiey H, Paxton RJ. Transcriptomic Responses Underlying the High Virulence of Black Queen Cell Virus and Sacbrood Virus following a Change in Their Mode of Transmission in Honey Bees (Apis mellifera). Viruses. 2023 May 30;15(6):1284.	2023
https://doi.org/10.3389/fphys.2023.1150340	Gao J, Guo Y, Chen J, Diao QY, Wang Q, Dai PL, Zhang L, Li WM, Wu YY. Acute oral toxicity, apoptosis, and immune response in nurse bees (Apis mellifera) induced by flupyradifurone. Front Physiol. 2023 Mar 28;14:1150340.	2023
https://doi.org/10.3390/insects14010077	Kablau A, Erler S, Eckert JH, Pistorius J, Sharbati S, Einspanier R. Effects of Flupyradifurone and Two Reference Insecticides Commonly Used in Toxicological Studies on the Larval Proteome of the Honey bee Apis mellifera. Insects. 2023 Jan 12;14(1):77.	2023
https://doi.org/10.3390/insects14120907	Mansour R, Bauer AL, Goodarzi M, Hoffmann C. Toxicity of Pesticides Applied in European Vineyards on Anagyrus vladimiri and Trichogramma evanescens, Parasitoids of Planococcus ficus and Lobesia botrana. Insects. 2023 Nov 24;14(12):907	2023

https://doi.org/10.17221/78/2023-vetmed	Strouhova A, Velisek J, Stara A. Selected neonicotinoids and associated risk for aquatic organisms. Vet Med (Praha). 2023 Aug 31;68(8):313-336.	2023
https://doi.org/10.1038/s41598-023-46135-7	Scheibli L, Elsenhans T, Wolf H, Stemme T, Pfeffer SE. Influence of the pesticide flupyradifurone on mobility and physical condition of larval green lacewings. Sci Rep. 2023 Nov 13;13(1):19804.	2023
https://doi.org/10.1002/etc.5721	Schöfer N, Ackermann J, Hoheneder J, Hofferberth J, Ruther J. Sublethal Effects of Four Insecticides Targeting Cholinergic Neurons on Partner and Host Finding in the Parasitic Wasp Nasonia vitripennis. Environ Toxicol Chem. 2023 Nov;42(11):2400-2411.	2023
https://doi.org/10.1002/etc.5630	Martin WJ, Sibley PK, Prosser RS. Comparison of Established and Novel Insecticides on Survival and Reproduction of Folsomia candida. Environ Toxicol Chem. 2023 Jul;42(7):1516-1528.	2023
https://doi.org/10.1016/j.ecoenv.2023.114785	Gao X, Zhao L, Zhu X, Wang L, Zhang K, Li D, Ji J, Niu L, Luo J, Cui J. Exposure to flupyradifurone affect health of biocontrol parasitoid Binodoxys communis (Hymenoptera: Braconidae) via disrupting detoxification metabolism and lipid synthesis. Ecotoxicol Environ Saf. 2023 Apr 15;255:114785	2023
https://doi.org/10.1016/j.scitotenv.2022.158886	Huang A, Mangold-Döring A, Guan H, Boerwinkel MC, Belgers D, Focks A, Van den Brink PJ. The effect of temperature on toxicokinetics and the chronic toxicity of insecticides towards Gammarus pulex. Sci Total Environ. 2023 Jan 15;856(Pt 2):158886.	2023
https://doi.org/10.1016/j.pestbp.2024.106147	Taha M, Cartereau A, Taillebois E, Thany SH. Flupyradifurone activates DUM neuron nicotinic acetylcholine receptors and stimulates an increase in intracellular calcium through the ryanodine receptors. Pestic Biochem Physiol. 2024 Nov;205:106147.	2024
https://doi.org/10.1021/acs.jafc.4c03004	Shen C, Pan X, Wu X, Xu J, Zheng Y, Dong F. Prediction of Potential Risk for Flupyradifurone and Its Transformation Products to Hydrobionts. J Agric Food Chem. 2024 Jul 10;72(27):15151-15163.	2024
https://doi.org/10.1002/etc.5892	English SG, Bishop CA, Bieber M, Elliott JE. Following Regulation, Imidacloprid Persists and Flupyradifurone Increases in Nontarget Wildlife. Environ Toxicol Chem. 2024 Jul;43(7):1497-1508.	2024
https://doi.org/10.1016/j.scitotenv.2024.172617	Scheibli L, Wiedenmann M, Wolf H, Stemme T, Pfeffer SE. Flupyradifurone negatively affects survival, physical condition and mobility in the two-spotted lady beetle (Adalia bipunctata). Sci Total Environ. 2024 Jun 25;931:172617.	2024
https://doi.org/10.1016/j.isci.2024.111050	Nebauer CA, Prucker P, Ruedenauer FA, Kollmann J, Leonhardt SD. Bumblebees under stress: Interacting effects of pesticides and heatwaves on colony development and longevity. iScience. 2024 Sep 26;27(11):111050.	2024

https://doi.org/10.1016/j.envpol.2024.125129	Azpiazu C, Sgolastra F, Ippolito A, Albacete S, Brandt A, Colli M, Grossar D, Jeker L, Malagnini V, Sancho G, Splitt A, Straub L, Strobl V, Boranski M, Jachuła J, Martins C, Medrzycki P, Simon-Delso N, Tosi S, Bosch J. Chronic oral toxicity protocol for adult solitary bees (Osmia bicornis L.): Reduced survival under long-term exposure to a "bee-safe" insecticide. Environ Pollut. 2024 Dec 15;363(Pt 1):125129.	2024
https://doi.org/10.1016/j.etap.2024.104571	Tiritelli R, Zavatta L, Tadei R, Mathias da Silva EC, Sgolastra F, Cilia G. Microplastic ingestion and co-exposure to Nosema ceranae and flupyradifurone reduce the survival of honey bees (Apis mellifera L.). Environ Toxicol Pharmacol. 2024 Oct;111:104571.	2024
https://doi.org/10.1016/j.scitotenv.2024.175935	Siviter H, DeVore J, Gray LK, Ivers NA, Lopez EA, Riddington IM, Stuligross C, Jha S, Muth F. A novel pesticide has lethal consequences for an important pollinator. Sci Total Environ. 2024 Nov 20;952:175935.	2024
https://doi.org/10.1016/j.scitotenv.2024.173418	Chen J, Liu YJ, Wang Q, Zhang L, Yang S, Feng WJ, Shi M, Gao J, Dai PL, Wu YY. Multiple stresses induced by chronic exposure to flupyradifurone affect honey bee physiological states. Sci Total Environ. 2024 Jul 20;935:173418	2024
https://doi.org/10.1098/rsos.231798	Gray LK, Hulsey M, Siviter H. A novel insecticide impairs bumblebee memory and sucrose responsiveness across high and low nutrition. R Soc Open Sci. 2024 May 8;11(5):231798.	2024
https://doi.org/10.1098/rspb.2023.2939	Rondeau S, Raine NE. Single and combined exposure to 'bee safe' pesticides alter behaviour and offspring production in a ground-nesting solitary bee (Xenoglossa pruinosa). Proc Biol Sci. 2024 Mar 27;291(2019):20232939.	2024
https://doi.org/10.3390/ani14060851	Bava R, Lupia C, Castagna F, Ruga S, Nucera S, Carresi C, Caminiti R, Bulotta RM, Naccari C, Britti D, Palma E. Interaction of Flupyradifurone and Deltamethrin, Two Pesticides Commonly Used for Plant Pest Control, in Honeybees. Animals (Basel). 2024 Mar 10;14(6):851.	2024
https://doi.org/10.1016/j.scitotenv.2023.169494	Schwarz JM, Knauer AC, Alaux C, Barascou L, Barraud A, Dievart V, Ghazoul J, Michez D, Albrecht M. Diverse pollen nutrition can improve the development of solitary bees but does not mitigate negative pesticide impacts. Sci Total Environ. 2024 Feb 20;912:169494.	2024
https://doi.org/10.1016/j.scitotenv.2023.167530	Al Naggar Y, Wubet T. Chronic exposure to pesticides disrupts the bacterial and fungal co-existence and the cross-kingdom network characteristics of honey bee gut microbiome. Sci Total Environ. 2024 Jan 1;906:167530.	2024
https://doi.org/10.1111/1744-7917.13268	Boff S, Ayasse M. Exposure to sublethal concentration of flupyradifurone alters sexual behavior and cuticular hydrocarbon profile in Heriades truncorum, an oligolectic solitary bee. Insect Sci. 2024 Jun;31(3):859-869.	2024
https://doi.org/10.1016/j.scitotenv.2023.166097	Fischer LR, Ramesh D, Weidenmüller A. Sub-lethal but potentially devastating - The novel insecticide flupyradifurone impairs collective brood care in bumblebees. Sci Total Environ.	2024

	2023 Dec 10;903:166097.	
https://doi.org/10.1038/s41598-025-20393-z	Schläppi D, Al-Hashemi A, Wasif V, Masson F, Leckie L, Stroeymeyt N. Synergistic effect of the next generation insecticide flupyradifurone with a fungal pathogen in the ant Lasius niger. Sci Rep. 2025 Oct 21;15(1):36636	2025
https://doi.org/10.3389/fphys.2025.1676992	Yıldırım Ö, Acar Ü, Tezel R, Erden Y, Bilge G, Yapıcı S. Dose-dependent hemato-biochemical and genotoxic responses of common carp (Cyprinus carpio) to flupyradifurone. Front Physiol. 2025 Oct 2;16:1676992.	2025
https://doi.org/10.1002/tox.70002	Campos F, Pavlaki MD, Soares AMVM, Loureiro S. Toxicity of Four Common Environmental Chemicals Across Caenorhabditis elegans Life Stages Supporting the One Health Concept. Environ Toxicol. 2025 Nov 28.	2025
https://doi.org/10.1007/s11356-025-36755-z	Scheibli L, Geiger SP, Pfeffer SE. Effects of two nAChR agonists on wood ants: acetamiprid induces lethality and immediate hypoactivity, while flupyradifurone causes time-delayed hyperactivity. Environ Sci Pollut Res Int. 2025 Jun;32(30):18366-18379	2025
https://doi.org/10.1007/s10886-025-01554-w	Schöfer N, Saxinger N, Braumandl K, Ruther J. Four Neurotoxic Insecticides Impair Partner and Host Finding in the Parasitoid Leptopilina heterotoma and Bioactive Doses Can Be Taken up Via the Host. J Chem Ecol. 2025 Jan 29;51(1):14.	2025
https://doi.org/10.1007/s00359-025-01735-8	Christian M, Kraft M, Wilknitz P, Nowotny M, Schöneich S. Flupyradifurone, imidacloprid and clothianidin disrupt the auditory processing in the locust CNS. J Comp Physiol A Neuroethol Sens Neural Behav Physiol. 2025 May;211(3):311-325.	2025
https://doi.org/10.1016/j.neuro.2025.01.001	Kaaki S, Cartereau A, Boussaine K, Taillebois E, Thany SH. The stoichiometry of the α4β2 neuronal nicotinic acetylcholine receptors determines the pharmacological properties of the neonicotinoids, and recently introduced butenolide and sulfoximine. Neurotoxicology. 2025 Mar;107:1-10	2025
https://doi.org/10.3389/finsc.2025.1673140	Mohamadzade Namin S, Begna T, Kang Y, Bisrat D, Najarpoor A, Ulziibayar D, Vatanparast M, Jung C. Exploring curcumin and rosmarinic acid as potential antidotes for pesticide-induced harm to honey bees. Front Insect Sci. 2025 Oct 22;5:1673140.	2025
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