The EIRE Research Project: Characterising exposures to neonicotinoid insecticides among the Irish population

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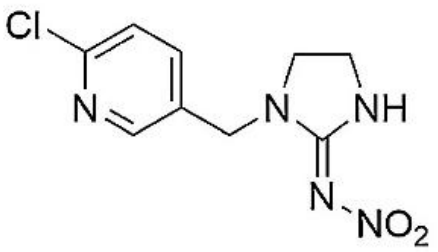
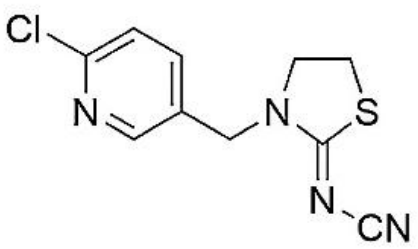
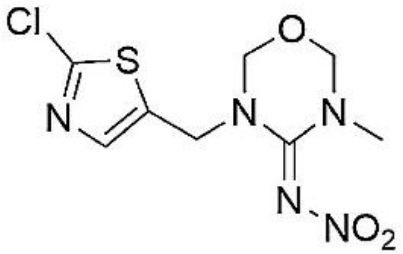
Neonicotinoid Insecticides (NNIs)



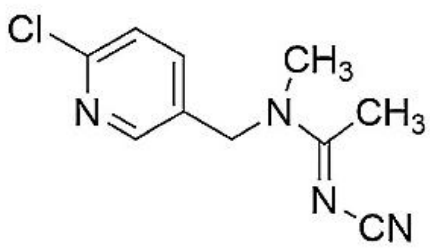
Imidacloprid



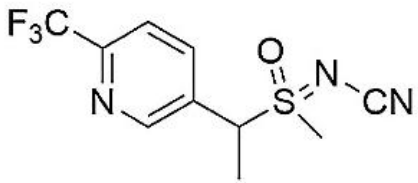
Thiacloprid



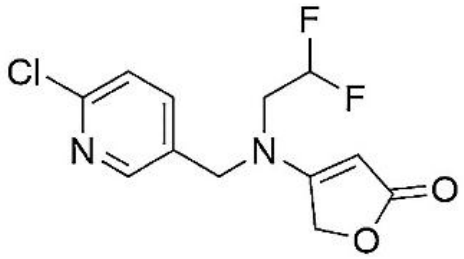
Thiamthoxam



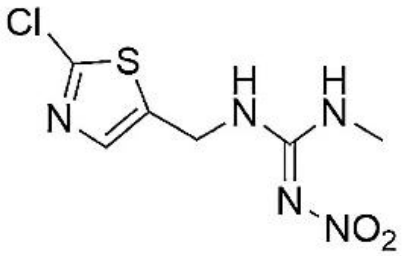
Acetamiprid



Sulfoxaflor
(Sulfoximines)



Flupyradifurone
(Butenolides)

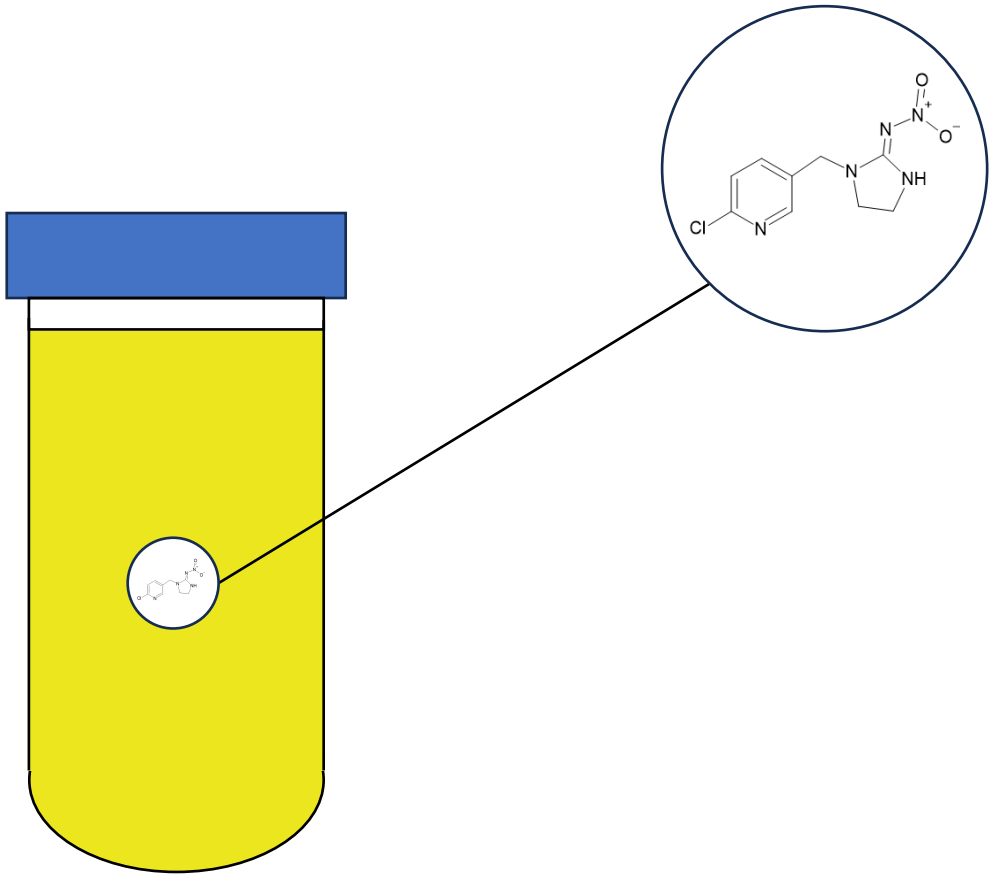


Clothianidin

Assessing exposures to NNIs using human biomonitoring

Human biomonitoring: Analysing biological material to characterise exposures

Urine samples analysed for 7 NNIs, and 9 of their metabolites[1]



1 Wrobel *et al*. 2022. Anal. Chim. Acta, 340680. https://doi.org/10.1016/j. aca.2022.340680

General Irish population exposure to NNIs

227 urine samples collected from the Irish population 2019-2020

Farm and non-farm families

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Characterising neonicotinoid insecticide exposures among the Irish population using human biomonitoring

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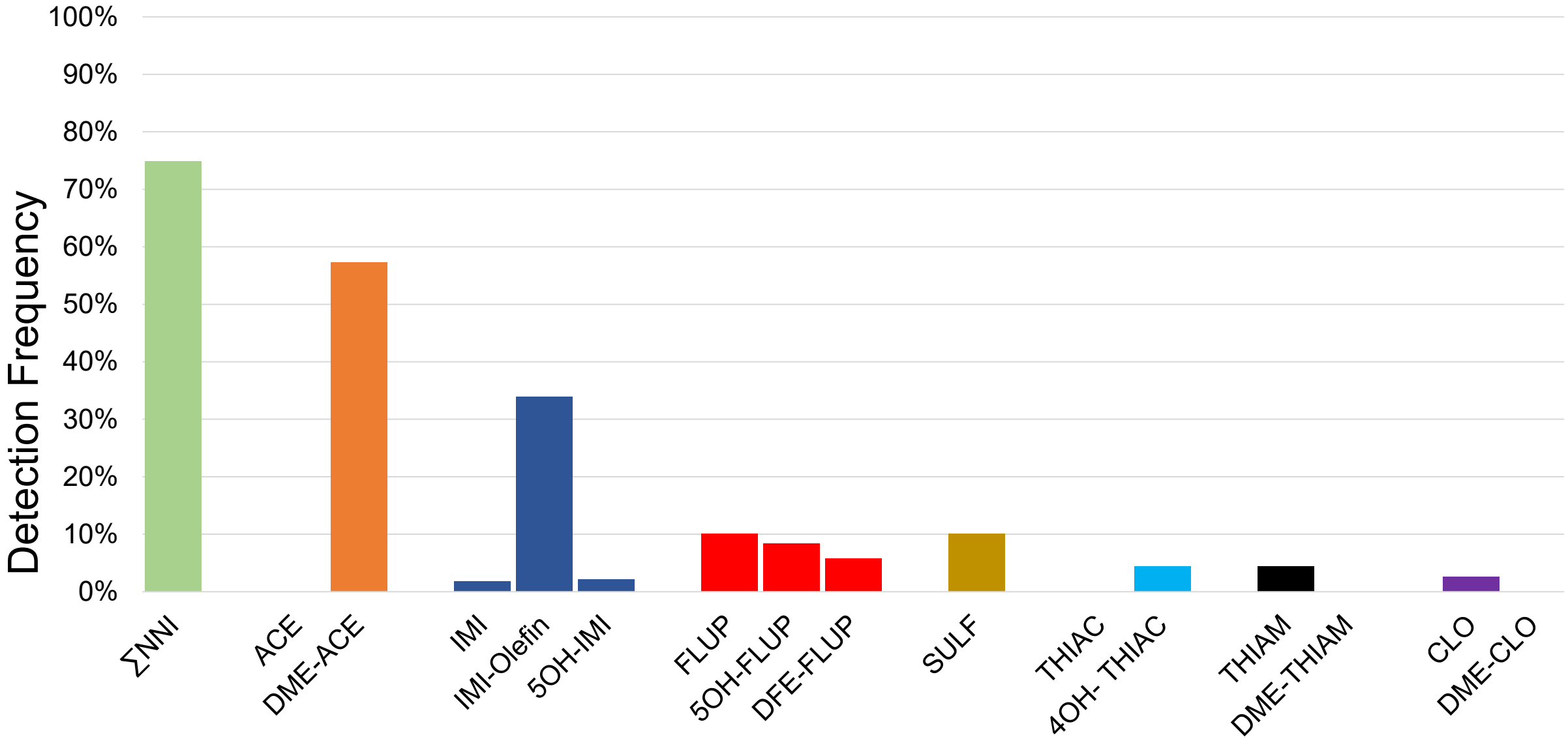
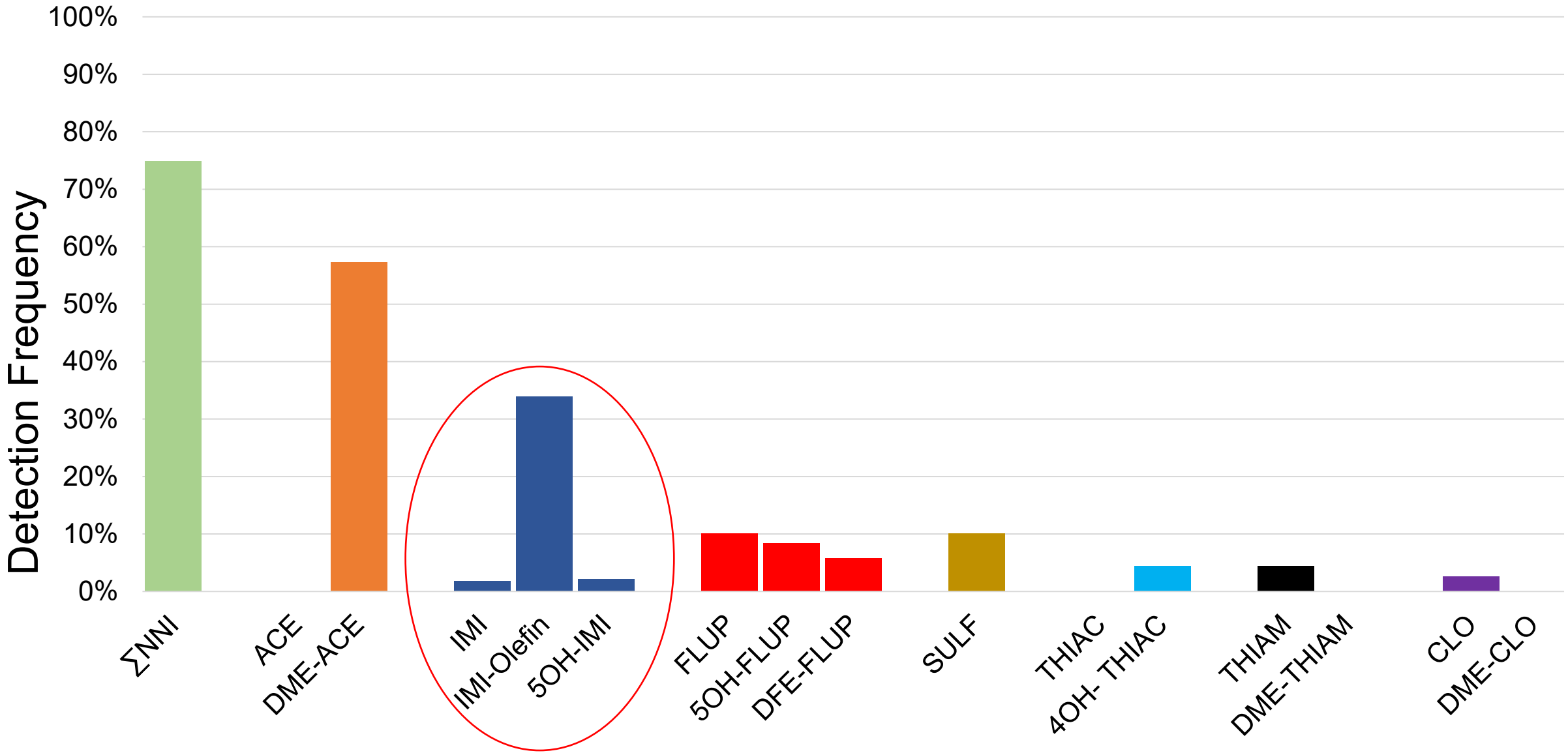
ABSTRACT

Neonicotinoid and neonicotinoid-like insecticides (NNIs) are the most widely used class of insecticides in the world, with previous large-scale human biomonitoring studies of NNIs showing widespread exposure. They have been identified as priority substances requiring further toxicological and human exposure research by numerous initiatives, including the Partnership for the Assessment of Risks from Chemicals (PARC). The study aimed to conduct the first human biomonitoring study investigating exposures to NNIs in Ireland by analysing 227 urine samples from the Irish population. Samples were collected between 2019 and 2020 from 14 farm and 54 non-farm families throughout Ireland and analysed for seven NNIs (acetamiprid, clothianidin, imidacloprid, thiacloprid, thiamethoxam, flupyradifurone, and sulfoxaflor) and nine of their metabolites using online-solid phase extraction coupled to liquid chromatography-tandem mass-spectrometry (online-SPE-LC-MS/MS). The results found that 75 % of samples had quantifiable levels of at least one parent compound or metabolite. *N*-desmethyl acetamiprid (dme-ACE) and imidacloprid-olefin (IMI-olefin), the main metabolites of acetamiprid and imidacloprid, were the most widely detected analytes and could be quantified in 57 % and 34 % of the urine samples, respectively. Based on reverse dosimetry, the maximum urinary concentration of dme-ACE corresponded to 31.7 % of the acceptable daily intakes (ADI) for acetamiprid, which has been recently reduced five-fold. In comparison, the maximum urinary concentrations of all other NNIs analysed in the study corresponded to less than 3 % of the ADIs of the respective parent NNIs. Though NNI exposure was widespread among this study group, the exposure levels were below current regulatory guidance values.

Detection frequency of NNIs in 227 urine samples from the Irish population



Detection frequency of NNIs in 227 urine samples from the Irish population



Imidacloprid

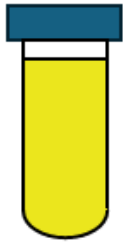
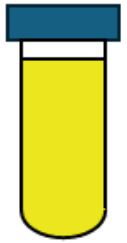
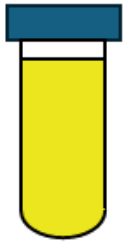
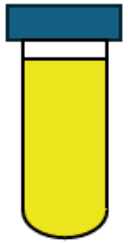
Restricted by the EU for use on plants in 2018

Why are we finding it in urine samples collected in 2019 and 2020?

It is still used as a flea treatment for pets!

Pet owners' sampling campaign

Collected samples from households with pets, both applicators and their family members

Day 1	Day 2	Day 3	Day 4	Day 5
Urine Sample (before the flea treatment is applied) 	Urine Sample 	Urine Sample 	Urine Sample 	Urine Sample 
Short Daily Questionnaire 	Short Daily Questionnaire 	Short Daily Questionnaire 	Short Daily Questionnaire 	Short Daily Questionnaire 
Apply Flea Treatment (Applicator) 				Longer Questionnaire 

Pet owners' study results

Significant increase in imidacloprid levels after flea treatment application

Concentrations peaked on Day 3 and persisted until Day 5

Comparison to Acceptable Daily Intakes (ADIs)

ADI: Amount of a chemical that can be ingested daily with no appreciable health risk

All imidacloprid levels were below 25% of the ADI across all studies

Unlikely to be any health risk towards the study populations based on EU guidelines

UCD School of Public Health, Physiotherapy and Sports Science
Scoil na Sláinte Poiblí, Fisiteiripe agus na hEolaíochta Spóirt UCD

Curious about the chemicals around us?

Be part of the HBM4IE study and help in strengthening environmental and public health regulations.

We are recruiting adults (18–39) living in Ireland

Complete a lifestyle questionnaire
Provide urine and blood samples at St. Vincents' Hospital Clinical Research Centre.

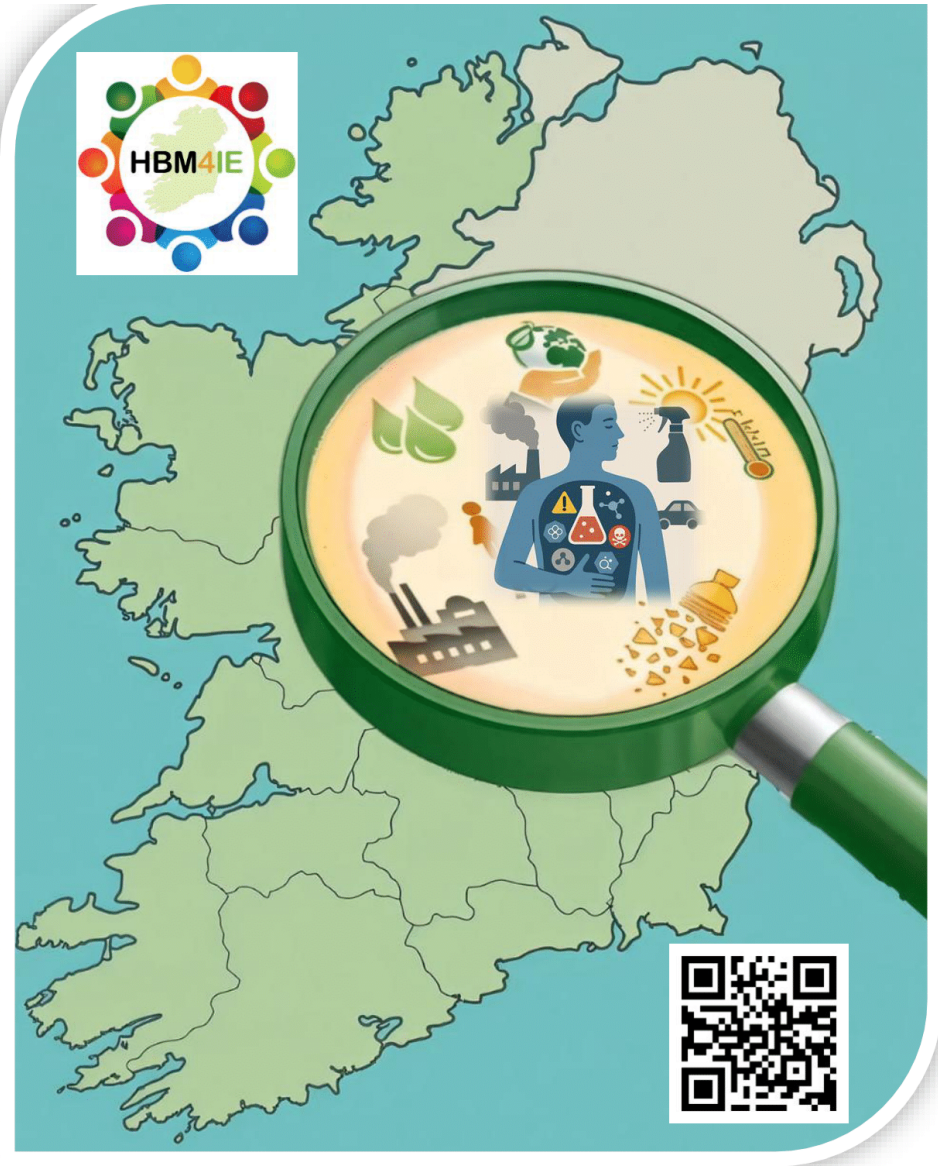
Thank You!!

Get a Token of appreciation for your contribution (coffee mug, reusable eco-friendly bag, light lunch, and One4All voucher)

Hurry up! First sampling campaign starting in November

Want to participate, please write to us: hbm4ie@ucd.ie or scan the QR code

Contact our researchers at:
richa.singh@ucd.ie
alison.connolly@ucd.ie



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