



## Investigating pesticide persistence in commercially available beeswax

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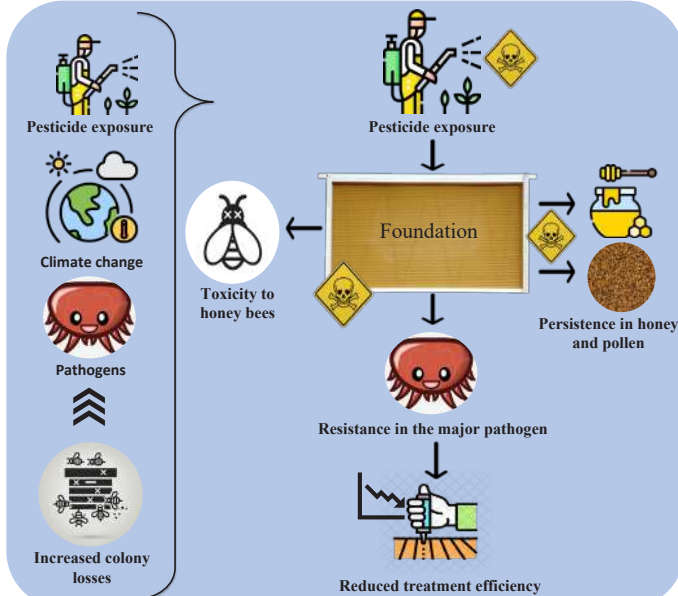
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### INTRODUCTION

- Honey bee colony losses have increased over the past 40 years due to climate change, pathogens, and pesticide exposure.
- Beeswax is the most contaminated hive material and can be reused for decades as foundation.
- Pesticide persistence in foundation can cause toxicity for honey bees, lead to the evolution of resistance in major honey bee pathogens, and result in decreased treatment efficiency.
- Pesticides can migrate into honey and pollen, posing risks for human health.
- Pesticides banned in Europe have been reported in several countries, including in Ireland.
- This contamination may originate from foundation because the beeswax trade is not regulated globally.

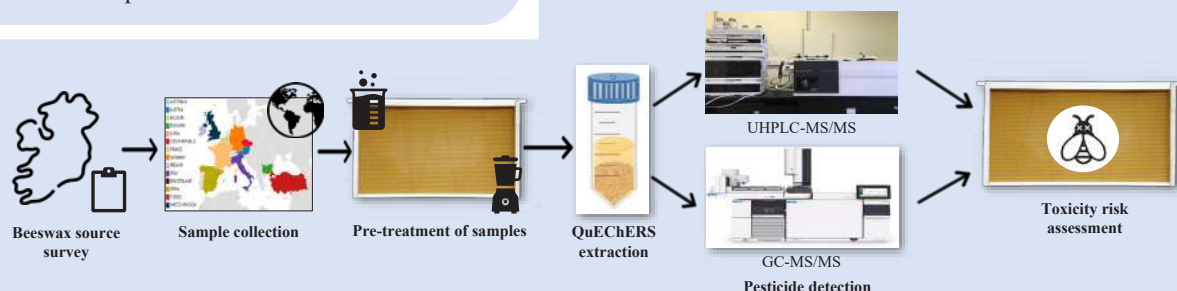


### METHODS

- We surveyed Irish beekeepers to determine where they buy their foundation.
- Beeswax samples were collected from suppliers across ten countries, both within and outside Europe.
- The analytical chemistry methods for pesticide screening in beeswax are currently being fine-tuned.
- Next we will screen all beeswax samples for over 300 pesticides.
- The toxicity risk will be calculated for each beeswax sample.



Origin of beeswax samples from different countries



### CONCLUSION

This study aims to provide data to international regulatory bodies and advocate for global policy development in the beeswax trade. This will mitigate contamination from beeswax and promote sustainable beekeeping practices with a 'One Health' approach for the future.

### REFERENCES

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## **PP-180 [Beekeeping Technology and Quality]**

### **The levels of pesticide persistence in commercially available beeswax from different countries**

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Beeswax is the most contaminated hive material because of its lipophilic nature, which allows pesticides to persist for more than 30 years. Beekeepers often supply reused beeswax to the bees, which is called as foundation. Foundation is the least replaced material, and it increases the risk of beeswax contamination. It has been shown that persistence in beeswax and foundation can cause toxicity, evolution of resistance in Varroa mites, and reduced treatment efficacy, which poses risks for honey bee health and apiculture. In addition, pesticide persistence can migrate to honey and pollen, posing risks to consumers of beekeeping products. Pesticide persistence in beeswax, honey, and pollen has been reported in different European countries, including banned pesticides, such as propargite and coumaphos. This contamination could have originated from contaminated beeswax because of beeswax trade is not regulated globally, and most of the beeswax in the market is imported from non-European countries such as China and Türkiye where pesticides banned in Europe are currently approved for use. To address this issue, beeswax and foundation samples were collected from ten European and non-European countries to determine pesticide persistence levels. Samples will be analysed using ultra-high-performance liquid chromatography-mass spectrometry (UHPLC-MS) and gas chromatography-tandem mass spectrometry (GC-MS/MS) to screen for over 300 pesticides, including banned pesticides in Europe. This study aims to provide data to regulatory bodies to eliminate contaminated beeswax in the beekeeping market, enhance honey bee health and ensure the safety of beekeeping products. In addition, this study advocates for global regulations on beeswax trade and promotes sustainable beekeeping practices to mitigate contamination risks in apicultural products.