Toxicology: Open Access

ISSN: 2476-2067

Editorial Open Access

Pesticide Dietary Risk Assessment in the European Union Uses Alternative Toxicological Methodologies for Identifying Leftovers

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Abstract

People are continually exposed to trace amounts of pesticide residues that are found in food products. Because of this, determining the risk posed by pesticide residues found in food necessitates not only identifying and evaluating the active ingredient's toxicological qualities, but also those of its metabolites, isomers, and degradates. The use of numerous laboratory animals is necessary for this. Contrarily, there is currently a focus on reducing the use of animals in toxicological research.

Keywords: Toxicological methods; Pesticides; Food

Introduction

Pesticide residues are a result of the use of pesticides for plant protection. They are a blend of several substances made up of the active ingredient as well as its isomers, metabolites, and degradates. This is the result of changes that start to take place as soon as a plant protection agent is applied, such as changes brought on by a plant's metabolism or changes brought on by soil microorganisms. In soil, other chemical processes like hydrolysis take place [1, 2].

Methods

Such evaluation is challenging because there is frequently either a lack of pertinent information about the toxicity of each component or a lack of information beyond research on acute oral toxicity. Metabolites, isomers, and degradates of the active substance may exhibit reduced, higher, or similar toxicity as well as distinct modes of action when compared to the parent drug [3, 4]. One metabolite of prothioconazole, prothioconazole-desthio, is more hazardous than the drug itself (EFSA, 2014). Similarly, omethoate (dimethoate's metabolite) (EFSA, 2013) and fipronil's photodegradation products sulfoxide derivatives of the N-methylcarbamates (EFSA, 2018a), and omethoate are more dangerous than their parent chemicals [5, 6]. Risk assessment considers the toxicologically relevant chemicals, which are those whose toxicity is comparable to, greater than, or different from that of the parent compound.

A comprehensive toxicological profile of all metabolites and breakdown products is almost hard to create. There is also a focus on reducing the use of test animals in toxicological research. Often times, there are simply too many metabolites and breakdown products to allow for a full panel of toxicological studies on all remaining substances. Notwithstanding the fact that the findings of the mandatory standard rat tests on the active ingredient (Commission Regulation (EU) No [7, 8].

Conclusions

A greater variety of chemicals may now be detected thanks to enhanced analytical techniques. A threshold toxicity level for many chemicals that occur in food and feed at low and extremely low concentrations, including compounds with unknown toxicity, may be established merely based on the chemical's structure. TTC values implementation lowers the number of test animals [9, 10].

Acknowledgements

The National Institute of Public Health-National Institute of Hygiene (NIPH-NIH), project number 16/Z.1/2016, provided funding for the research.

Declaration of competing interest

The authors affirm that they have no known financial or interpersonal conflicts that would have appeared to have an impact on the research presented in this study.

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Received: 03-Mar-2023, Manuscript No: tyoa-23-91162; **Editor assigned:** 06-Mar-2023, Pre-QC No: tyoa-23-91162 (PQ); **Reviewed:** 20-Mar-2023, QC No: tyoa-23-91162; **Revised:** 22-Mar-2023, Manuscript No: tyoa-23-91162 (R); **Published:** 29-Mar-2023, DOI: 10.4172/2476-2067.1000207

Citation: Donell D (2023) Pesticide Dietary Risk Assessment in the European Union Uses Alternative Toxicological Methodologies for Identifying Leftovers. Toxicol Open Access 9: 207.