

Chapter 2

Toxicological Parameters and Risk Assessment of Some Novel Insecticides: An In-Depth Analysis

Akanksha Chand
State Niti Aayog, India

ABSTRACT

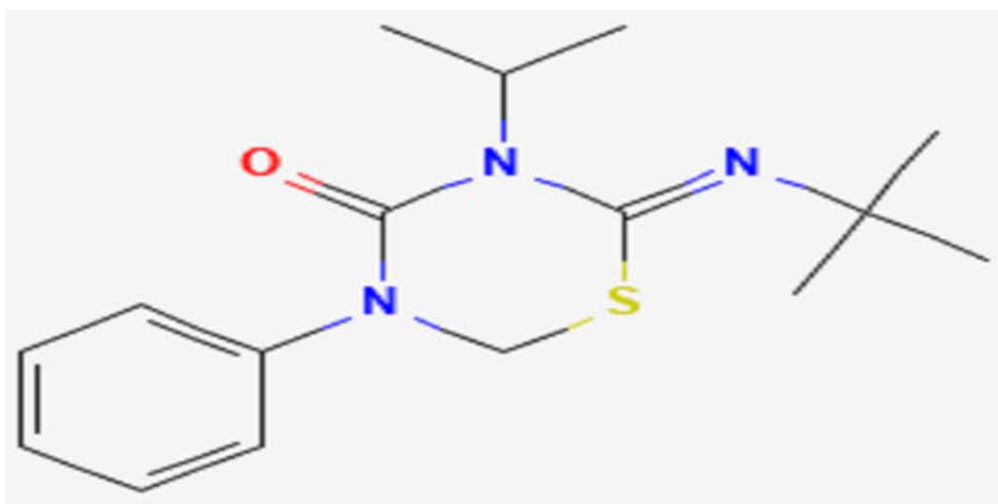
Pesticides are widely used in agriculture, horticulture, and public health to protect crops and control pests. However, pesticides can also pose a significant risk to human health and the environment, especially when used improperly or in excessive amounts. The toxicity of a pesticide is often expressed in terms of its lethal dose (LD) or lethal concentration (LC) values, which provide an estimate of the amount of the pesticide that can cause death in a specified population. In this chapter, the authors review the LD and LC values and explore the different factors that influence pesticide toxicity, such as the mode of action and formulation. Additionally, they present the toxicity ranges of selected pesticides commonly used in agriculture and public health and discuss the health effects associated with acute and chronic exposure to these chemicals. The chapter will conclude with a discussion of the regulatory frameworks governing pesticide use and the need for sustainable and integrated pest management practices.

INTRODUCTION

As the development of new insecticides continues to advance, it becomes increasingly important to evaluate their toxicological parameters and assess the associated risks. Novel insecticides offer promising solutions for pest control, but their potential impacts on human health and the environment must be thoroughly understood. Toxicological parameters encompass a range of factors, including acute and chronic toxicity, effects on non-target organisms, and persistence in the environment. Risk assessment plays a crucial role in determining the safety and suitability of these insecticides for use.

DOI: 10.4018/979-8-3693-0200-2.ch002

Figure 1. Chemical structure depiction of Buprofezin



Toxicological parameters form the foundation for understanding the potential hazards posed by novel insecticides. Acute toxicity studies investigate the immediate effects of exposure to determine the lethal dose (LD50) or concentration (LC50) that causes adverse effects in test organisms. Chronic toxicity studies, on the other hand, focus on the long-term effects of repeated or continuous exposure to insecticides, providing insights into potential reproductive, developmental, and carcinogenic effects. These parameters enable scientists and regulators to assess the risks associated with human exposure and determine safe levels of application.

Furthermore, the effects of novel insecticides on non-target organisms such as beneficial insects, pollinators, aquatic organisms, birds, and mammals are a significant concern. The persistence of insecticides in the environment also warrants attention.

In conclusion, the evaluation of toxicological parameters and the rigorous risk assessment of novel insecticides are fundamental steps in ensuring the responsible and sustainable use of these chemical tools for pest control. Hence, the toxicological parameters of some insecticides are discussed below.

BUPROFEZIN

Buprofezin is a non-systemic narrow-spectrum foliar insecticide in the thiazine class belonging to IRAC Group 16 (chitin biosynthesis inhibitor-type1). It does not exhibit cross-resistance to other pesticide classes. It acts as a molting inhibitor against some Coleoptera, Hemiptera, Acarina and Homoptera such as plant hoppers, whiteflies and scale insects. It is widely used in more than 80 countries. Insect growth regulators (IGRs) have lower toxicity against vertebrates than most conventional insecticides.

Specifications

MF: C₁₆H₂₃N₃OS
 MW: 305.4g/mol

14 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/toxicological-parameters-and-risk-assessment-of-some-novel-insecticides/329127

Related Content

Importance of Cloud Computing in 5G Radio Access Networks

Wael S. Afifi, Ali A. El-Moursy, Mohamed Saad, Salwa M. Nassar and Hadia M. El-Hennawy (2020). *Fundamental and Supportive Technologies for 5G Mobile Networks* (pp. 255-268).

www.irma-international.org/chapter/importance-of-cloud-computing-in-5g-radio-access-networks/241981

IoT-Fog-Blockchain Framework: Opportunities and Challenges

Tanweer Alam (2020). *International Journal of Fog Computing* (pp. 1-20).

www.irma-international.org/article/iot-fog-blockchain-framework/266473

The Financial Clouds Review

Victor Chang, Chung-Sheng Li, David De Roure, Gary Wills, Robert John Walters and Clinton Chee (2011). *International Journal of Cloud Applications and Computing* (pp. 41-63).

www.irma-international.org/article/financial-clouds-review/54719

Cloud Computing-Based Smart Agriculture

Kaushal Kishor and Raj Kishor Verma (2023). *Convergence of Cloud Computing, AI, and Agricultural Science* (pp. 120-136).

www.irma-international.org/chapter/cloud-computing-based-smart-agriculture/329131

A Customer-Oriented Task Scheduling for Heterogeneous Multi-Cloud Environment

Sohan Kumar Pande, Sanjaya Kumar Panda and Satyabrata Das (2016). *International Journal of Cloud Applications and Computing* (pp. 1-17).

www.irma-international.org/article/a-customer-oriented-task-scheduling-for-heterogeneous-multi-cloud-environment/173769