Assessment of the Kinetic reaction and residue Determination of four insecticides using High Liquid Performance Chromatography Technique on Tomato Fruits

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DOI: https://doi.org/10.36077/kjas/2026/v18i2.13551
Received date: 3/10/2023
Accepted date: 28/11/2023

Abstract

The imidacloprid, avaunt, karate, and coragen residues in the fruits were investigated. The results show that imidacloprid residues started to decrease over the time to reach 313.5, 180.93, and 131.15 into 0 mg L respectively after 14 days of the application. While karate residues slowly decreased into 62.88 mg L^{-1} after 14 days of the application. The kinetic assessment, the dissipation of imidacloprid, avaunt, and coragen residues underwent the first order model with the degradation rate 0.322, 0.395, and 0.322 a day. Subsequently, the half-life scored 2.14, 1.75, 6.72, and 2.14 days for the same order above respectively. Whilst Karate undergoes the second order model, giving 0.009 a day degradation rate. This resulted in a slow breakdown with the half-life being 770.16 days based on the current result. Overall, these results suggest that the use of those insecticides are safe and not be tended as harmful due to their fast degradation, except karate needs extra time to reach at low level.

Keywords: Avaunt, Coragen, Imidacloprid, Karate, Kinetic evaluation.

Introduction

Plants belonging to the Solanaceae family, tomato (*Lycopersicon esculentum*) Mill. One of the most produced crops, tomatoes will yield 186.8 million tonnes worldwide in 2020 [1]. It is one of the most popular fruit vegetables, especially rich in vitamins, minerals [2]. Tomatoes are infected with many of diseases and insects, one of the most significant pests on tomatoes is the tomato pinworm (*Tuta absoluta)* (Meyrick) (Lepidoptera: Gelechiidae) crop loss. Pesticides are essential to control *T. absoluta* that may cause the loss 80% of tomato production[3] . Some pesticides have tolerance to biological or chemical degradation and have a tendency to bioaccumulate in plant leaves, fruits and animal tissues [4] . The pest has a brief life cycle of around 28 to 29 days and may produce 10 to 12 generations annually. *T. absoluta* has been subjected to a variety of controls[5]. Since other approaches alone have failed to stop the harm of this insect , chemical treatment has been applied, and spraying chemical insecticides is considered a preferred method for managing pests and keeping better production of tomatoes [6]. Insecticides can kill natural predators and have a