



Original Article

Changes Evaluation of Reserve Substances and Degradation Enzymes after Exposure of Tomato Plants (*Lycopersicon esculentum* Mill.) to Alpha - Cypermethrin, Chlorpyrifos and Pyrimicarb

CHAHID Karim¹, Amin LAGLAOUI², Said ZANTAR³, Abdeslam ENNABILI^{1*}

¹LAMEC, Sciences Faculty of Dhar El Mahraz, Sidi Mohamed Ben Abdellah University, Morocco.

²ERBGB, Science and Technology Faculty, Abdelmalek Essaâdi University, Tangier, Morocco.

³INRA, Regional Center of Agricultural Research, Tangier, Morocco.

Abstract

Tomato (*Lycopersicon esculentum* Mill.) is one of the most important vegetables, whose production and consumption increased quite rapidly. The impact of three xenobiotics such as alpha-cypermethrin, chlorpyrifos and pyrimicarb on reserve substances (proteins, starch and lipids) and degradation enzymes (protease and alpha-amylase) was investigated. The effect of the insecticides was observed by using four dilutions of the normal concentration used in agriculture (100%, 75%, 50% and 25%) for germinating seeds, and only the recommended concentration in agriculture for growing plants. The results suggest that the tested insecticides induced an accumulation of proteins in both treated seeds, and treated plants leaves and roots. Moreover, the protease activity was reduced in treated seeds and plants. Also a great accumulation of starch in presence of the insecticides was registered in treated seeds, and leaf and roots of treated plants, whereas this accumulation is accompanied with an inhibition of alpha-amylase activity. Concerning lipids, a significant increase was observed in treated samples compared to the control ones.

Keywords: insecticides, tomato, *Lycopersicon esculentum* Mill., reserve substances, degradation enzymes.

1. Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the most widely grown vegetables in the world. In recent years, competition has intensified increasingly as world exports of tomato products from main suppliers. Processing tomatoes are attacked by various arthropods, plant diseases and nematodes which significantly reduce yield and quality of fruit [21].

In the Northern Morocco, the most important way to protect cultures is the use of the chemical pesticides. Many pesticide types are used, especially

organochlorine pesticides, organophosphorus pesticides, carbamate pesticides and pyrethroids pesticides [8].

However, the use of these pesticides obtained by chemical synthesis represents the major cause of agricultural soil and groundwater contamination because of their persistence, bioavailability and mobility [1]. In this way, the study of pesticide occurrence in agricultural soil of the Tangier region shows the presence of many pesticide types such as endosulfan isomers (alpha and beta), endosulfan sulfate, some DDT metabolites and alpha HCH [8].

In plant, the proteins are highly concentrated in seeds, reaching 40% of dry weight. The proteins function as reserves of amino-acids ensures growth plant after seed germination [23]. Proteases catalyse peptides and proteins hydrolysis at both intra- and

* Corresponding author.
Tel./Fax: + 212 (0)35 689 500
e-mail: aennabili@gmail.com