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Residue changes and processing factors of thirteen pesticides during different tomato pickle processes

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Abstract

Tomatoes grown in an experimental greenhouse were sprayed with 13 selected pesticides at the recommended field doses, and used for pickle processing. Three different pickle processing techniques (natural fermentation, starter added fermentation and canning) were applied during the trials. Two strains of *Lactobacillus plantarum* were used as starter cultures in starter added fermentation trials. Changes in pesticide residues, pH levels and microbiological populations were periodically analysed and

In this article

moulds and enterobacteria were not detected in any of the trials. Mesophilic aerobic bacteria were detected during both fermentation treatments (natural and starter added), whereas lactic acid bacteria were only observed in starter added trials. The initial pH levels of brines in all treatments were measured as 2.7 at the beginning of the processes and changed depending on the type of treatment. Lower pH values were detected in starter added treatments. Following the harvest day, significant reductions were observed in pesticide concentrations during both types of fermentation (natural and starter added) trials ($p < .01$) with the exception of bifentazate and abamectin. But on the contrary, residue changes were not significant ($p > .05$) throughout the canning process. Since bifentazate and abamectin are more stable at lower pH, their residue levels were not affected by the methods applied during fermentation processes. Only PF of canning process for bifentazate was higher than 1 and calculated as 1.17. All other PF values were lower than 1, indicating that the treatments caused degradation of the active compounds. Processing methods affected the pesticide residue levels in different ways, as a result of various degradation mechanisms.

Q Keywords: LC-MS/MS GC-MS/MS MRL food safety

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Introduction

Pesticide use is inevitable during agricultural practices for the control of diseases and pests. These chemicals are strictly controlled and considered as safe for humans and the environment if they are applied at the recommended field doses and their pre-harvest interval (PHI) regulations are regarded. Nevertheless, excessive use and/or harvesting before any PHI is completed, may lead to residue problems in the agricultural products (Gonzalez-Rodríguez et al. [2011](#)). Tomato is an important agricultural crop and widely consumed fresh, in pickle form or as an ingredient in many processed foods in several forms. It is cultivated in large amounts worldwide and it has great economic importance (FAO [2023](#)). Many pesticides are licenced for tomato cultivation and may be used legally