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MONOGRAPH

Determination of Chlorpyriphos in Sicilian peaches by Gascromatography-MSMS method coupled with quechers sample preparation procedure preparation

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ABSTRACTS Chlorpyrifos is an organophosphate pesticide used to kill a number of pests including insects and worms. It is considered moderately hazardous to humans by the World Health Organization and is harmful for these classes of animals. Gas chromatography tandem mass mass spectrometry (GC-MS) was used for the quantification and confirmation of Chlorpyrifos pesticide residues in peaches. The analysis carried out on peach samples confirmed that chlorpyrifos are widely used in Sicilian territory so that 34 percent of the samples were contaminated by the pesticide.

KEY WORDS Chlorpyrifos; pesticides; GC-MS.

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INTRODUCTION

Chlorpyrifos, sold under many brandnames, is an organophosphate pesticide used to kill a number of pests including insects and worms. It is used on crops, animals. It acts on the nervous system of insects by inhibiting acetylcholinesterase. Chlorpyrifos is considered moderately hazardous to humans by the World Health Organization. Exposure surpassing recommended levels has been linked to neurological effects, persistent developmental disorders and autoimmune disorders. Exposure during pregnancy may harm the mental development of children. In agriculture, it is one of the most widely used organophosphate insecticides in Sicily (Lehotay, 2010; Wilkowska & Biziuk, 2011).

The aim of this work is analyzing sicilian peaches samples aiming to identify and quantify eventually residues of Chlorpyriphos. LMR for chlorpyriphos in peaches, do not exceed 0.01 mg/kg.

MATERIAL AND METHODS

Gas chromatography tandem mass mass spectrometry (GC-MS) was used for the quantification and confirmation of Chlorpyrifos pesticide residues in peaches. The QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) method was applied

for preparing samples. For the extraction procedure, 10.0 g of homogenized peach was weighed in a polypropylene tube. Afterwards, 10 mL acetonitrile was added and the sample vortexed for 1 min. After adding Supelco Citrate buffer mixture extraction, the sample was vortexed again for 1 min, and then it was centrifuged for 5 min at 3000 rpm. The extraction method was followed by a clean-up procedure by Supelco PSA dispersive solid-phase extraction (d-SPE).

The analyte was determined by ThermoFisher Trace 1310 gas chromatography- coupled with a triple quadrupole spectrometry TSQ-Quantum XLS by selected reaction monitoring (GC-MSMS-SRM)

Figure 1. Sicilian peaches.

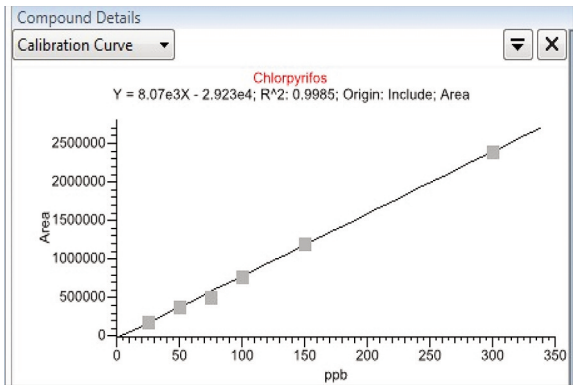

Figure 2. Calibration curve of the chlorpyrifos standard solutions expressed as ppb.

equipped with a TR-5MS 5% Phenyl Methyl Siloxan, 30 m x 250 µm x 0.25 µm column. The LoQ calculated is 0.005 mg/Kg.

RESULTS AND DISCUSSION

150 samples of Sicilian peaches were collected in 3 years and analyzed for clorpyriphos. Clorpyriphos was revealed in 48 samples but under LMR value.3 samples was find a concentration over LMR (0.04 mg/Kg; 0.05 mg/Kg; 0.03 mg/Kg). Samples above the LMR are used as raw materials, so they will be processed by a dilution process that will make the product not hazardous to human health.

CONCLUSIONS

This study has demonstrated that QuEChERS is a rapid and reliable method to determination of chlorpyriphos from peaches.

The analysis carried out on peach samples confirmed that chlorpyrifos are widely used in Sicilian territory so that 34 percent of the samples were contaminated by the pesticide.

More attention should be paid to the use of Chlorpyrifos in order to reduce their detection levels.

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