



Chlorpyrifos and Lambda-Cyhalothrin residue analysis of cultivated Cowpea using GC-ECD

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Introduction

Cowpea is an annual herbaceous legume and a major staple food crop in sub-Saharan Africa, especially in most savannah regions of West Africa

The grain contains 22-23 % protein (as opposed to 2 % in cassava and 10 % in maize)

Cowpea has a good quantity of thiamine (vitamin B₁), riboflavin (vitamin B₂) and niacin (vitamin B₃), and richer than cereals in iron and calcium content

Cowpea leaves are a good source of ascorbic acid (Vitamin C), Beta-carotene and high protein which can be beneficial to infants, lactating mothers and pregnantwomen

Objectives of the Study

The objectives of study is ;

determine the levels of Lambda-Cyhalothrin (Pyrethroids) and Chlorpyrifos (Organophosphates) in Twenty (20) new of cowpea genotypes.

To compare the residual levels of the pesticides to the Maximum Residual Levels (MRLs) by the European Union (EU) and the Food and Agriculture Organization (FAO) Standards.

Purpose of the Study

To maximise yield of cowpea research institutions have made relentless effort to produce cowpea varieties that are resistant to parasitic weeds like Striga (*S. gesnerioides*), insect pest attack,diseases (biotic), and drought (abiotic).

The use of pesticides to remedy this situation is very important since most popular and effective method of controlling pests especially when these pests have exceeded the economic injury level This study is aimed at checking the level of acquired pesticides in the cowpea were obtained from Microbiology and Biotechnology Department of The University of Cape Coast, through the gene bank of the International Institute of Tropical Agriculture under the auspices of FAO

Methods

Sorting, milling and sieving of Seeds suspected to contain Chlorpyrifos and Lambda-Cyhalothrin pesticides

Modified QuEChERS Sample Preparation

Extraction / Partitioning – Acetonitrile sorting out extraction from an aqueous environments

Cartridges Solid Phase Extraction (C-SPE)

Analysis – MS-ECD

AOAC was considered (AOAC 2007.01)

Extraction/ Partitioning

10g of the grounded sample is transferred in a 50ml centrifuge tube containing 5ml of water and shaken vigorously.

15ml of Acetonitrile is added and 4g of Anh. MgSO₄ is also added and vortex for a 1minute.

Centrifuge for 1 minute at > 1500 rpm

1 - 8ml of the supernatant is transferred into a 15ml centrifuge tube containing 0.6g of

Anh. MgSO₄ and 1.5g of Anh. Sodium Acetate.

Centrifuge for 5 minutes at > 4500 rpm.

GC Status (SPL)

Carrier gas : ON

Temperature : 270.0/270.0 C

Pressure : 84.2/84.4.2 kPa

Total flow 3.9/50.0 mL/min

Temperature 70.0/70.0C



Results

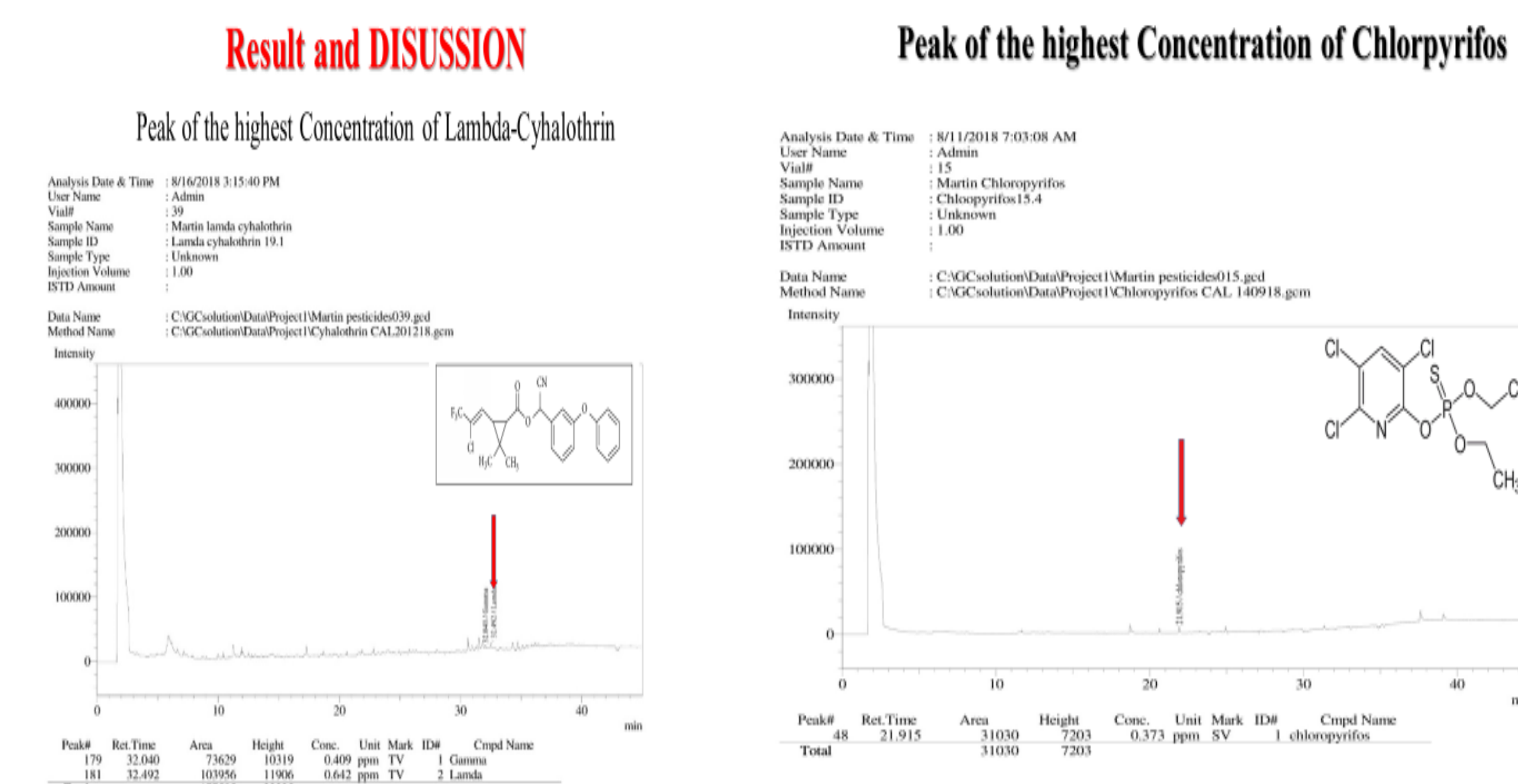
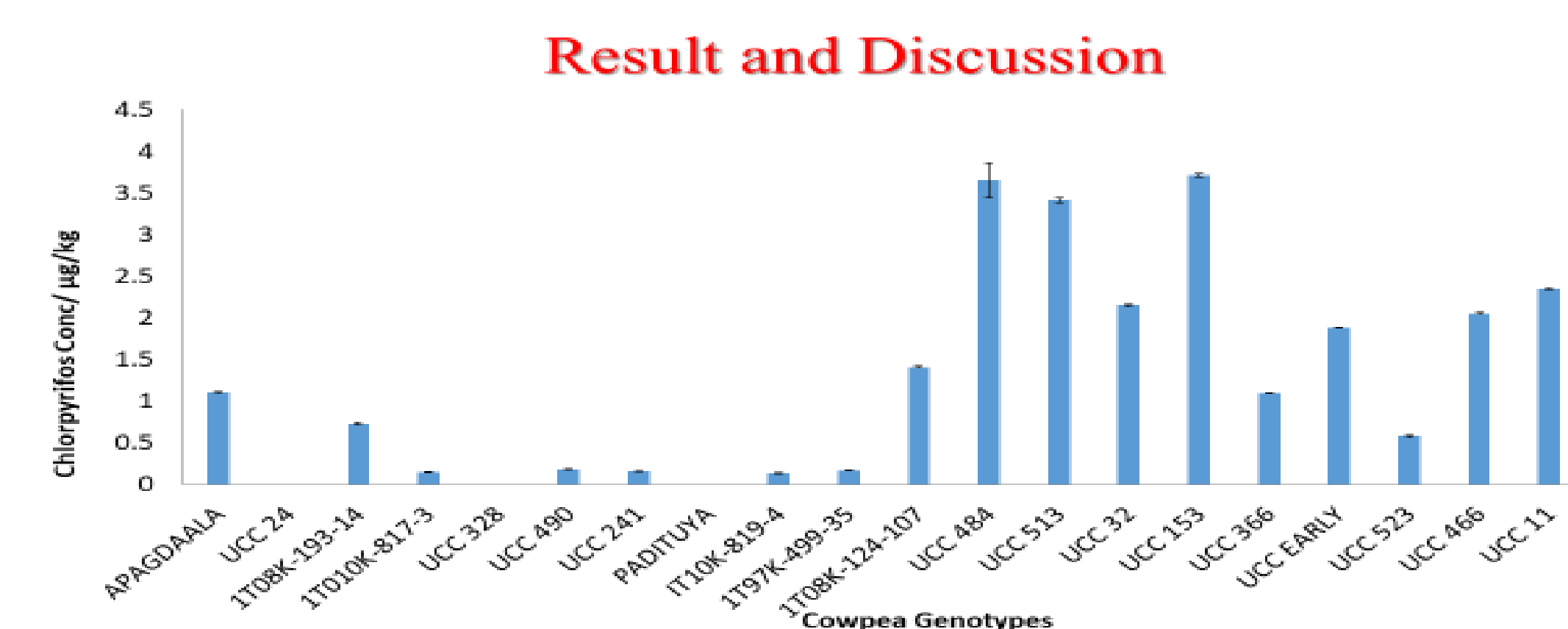


Figure 2: Concentration of Chlorpyrifos in Cowpea genotypes

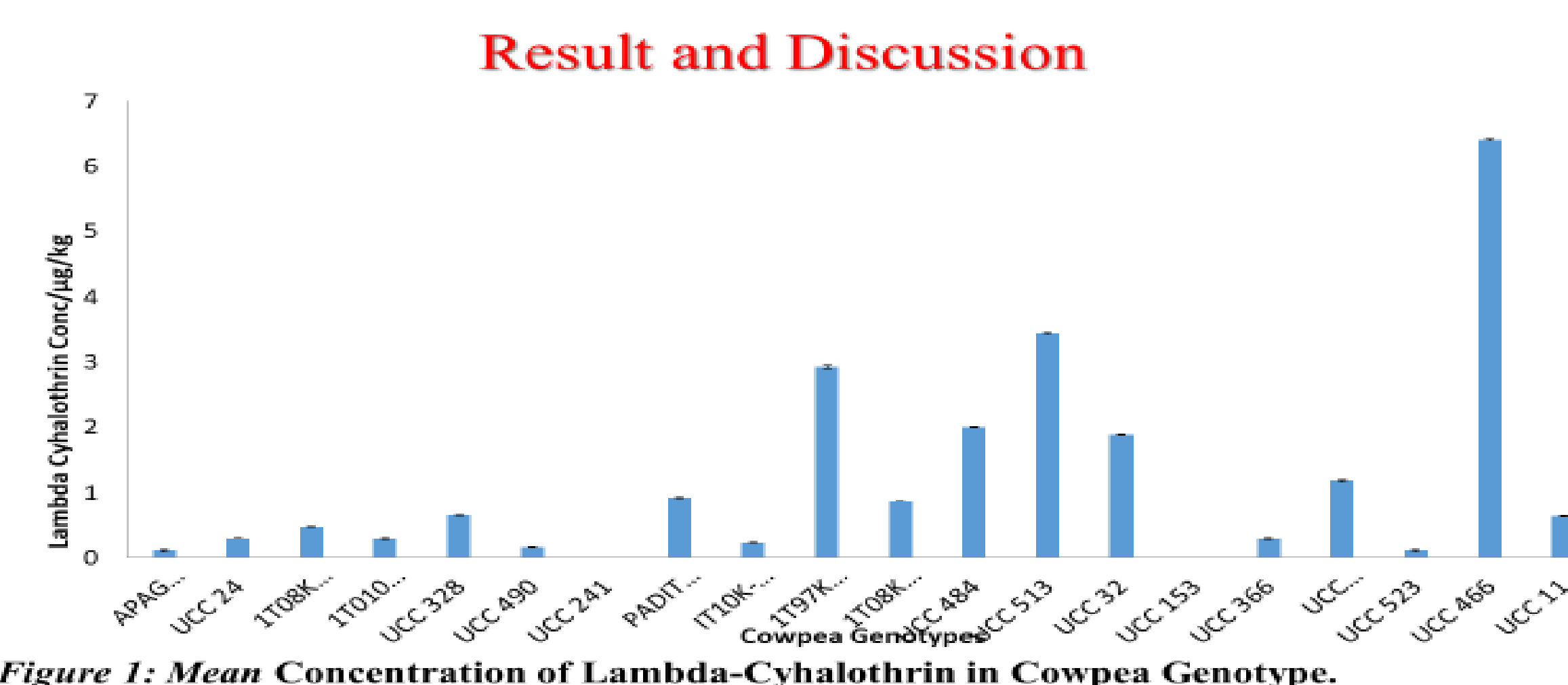


Figure 1: Mean Concentration of Lambda-Cyhalothrin in Cowpea Genotype.

Conclusions

The study revealed that the cowpea genotypes contains some levels of Lambda-Cyhalothrin and Chlorpyrifos pesticides.

The highest mean concentrations of Lambda Cyhalothrin and Chlorpyrifos were detected as $6.405 \pm 0.015 \mu\text{g/kg}$ and $3.650 \pm 0.01 \mu\text{g/kg}$ respectively.

The mean concentrations of Lambda Cyhalothrin and Chlorpyrifos in the cowpea were significantly lower than the permissible limit (PL) of 200 $\mu\text{g/kg}$ and 100 $\mu\text{g/kg}$ as specified by FAO/WHO.

Reference

Kaur, R., Mavi, G. K., Raghav, S., & Khan, I. (2019). Pesticides classification and its impact on environment. Int. J. Curr. Microbiol. Appl. Sci, 8(3), 1889-1897.

Dhananjayan, V., Jayakumar, S., & Ravichandran, B. (2020). Conventional methods of pesticide application in agricultural field and fate of the pesticides in the environment and human health. In Controlled release of pesticides for sustainable agriculture (pp. 1-39). Springer, Cham.

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