



# A study on pesticide residue levels in selected Sri Lankan vegetables

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## ABSTRACT

A pesticide is any substance or mixture of substances used for preventing, destroying, repelling, or mitigating any pest such as insects, mice and other animals, unwanted plants (weeds), or microorganisms such as bacteria, fungi and viruses. Although pesticides are applied for the control of target organisms, they can also have adverse effects on non-target organisms including humans. Thus, to control these undesirable side effects regulations have been established with regard to the proper use and the resulting residual pesticides. Effective analytical methods have been developed to analyze pesticide residue levels in vegetables.

In this study, residual pesticide levels of ten pesticides captan, carbofuran, chlorfluazuron, chlorothalonil, chlorpyrifos methyl, deltamethrin, fenthion, fenvalerate, profenofos and propiconazole were determined for upcountry vegetables, cabbage and leeks and two low country vegetables brinjal and snake gourd. Nuwara Eliya and Hambantota districts were selected for vegetable sampling as the respective districts produce higher yields of selected upcountry and low country vegetables. The pesticide residue analysis was carried out using the method specified in Association of Analytical Communities (AOAC official method 2007.01). The procedure involved dispersive solid phase extraction of samples. The vegetable samples were homogenized by grinding, extracted with acetonitrile and partitioned with magnesium sulfate. The quantitative determination of residual pesticides was carried out by GC/MS in SIS mode.

Recovery studies were carried out by spiking vegetable samples with the ten above mentioned pesticides at different concentration levels (0.5, 1.0 and 2.0 ppm) and carrying out the analysis vary the above method. Percentage recoveries obtained (six replicates) ranged from 86% to 97% and were in the acceptable range of 70% to 120%, the percentage relative standard deviation of average recoveries varies between 0.9% and 19% indicating satisfactory values of  $\leq 20$  at the 0.5 ppm spiked level. Percentage recoveries obtained (three replicates) at 1.0 ppm and 2.0 ppm spiked levels were recorded from 37% to 98% and 41% to 98% respectively. Further, the percentage relative standard deviation at these two levels ranged from 0.6% and 20.5% and from 0.8% to 14.5% respectively.

The Limit of Detection and Quantification were respectively 0.06 ppm and 0.19 ppm for captan, 0.05 ppm and 0.15 ppm for carbofuran, 0.08 ppm and 0.22 ppm for chlorfluazuron, 0.06 ppm and 0.17 ppm for chlorothalonil, 0.02 ppm and 0.07 ppm for

chlorpyrifos methyl, 0.05 ppm and 0.15 ppm for deltamethrin, 0.28 ppm and 0.82 ppm for fenthion, 0.04 ppm and 0.11 ppm for fenvalerate, 0.05 ppm and 0.14 ppm for profenofos and 0.05 ppm and 0.15 ppm for propiconazole in snake gourd.

The Limit of Detection and Quantification were 0.05 ppm and 0.15 ppm for captan, 0.04 ppm and 0.12 ppm for carbofuran, 0.09 ppm and 0.26 ppm for chlorfluazuron, 0.06 ppm and 0.17 ppm for chlorothalonil, 0.04 ppm and 0.12 ppm for chlorpyrifos methyl, 0.08 ppm and 0.25 ppm for deltamethrin, 0.05 ppm and 0.15 ppm for fenthion, 0.04 ppm and 0.12 ppm for fenvalerate, 0.03 ppm and 0.09 ppm for profenofos and 0.07 ppm and 0.20 ppm for propiconazole in leeks.

The Limit of Detection and Quantification were 0.05 ppm and 0.16 ppm for captan, 0.08 ppm and 0.23 ppm for carbofuran, 0.07 ppm and 0.22 ppm for chlorfluazuron, 0.02 ppm and 0.06 ppm for chlorothalonil, 0.03 ppm and 0.09 ppm for chlorpyrifos methyl, 0.07 ppm and 0.20 ppm for deltamethrin, 0.04 ppm and 0.10 ppm for fenthion, 0.06 ppm and 0.12 ppm for fenvalerate, 0.06 ppm and 0.17 ppm for profenofos and 0.06 ppm and 0.16 ppm for propiconazole in brinjal.

The Limit of Detection and Quantification were 0.04 ppm and 0.11 ppm for captan, 0.05 ppm and 0.16 ppm for carbofuran, 0.05 ppm and 0.16 ppm for chlorfluazuron, 0.04 ppm and 0.12 ppm for chlorothalonil, 0.07 ppm and 0.22 ppm for chlorpyrifos methyl, 0.06 ppm and 0.17 ppm for deltamethrin, 0.05 ppm and 0.15 ppm for fenthion, 0.05 ppm and 0.14 ppm for fenvalerate, 0.04 ppm and 0.13 ppm for profenofos and 0.02 ppm and 0.05 ppm for propiconazole in cabbage.

Thirty samples of each selected vegetable giving a total of 120 samples were analyzed in this study. The pesticide captan, carbofuran, chlorfluazuron, chlorothalonil, chlorpyrifos methyl, deltamethrin, fenthion, fenvalerate, profenofos and propiconazole were not detected within the limit of detection in the tested vegetable samples.