# Abstract

In this study, an analysis of pesticide residues was performed using a gas chromatography/ electron impact mass spectrometer (GC/EI-MS) to qualitatively assess and characterize pesticide residues in *khat* leaves sampled from selected agricultural farms in Meru County, Kenya. A solid-phase microextraction (SPME) procedure followed by GC/EI-MS analysis led to the detection and identification of six pesticide compounds from the sample-ion chromatograms. They include cypermethrin, acephate, cyhalothrin, cyfluthrin, chlorpyrifos, and chlorfenvinphos. The prevalence rate of pesticide contamination was determined to be 54.5% of the sample size. Of the identified pesticide residues, 50% were compounds based on pyrethroids and the other 50% were based on organophosphate. Four of the six identified pesticides were chlorinated compounds. A quick, easy, cheap, effective, rugged, and safe UV-vis double beam spectrophotometric technique based on copper (II) chelation reactions leading to colored copper pesticide complexes was developed, validated, and applied to quantify and compare the levels of selected pesticide compounds found in the *khat* samples. UV-vis wavelength-scan measurements performed on pesticide compounds chelated with copper (II) ions revealed maximum absorption of Cu-cypermethrin and Cu-acephate at 321 and 207 nm, respectively. The standards calibration curves developed from the UV-Vis quantitation technique showed excellent linearity in the concentration range of 0.5-10.0 µg/L ($R^2$ = 0.99) for both cypermethrin and acephate standards. The estimated limits of quantification (LOQ) were 0.25-0.26 µg/L, respectively. The UV-Vis quantitation results from the selected samples (in which residues were confirmed to be present) revealed that acephate (an organophosphate residue) occurred at higher concentration levels (range 2.897-7.978 µg/L) than cypermethrin (2.145 µg/L). For the pesticides quantitatively analysed in the selected samples, the levels were below the maximum residue limit (MRL). The hazard quotients (HQ) were in the range of between 0.247-0.797.