Developing a Method to Determine 2, 4-D and MCPA in Tea with Derivatization by Gas Chromatography — Electron Capture Detector (GC-ECD)

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A gas chromatographic method was developed for the determination of residues two phenoxy acid herbicides. The black tea samples were extracted in methanol: water (8:2) mixture, and then followed by liquid-liquid partition with dichloromethane and water (for 2, 4-dichlorophenoxy acetic acid or 4-Chloro-2-methylphenoxy acetic acid). Then the residues were derived with methanol: sulfuric acid (9:1) mixture and the resulting mixture was further cleaned up by hexane and washed with $NaHCO_3$. The esters were analyzed by a gas chromatography equipped with an electron capture detector (ECD) and they were quantified by the external standard method. The recovery percentages of the spiked samples at 0.05, 0.1 and 1.0ppm for 2,4-D were 0.09225, 0.05775 and 0.05325 respectively. Since the recoveries of the spiked samples at 3 spike levels were all below 70%, it was revealed that the method is not up to the acceptable levels for 2,4-D in according to the quality standards of European Union and Japanese. However, the proposed method can be improved with some modifications of methylating reagent, extraction method and clean-up method to determine pesticide residue in black tea.

Key words: 2,4-D, MCPA, Black tea, Electron capture detector