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## QuEChERS method to analyze pesticide residues in tea

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Tea is the most demanded and profit generating commodity among all export items of agriculture in Sri Lanka, due its higher quality. However, a problem associated with pesticide residues in Ceylon tea, which interferes with its quality, has been identified several years ago. Therefore, analysis of pesticide residues in tea has become critical in exporting to maintain its quality. The methods available for analyzing pesticide residues have some constraints, such as the longer time taken, higher solvent cost, use of chlorinated solvents, high wastage and the need for skilled manpower. Therefore, this study was conducted with the objective to validate the method, dubbed the quick, easy , cheap, effective, rugged and safe (QuEChERS) to analyze pesticide residues in tea.

Experiments were performed to validate the modified QuEChERS method to analyze pesticide residues [i.e. Organochlorine and Organophosphate] in tea. Tea samples were treated with three different levels of know concentrations (0.05, 0.25 and 0.50 mg/kg) of Organochlorine (Aldrin, HCH's, Endrin, Endosulphan, DDT, Heptachlor and PCNB was used as internal standard) and Organophosphate (Diazinon, Fenthion, Malathion, Parathion, Phenthoate,) pesticide standard solutions (spiking) and these samples were analyzed by the QuEChERS multiresidue method. Extraction of pesticide residues from the spiked tea samples was done using 50 mL of Ethyl acetate (ETOAc). Samples were dehydrated with 10 g of Anhydrous $Na_2SO_4$ and then neutralized using 1.6 g of $NaHCO_3$ and centrifuged. After centrifugation 10 mL of the ETOAc extract underwent a cleanup step (in a technique known as dispersive solid-phase extraction) in which the removal of impurities and trace amounts of water were performed using 0.25 g of Primary Secondary Amine (PSA) and 1.5 g of $MgSO_4$. Then the extract was concentrated and analyzed by to GC-ECD or NPD. The recovery of each spiked pesticide was calculated. The statistical analysis was done using "Two Factor-Factorial CRD"

Recoveries of each pesticide obtained using the modified QuEChERS method is high and was greater than 85% for Organochlorine pesticides for all three spiking levels. However, less than 30% recovery was shown for Organophosphate pesticides because of the problem associated with Caffeine. The modified QuEChERS method is recommended for analysis of Organochlorine pesticide residues in tea whereas in the analysis of Organophosphate pesticides the Caffeine interferes with the recoveries. As further studies, removal of Caffeine by available removal methods and then validating the method for analysis of Organophosphate residues of tea could be suggested.

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