

Development and Validation of a Method for Analysis of Carbosulfan Residues in Tea (*Camellia sinensis*) Using LC-MS/MS Technique

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The presence of pesticide residues above the maximum residue levels in tea, which results from field application of pesticides without following precautionary measures, is one of the major issues faced in the tea sector. However, with increased health *consciousness*, it has become a need of the day to assure that tea is free of pesticide residues. Therefore, introducing appropriate methods to determine pesticide residues in tea is of timely importance. This study highlights a method developed and validated for the determination of Carbosulfan in tea. Carbosulfan is a systemic pesticide that belongs to the carbamate group, which affects the nervous system of the pest. The carbosulfan residues in tea were extracted following the QuEChERS approach using acidified acetonitrile, which was buffered using sodium acetate. The clean-up of the extract was carried out using a combination of primary secondary amine, graphitized carbon black and C18 dispersive clean-up materials. The detection of carbosulfan was carried out using liquid chromatography-tandem mass spectrometry with electron spray ionization and multiple reaction monitoring. The chromatographic separation was achieved using a C 18, Synergy 4u fusion column. Methanol and water acidified with formic acid (0.1%) were used as mobile phases. The method was validated considering accuracy, precision and recovery at three different concentration levels: low, mid and high. The linear working range of the method was 0.005–0.250 mg/kg with a correlation coefficient of 0.999 over six calibration levels. Recoveries were in range of 70-120% and percentage relative standard deviation was below 6% over the three concentration levels (0.040, 0.100 and 0.200 mg/kg). The limit of detection and limit of quantification were 0.004 mg/kg and 0.005 mg/kg respectively. The method developed in the present study is accurate and reproducible and, it complies with the international validation guideline requirements allowing determination of carbosulfan residues in tea.

Keywords: Carbosulfan, Tea, QuEChERS, Method validation, LC-MS/MS

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