

Degradation Kinetic of Dinotefuran in Tea Using Liquid Chromatography Tandem-Mass Spectrometry

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Abstract Dinotefuran [(*RS*)-1-methyl-2-nitro-3-(tetrahydro-3-furylmethyl)guanidine] is a novel neonicotinoid (New generation) insecticide. It is particularly effective against sucking insects such as *Helopeltis theivora*, Bugs, Aphids Thrips etc. in tea. The residue analysis in tea is usually difficult owing to matrix interference and complicated extraction procedures. The routine residue analysis of Dinotefuran in regular consumed matrices like tea is important for living system through a simple, low cost method.

An analytical method for the quantification of Dinotefuran (TOKEN 20% SG) in tea [*Camellia sinensis*, Variety: Betjan (Kamalpur Tea Estate, Darjeeling), C194 (UPASI Experimental Farm, Valparai)] green leaves, Made tea, tea infusion and respective field soil has been developed using LC-MS/MS in MRM (ES+) mode. Dinotefuran was applied (350 g a.i. ha⁻¹, 700 g a.i. ha⁻¹), collected in a definite days interval and was extracted into Dichloromethane (DCM) with conventional partition method and cleaned-up through florisil, Accu BOND C₁₈ Cartridge with elution with n-hexane and DCM and dispersive Solid Phase Extraction (d-SPE) with PSA, GCB and Na₂SO₄.

The method was established in concentration ranging from 0.01-0.1 µg g⁻¹ and recovery percentage of Dinotefuran was ranged between 87-95% for all matrices having RSDa ≤ 15% and HorRat ≤ 0.4 (n=5). The correlation coefficient (r²) of the standard calibration curve was ≥ 0.993 using eight concentration levels in the range of 0.002-0.500 µg g⁻¹ and matrix interferences also considered. The degradation follows 1st order kinetics and the half-life was 3.20-3.58 days in green tea samples. No residue was detected at any days and after 3 days for Tea liquor and made tea respectively.

The new and unique quantitative method developed in the present study using conventional extraction as well as QuEChERS approach is very sensitive and it consumes low cost, time of analysis than other conventional method of extraction.

Keywords: Dinotefuran, Tea, LC-MS/MS, d-SPE, Matrix match calibration, 1st order kinetics, half-life.
