



Development and Validation of HPLC Method for the Simultaneous Determination of Insecticides (Carbofuran and Fipronil) in Its Technical and Granular Formulation

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Abstract

A precise, accurate, simple and low cost reverse phase high performance liquid chromatographic (RP-HPLC) method was developed and validated for the simultaneous quality assessment of commonly used insecticide carbofuran and fipronil in its technical and formulated products. The chromatographic parameters, i.e. mobile phase composition, wavelength and flow rate of developed method was optimized in such a way that the HPLC was carried out at 280 nm by using a mobile phase, which contains 80 parts acetonitrile and 20 parts water by volume (ACN:H₂O, 80:20) flowing at a rate of 1.0 mL/min. A linear relationship ($R^2 > 0.999$) was shown by calibration curve plotted in the concentration ranged from 30-800 mg/L. The limit of detection (LODs) were found to be 14.5 mg/L and 20.9 mg/L and limit of quantification (LOQs) were recorded to be 43.9 mg/L and 63.2 mg/L for both carbofuran and fipronil respectively. The developed method's accuracy was exhibited by recovery percentage (96.0-100.8) % of water samples spiked with 100, 300 and 600 mg/L of carbofuran and fipronil, respectively. The developed RP-HPLC method is therefore simple, cheap, rapid and can be proficiently used for the simultaneous identification and quantification of carbofuran and fipronil in its technical and formulated products.

Keywords: Carbofuran, Fipronil, Quantification, HPLC, Validation

Introduction

A noticeable increase in the usage of pesticide has been observed during the last few decades in advancing agricultural development to meet the consumption rate per capita [1]. Currently available formulations are composed of approximately eight hundred and sixty (860) active ingredients sold commercially [2]. These plant protection products (pesticides) play a significant role in the field of agriculture to meet international requirements for food security and quality [3]. Irrespective

of the economy, the excessive use of pesticide causes severe damages to the environment as well as crops. The aim of the protection policy at European and National level is to lessen risks associated with the use of pesticides [4]. Quality control and assessment of these chemical substances is the foremost step in this esteem. Pesticide products are sold in various formulations i.e. granular, solutions, emulsions, aerosols and dry solids due the differences in physical, chemical, handling,